The Wireless World

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THE PRACTICAL RADIO JOURNAL

with

Complete Foreign Programmes

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Is It Wanted?

IN a recent issue we drew attention to a situation which is developing in America where the majority of the receivers are now virtually designed by the valve manufacturers, who supply complete designs in return for orders for the valves to be used with them. We rather deplored this tendency, because we felt that it would lead to giving one or two valve manufacturers the monopoly in set design, for it would discourage set manufacturers from maintaining a technical development department of their own and showing any originality of their own in their products.

There may, however, be occasions when a high degree of standardisation with some particular object in view may be an advantage to the public. We have, for example, the case in Germany of a national receiver manufactured jointly by all the German wireless firms, so that it has been possible to reduce the price to a very low figure and thus bring wireless sets within the reach of very many who hitherto have either been without wireless or have had to put up with old sets of very poor performance.

Co-operation, Not Design, the Problem

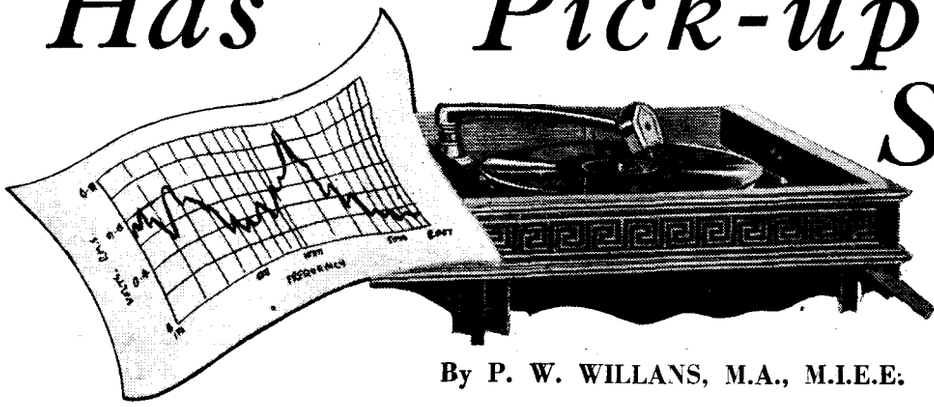
There should be little difficulty in the way of producing a design for this country on the same lines as the German set, but the price at which it could be sold would depend upon how extensive production could be and how far all firms in the wireless industry would co-operate to support it. It can be argued that the production of such a set would not affect to any serious extent sales on the higher priced instruments, that it would replace a vast quantity of obsolete junk and would bring wireless into many homes where cost has so far precluded its use. If it led to the production of shoddy and inefficient sets there would certainly be no gain to the public; there would have to be some standard set up and maintained. In Germany it required a dictator to introduce such a set, which suggests that the idea provides a subject of controversy. Nevertheless, it would be interesting to know what our readers' views may be on the question of how far such a policy would be acceptable in this country, and whether in their opinion there would be too great a risk of lowering the standard of reproduction quality.

The Passing of Poldhu

A Pioneer Station

"FIFTY acres of Cornish coastal land for sale by order of Marconi's Wireless Telegraph Co., Ltd." There is romance in this announcement, for the site of Poldhu Wireless Station is included in this area. One might almost have hoped that such a spot could have been scheduled as an historical monument and preserved for the nation, for it was from this station that the first wireless signal was transmitted across the Atlantic Ocean in December 1901, so opening up the possibilities of long-range communication. But since that date Poldhu has also served as an experimental station for the development of so many important stages in the progress of wireless, culminating with research work on beam wireless under the direction of the British beam pioneer, C. S. Franklin, that there is little remaining at the site except the name to associate it with the pioneer transatlantic feat.

Has Pick-up Design Stagnated?



Some Aspects Which Invite Consideration

By P. W. WILLANS, M.A., M.I.E.E.

WHILST many components of wireless receivers and low-frequency sound-reproducing instruments have undergone radical changes in design in the course of years, it is a curious fact that the gramophone pick-up has departed comparatively little from the general plan of the original specimens. In this article the author suggests directions in which improvements in performance might be expected if changes were introduced. His views suggest that the pick-up has rather been neglected by modern designers.

IN these days, when the quality of musical reproduction is receiving so much attention, it is a curious thing how little interest is being taken in the question of pick-ups.

An article dealing with these matters appeared in *The Wireless World* of February 3rd, 1933, in which a large number of pick-ups were illustrated, and a summary was given of the features which were considered desirable. It was noted in the article, and it was also fairly evident from the illustrations, that not very much change had been made of a fundamental character since the original paper of Kellogg was published, but that the attention of designers had mainly been concentrated on improvements to the details of design and the provision of convenient arrangements for the user.

The writer, while admitting, with all due shame, that he has little to show in the way of positive achievement in pick-up designs, has for some time been of the opinion that pick-ups have not received the attention they deserve, and that in one main direction, namely, the control of low-frequency response, the efforts of designers have been largely misdirected. Actually, some work on pick-ups was carried out in the Columbia Co.'s laboratories in 1930, but it is not known whether any use has been, or will be, made of the results. Certain features of the design were, however, patented[1] in conjunction with Messrs. A. D. Blumlein and H. E. Holman, and reference will be made later in this article to the underlying principles.

The theory of pick-up operation is fairly well understood nowadays, but it will be as well, in order to appreciate the points at issue, to give a simple résumé.

The operation of an ideal pick-up is simplicity itself. Such a pick-up will have the following characteristics:—

(*a*) Its body will not vibrate at any frequency but will merely move sideways to track the record.

(*b*) Its needle and armature will behave as a single rigid body pivoted about an axis.

(*c*) The point of the needle will faithfully follow the undulations of the record groove.

(*d*) The velocity of vibration of the armature will be faithfully translated into an electrical effect.

We must also assume that the gramophone record possesses ideal properties, i.e., that the material of the record track is perfectly rigid and does not deform as a result of the pressure of the needle point. Any flexibility of the record will have the same effect as flexibility of the needle point, which is considered below.

Under these conditions, the needle point is compelled by the pressure of the walls of the record groove to follow its undulations, and thus to repeat the movements of the recording stylus when the record was made. This point deserves some consideration, because it explains one feature of pick-ups which is not quite obvious, namely, that the main resonant frequency of the needle and armature in their supports does not enter into the problem. The existence of this resonant frequency can be demonstrated, in practically any pick-up, by passing alternating currents of varying frequency through its windings and driving it backwards. The circumstances in this latter case are different, because we provide a substantially constant force at different frequencies and obtain a varying velocity. When the pick-up is used in the normal manner, however, we prescribe a constant velocity, and the record provides just as much or as little force as is necessary to produce it. This reaction of the needle tip on the walls of the record groove, under practical conditions, is the determining factor in relation to the problem of record "wear."

Practical pick-ups behave in a manner not too far removed from the ideal over a fairly large band of frequencies in the middle register. At low frequencies their bodies vibrate, and give that accentuation of bass frequencies which appears to cause satisfaction to so many vendors of pick-ups. At high frequencies their needles bend and give rise, with their armatures, to a resonance effect which sets a limit to the upper frequency response, and, if uncontrolled, gives rise to chatterings on certain frequencies and "musical" surface noise.

Middle Register Efficiency

Both of these resonance effects are of the kind which produces very severe mechanical reaction on the record. That in the bass breaks down the track walls in difficult passages, and that in the treble produces blurred results in the upper register and contributes to the increase of surface noise. The reason for this heavy loading of the record is not easy to illustrate by a mechanical example, but readers of *The Wireless World* will have no difficulty in appreciating an electrical analogy.

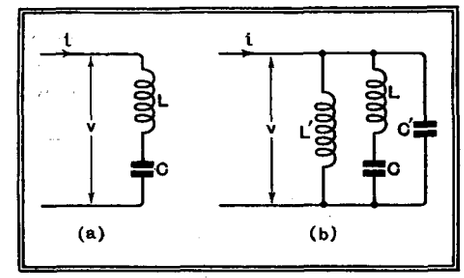


Fig. 1.—Equivalent electrical circuits (a) of the ideal pick-up and (b) a practical pick-up which takes into account the mass of the pick-up and tone arm and the flexibility of the needle.

In Fig. 1 (*a*) is shown a circuit which corresponds in its operation to the functioning of an ideal pick-up. Here an alternating current *i* is caused to flow through an inductance L and a capacity C in series. In so doing it will give rise to a potential difference *v* across the terminals of the combination, which will be zero for the resonant frequency of L and C, and will rise for frequencies higher and lower than this frequency. The current which is forced through the circuit corresponds

[1] British Patents Nos. 357,248, 361,468, 362,494.

Has Pick-up Design Stagnated?

to the velocity imposed upon the needle tip by the record, and the potential difference to the force exerted by the needle tip on the groove walls. The two parts of this potential difference, across L and C, respectively, correspond to the mechanical reactions of inertia and stiffness in the pick-up.

At low frequencies, practically all the volts are dropped across C, and, correspondingly, practically all the force exerted by the record on the needle is spent in overcoming the stiffness of the support. At high frequencies, L is the principal electrical impedance, and, in the mechanical case, the inertia of the armature and needle, the principal mechanical impedance.

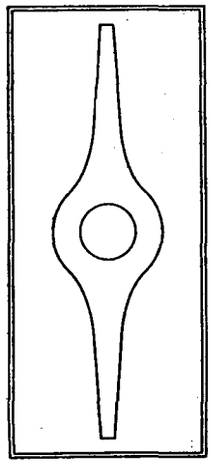


Fig. 2.—Scale drawing of a pick-up armature tapering away from a central hub in order to reduce the mass at a distance from the axis.

It should be noted that this electrical illustration gives precisely, in terms of current and potential difference, what we obtain in practice from the corresponding mechanical system in the way of velocity and mechanical reactive force. If, therefore, the operation of the circuit diagram is fully understood, it is possible to appreciate not only the qualitative, but the quantitative, manner in which the pick-up behaves.

Electrical Equivalent

The case of a practical pick-up as opposed to an ideal one is illustrated in Fig. 1 (b). Here it will be noted that the circuit diagram shows, in addition, an inductance L′ and a capacity C′, both connected in parallel with the original branch LC. These correspond respectively to the mass of the pick-up body and tone arm and the flexibility of the needle tip.

Now, considering first of all what parallel branches in general mean, it is obvious from the electrical diagram that the current flowing into the system from outside does not all flow through L and C, as heretofore, but a part will go down branch L′ and a part down branch C′, and the current will clearly distribute itself between the three branches in different ways at different frequencies. Considering the corresponding behaviour of the pick-up, it is clear, by analogy, that if the needle tip is moved, not all the movement is imparted to the armature (in the sense, that is to say, of rotating it), but a part will go towards moving the body of the pick-up and a part will result in a bending of the needle tip.

Now the electrical analogy will indicate that, if L′ is very much greater than L, and C′ is very much less than C, L′ will come into resonance with C at a low frequency, where the C′ path is virtually an open circuit, and L will come into resonance with C′ at a high frequency, where the L′ path is virtually an open circuit. At frequencies in the middle of the operating range of the pick-up the path LC becomes of such low impedance value that neither of the other two paths are of any consequence.

This state of affairs corresponds broadly to the behaviour of an average pick-up, where the mass of the pick-up body is much greater than that of the armature and the flexibility of the needle point much less than that of the elastic supports of the moving parts.

Two Resonant Frequencies

At the two resonant frequencies, the movement of the armature will be greatly in excess of that of the stylus, and, in fact, by analogy with the circuit as shown where there is no resistance, the pick-up would be infinitely rigid and the amplification infinite at these two frequencies. In practice, attempts are made to introduce damping into the system by making the elastic supports of the moving parts out of energy-dissipating material, with the result that tracking of the record is possible and the accentuation of the resonant frequencies more or less controlled.

In considering the question of pick-up design in the light of the above phenomena, the situation in one resepct is clear, namely, that nobody wants the high-frequency resonance. As regards the low-frequency effect, the tendency has been for designers to avail themselves of this resonance to give bass accentuation and thus to compensate for the bass depreciation taking place on the record. The situation which has given rise to this trend of development semes to be a morbid desire on the part of the public for "bass at any price" coupled with a pseudo-theoretical justification for this desire, namely, the known deficiency in response of the recording apparatus.

It is difficult to upset a tendency of this kind, and the writer can only place on record his firm conviction that the bass accentuation obtained in this manner is marred by uncertainty in amount, by non-linear distortion and by excessive wear on the record.

Taking these points in order, the control of the bass resonance, being essentially dependent upon the elastic and energy-dissipating qualities of the rubber supports for the vibrating element, will vary as these vary; moreover, since the movement of the armature in the pole-pieces no longer follows the movements of the stylus, any non-linear properties of the rubber will influence the movement of the armature and will give rise to non-linear distortion. This is the second of the three disadvantages above mentioned, and it is exaggerated by virtue of the fact that the armature will almost certainly vibrate in the magnetic gap so as to exceed the permissible limits within which non-linear distortion of the magnetic kind is avoided. Lastly, the amount by which the rubber damping reduces the stiffness of the needle point at resonance is, again, essentially dependent upon the condition of the rubber, and even if, in the first instance, the state of affairs is tolerable, any reduction of damping due to ageing of the rubber will put the pick-up out of adjustment and may result in serious defects as regards tracking and record wear.

It is worth while considering this question of record wear very carefully. One of the most important things we can ask of a pick-up is that it should enable the utmost possible life to be obtained from the records which it plays, and if there is any obvious way of furthering this demand, it should be followed to the utmost extent. It seems a pity, therefore, that, in the endeavour to obtain an improvement in bass response, considerations of record wear should be disregarded, as inevitably they must, particularly when, in return, nothing more is generally obtained than a kind of dubious loudness in the bass register. If increased bass response is desired, surely some endeavour could be made to standardise on electrical means for bringing this about.

H.F. Resonance

Returning to the consideration of the high-frequency resonance effect, it is perhaps fair to say that this phenomenon is at the back of all our pick-up troubles, since endeavours to damp this out have almost invariably been attended by an increased stiffness in the armature which has resulted in increased low-frequency response and thus an apparent improvement. If we take the obvious course of relieving the low-frequency effect by slackening the control of the armature, it is more than probable that an objectionable high-frequency effect will make its appearance, and we are not therefore in a position to deal with the former until we have disposed of the latter.

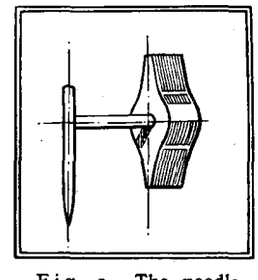


Fig. 3.—The needle shown coupled to the armature.

The obvious method of eliminating the high-frequency resonance effect is by pushing it up into a region of frequency where it does no harm. The difference to the performance of a pick-up, as the upper frequency resonance is pushed upwards from 4,000 c.p.s., is most marked, and a frequency value for this resonance of between 5,000 and 6,000 c.p.s. seems to be much more satisfactory than the various values, round about 4,000 c.p.s. or below, which seem to be characteristic of most present-day pick-ups.

The writer's attempts at pick-up design were directed towards an endeavour to reduce the inertia effect of the needle and armature of a pick-up while retaining adequate sensitivity. Only a brief summary can be given in these columns, but

Has Pick-up Design Stagnated?

a fairly complete account of the theory is given in the patent specifications quoted in the footnote. Briefly, the questions which appear to require answering when tackling this part of the problem are as follows:—

(a) What is the best shape of armature to give a maximum of electrical effect with the minimum of inertia.

(b) Given existing types of needle, what is the best way of coupling the needle to the armature to give the minimum inertia effect.

(c) How can desiderata arising from the above questions be satisfied in a practical manner.

Considering these points in order, we have first to bear in mind that the inertia effect of any rigid body about an axis is vastly increased if it has massive portions located at a distance remote from the axis. The magnetic properties of an armature, on the other hand, demand, at any rate, that its overall length shall not be too small.

Supposing, then, that for a first attempt we make our armature in the form of a rod, it is well known that its inertia effect will be divided by four if we pivot it about the centre instead of about one end; the magnetic effect, on the other hand, will be the same in the two cases. The first desideratum, therefore, is that a double-ended armature be employed.

The shape of this armature is governed by the necessity of a compromise between the least inertia effect, implying a small mass, and the greatest magnetic effect, implying the reverse. In view of the desirability of keeping down mass at a distance from the axis of rotation, there is a general indication that the armature should taper away from a central hub to its two extremities. The best law of taper has been calculated from theoretical considerations, and is that the thickness of the armature should decrease in inverse ratio to its distance from the axis. Such an armature is illustrated in Fig. 2.

Armature Effects

Leaving the exact mechanical details of the assembly out of the question for the moment, we may consider the needle as coupled to the armature so as to be pivoted about the same axis and perpendicular to it as in Fig. 3.

If the needle were very long, the inertia of the armature would be reduced by leverage to a negligible value, but its place would be taken by that of the needle, which would become considerable. If we postulate a needle constructed of given material, we find that there is a needle length, measured from the axis, giving minimum inertia effect for the needle and armature in combination. With existing armatures, it would appear that an increase in the needle length above the general standard would be desirable, and that the existence of the long, so-called "talkie" needle is due to this cause.

Using a double ended armature of about $\frac{3}{8}$in. in length, the writer found that an ordinary gramophone needle had to be pivoted about 0.15in. from the blunt end and that the gain, as regards inertia, of cutting the excess length off was not worth a departure from standard. The needle-holder was made, therefore, to accommodate a whole standard needle.

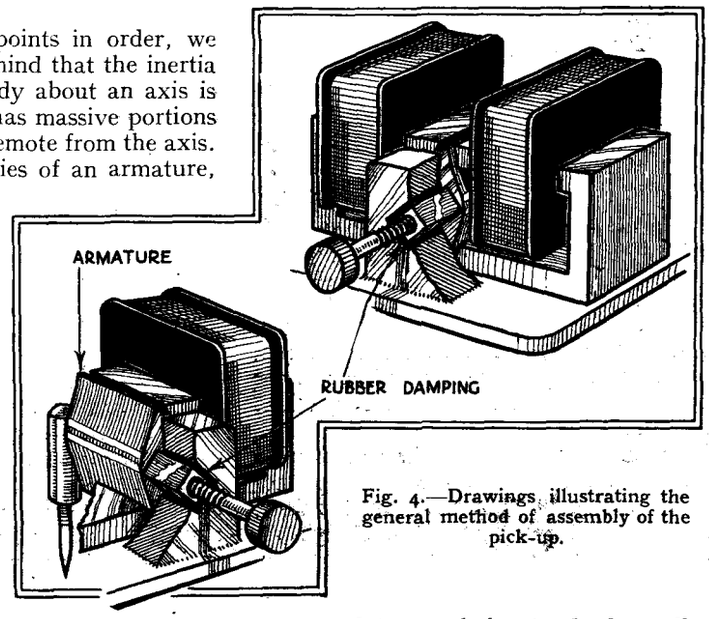


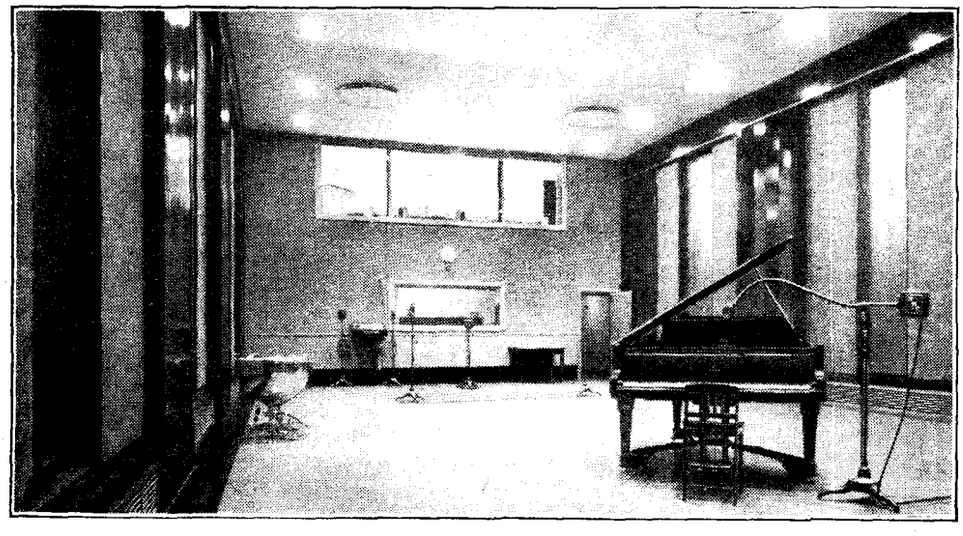
Fig. 4.—Drawings illustrating the general method of assembly of the pick-up.

The manner of assembling needle and armature is to be considered in the light of the difficulties introduced by adopting a double-ended construction for the latter. This implies some kind of connecting spindle, but the fact that such a spindle can be made of very light metal, and has no parts at a great distance from the axis of rotation, makes it quite a simple matter to keep its moment of inertia so low as to be insignificant. The whole assembly is illustrated in Fig. 4, which is largely self-explanatory.

At the time when the work on this matter was discontinued there seemed every reason to suppose that the output could be made not less than that of good standard pick-ups, but this aspect of the problem was not thoroughly investigated. The upper resonant frequency was located well above 5,000 c.p.s., and, while it was not found possible entirely to eliminate its effects mechanically, the use of a resonant scratch-filter did so as far as performance was concerned, and the improvement of quality, due to the additional range obtained, was very noticeable.

The pick-up was made with generous air gaps and the armature support was kept as flexible as possible. The result was that the pick-up gave less bass than most commercial models and was not considered suitable for immediate use in replacement of other types. An equalising circuit of very simple kind was got out for the purpose of increasing the low-frequency response, and the general improvement of quality, as compared with that of normal pick-ups, was then most marked.

In the light of experience obtained with a pick-up of the kind here described, it seems that there are real advantages to be obtained by the improvement of the upper resonance and the substitution of electrical for mechanical bass ("boost"); nor do there seem to be any fundamental reasons why progress should not be made on these lines. One main circumstance which favour electrical equalising is the great simplicity with which large values of low-frequency amplification can be obtained with modern valves, though it may be noted that such values are not so readily available when the low-frequency amplifier to be used is a part of a radio receiver. Still, it is perhaps not too much to hope that in future radio-gramophone developments we are not irrevocably tied to past practice in pick-up design, and that there need be no question, to put it colloquially, of "spoiling the ship for a ha'p'orth of tar."



VARIABLE ACOUSTICS IN BROADCAST STUDIOS. Sliding wall panels, seen on the left and right, operated electrically from the control room, are a new feature recently introduced in the studios of the N.B.C. headquarters in New York, for producing varying acoustic effects.

"Radio-Nations"

By C. DREXEL

Work of the League of Nations Station at Geneva

THE unceasing activities of the European broadcasting stations are apt to overshadow the important work which is carried out from day to day by the League of Nations transmitters at Prangins, Geneva. This article, by a League correspondent resident in Switzerland, describes how "Radio-Nations" carries on its responsible task of maintaining touch with all parts of the world.

ALTHOUGH the subject was under discussion for many years, it was only in September, 1929, that the Assembly of the League of Nations resolved to erect a wireless station which would ensure independent and direct communication between the League and the greatest possible number of its Member-States.

And now, five years later, Radio-Nations occupies an honoured position among those stations which link the world closer together and make isolation a nightmare of the past.

Upon decision of the League Assembly it was decided to execute the project submitted by the Swiss Government, according to which the League of Nations should bear the cost of two short-wave transmitters, whilst Radio-Suisse would be called upon to provide a medium-wave transmitter of 50 kW. aerial power for traffic with European countries, a certain number of receivers, the technical equipment of a central telegraph office at Geneva, as well as the land and buildings necessary for the transmitting and receiving stations.

The former is at Prangins, a charming spot on the lake close to Nyon, and therefore about eight miles from Geneva. The latter is at Colovrex, on a plateau in the lower hills of the Juna, behind Geneva. They are connected by underground cables with the operating office in the League Secretariat, and with two auxiliary offices—one in the palatial hall across the city where the assembly meets and another in the Disarmament Conference building next to the League Secretariat on the Quai Wilson. They are also connected with the main Telegraph Office in Geneva. For the purpose of the League's new broadcasting programme which goes out on Saturday evenings, in English, French and Spanish, a quarter of an hour of each, starting at 22.30 (G.M.T.) on two short-wave lengths around 38 metres, a microphone has been installed in an office in the League Secretariat.

Each talk is given by a different speaker on a topic bearing on the most recent activities of the League. The speakers are chosen from among League officials specially concerned with the subject under review or from members of the League Committees, the Council or the Assembly, as they meet at Geneva.

When the Council meets the President-in-Office is usually asked to broadcast.

Radio-Nations was erected at a cost of nearly four million gold francs, of which about 2,500,000 was borne by the League and about 1,500,000 by Radio-Suisse. In normal times it is Radio-Suisse, in collaboration with the League's Transit and Communication Section, which operates the station, while in times of emergency the League has complete control. Orders to stop hostilities and other urgent negotiations can thus have priority, keeping the League Council in direct communication with the danger spot.

In normal times the station is in constant use for the exchange of telegraphic messages between the League Secretariat and delegations at various conferences at Geneva, and the greatest possible number

"Radio-Nations"—
of European and Extra-European Governments, either direct or by means of retransmission. Apart from this, the plant can be employed for transmitting circular messages from the League Secretariat to Member-States, and for rapid conveyance of important documents to distant points, thereby ensuring a nearer connection between the League Secretariat and Extra-European countries.

Short-Wave Transmitters

The transmitting station comprises two short-wave transmitters belonging to the League of Nations, and a medium-wave transmitter provided by Radio-Suisse. Of the two short-wave transmitters one was supplied by the Société Française Radio-Electrique, Paris, and the other by Marconi's Wireless Telegraph Co., Ltd., London, who also erected the medium-wave transmitter.

The French short-wave transmitter has a wave-range from 14 to 40 metres and is quartz driven. This transmitter is at present working on three waves, the change from one wavelength to the other being effected in a couple of minutes. The Marconi transmitter has a wave-range of 14 to 100 metres, and is driven by a master oscillator. This transmitter is at present working on four wavelengths, and the change from one to the other can be made in a very short space of time. Both transmitters can be used for telegraphy as well as for telephony.

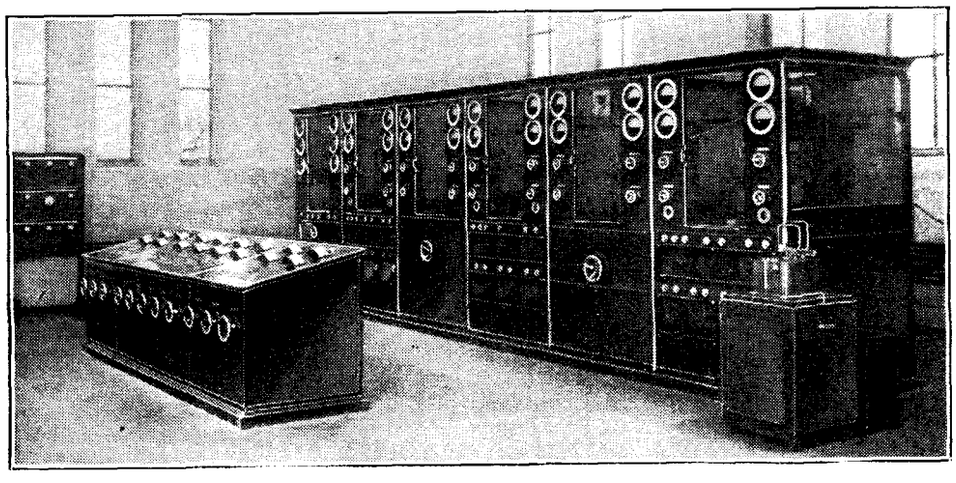
The aerial system consists of three groups of beam aerials. The first group (Marconi system) comprises two parts, one of which is directed towards South America, the other towards the Far East, each side being composed of two complete sets of aerials, one for day and one for night working. The second aerial group (Telefunken system) is directed towards Central America and can be oriented in the direction of Australia and the West Indies. This group is also divided into a night and day array. The third aerial group (Telefunken system) is directed towards South America, and can be oriented towards British India. This aerial has been designed for one wavelength only. Apart from these three groups of beam aerials the station possesses three omni-directional aerials. The two short-wave transmitters have an aerial power of 20 kW.—sufficient for reaching the most distant parts of the globe. The aerials are supported by six masts about 150 feet in height.

The medium-wave transmitter of 50 kW. aerial power supplied by the Marconi Company, and belonging to the Radio-Suisse S.A., is installed in a special room. This transmitter can work on waves between 3,000 and 5,000 metres, and it is possible to establish by means of it communications with any point in Europe.

The receiving station at Colovrex is equipped with three short-wave high-speed receivers of which two are Telefunken and one a product of the Bell Telephone Co.

On the ground outside the building there are four aerial groups, of which three have beam aerials (Telefunken). One group is directed towards South America and the Far East, a second towards the West Indies and Central America, and a third towards North America and British India. A fourth group comprises several simple omni-directional aerials, enabling reception of waves between 10 and 30,000 metres to be carried out from all directions.

Will Radio-Nations help the League of Nations in organising a world without war and without preparations for war? That is the hope of those who are sponsoring these rapid communications between governments and peoples of the earth.



The French short-wave transmitter which has a wave-range of 14 to 40 metres and is employed for direct communication between the League headquarters and the Japanese and Chinese Governments.

Financial Aspects of Television

TO attempt to discuss in a technical journal the financial aspects of television may at first seem out of place, but it need not take long to say enough to make readers appreciate that the future of television is so bound up with the financial side that the one cannot be properly considered if the other is ignored.

At a time when a committee appointed to advise the Postmaster General on the future of television is still deliberating, it is natural that there should be a lull in disclosures of technical advances in this country, but enough is known to justify the opinion that at least point to point transmission of television with quite good definition has reached a satisfactory stage, even if general reception on the same basis as broadcasting still offers serious problems. It is only comparatively recently that it has been possible to speak with so much assurance on the technical progress which has been made.

We still have to face the fact that, if really high definition is required, there can be no wire link of any considerable length between transmitters and studio, so that we cannot look for the linking up by wire of a number of scattered transmitters united to one studio. Confirmation of this view, if it were necessary, is forthcoming from a paper recently published in America, when it was pointed out, in connection with a demonstration of the Zworykin Iconoscope, that the system produced sidebands 200 kilocycles in width "which precludes the use of wire lines for transmission over any considerable distance, and all remote pick-up stations must transmit to the main station by radio."

A year or two back television seemed to be quite a long way off because insufficient technical advance had been made. It would now seem that having reached a fair state of progress, and having, in fact, come to a point where it is possible to begin to talk about television as a service, the problem of the financial side looms up as the greatest obstacle to future development. Let us examine the difficulties rather more in detail.

At a Convention held in May this year in America by the Institute of Radio Engineers a number of technical papers on television progress were read. These technical papers were preceded by a talk by Mr. Baker, who is Vice-president and General Manager of the R.C.A. Victor Company of America. Mr. Baker emphasised the problem of cost in establishing a television service. He assumed that receivers could be produced at a cost of the equivalent in English money of £60, and that to serve an audience of, say, 700,000 persons in America eighty transmitters would be required, costing £8,000,000 to erect, with another sum equivalent to this which would have to be expended on building up an inter-connecting network for the stations. To maintain these stations on the air would involve an annual expenditure of £11,600,000. To bring home to his audience these staggering figures he explained that the present investment in the broadcast transmission in America is approximately £5,000,000, and that this

Financial Aspects of Television—

sum had been expended over a period of more than ten years.

The next item of expenditure discussed was that of providing programmes for the stations when erected, but it was pointed out that if you broadcast once, every film produced in the United States, and every play on the stages in New York, and, in addition, film news reels, you would still only cover less than half the total of hours required to bring up television to the 5,000 programme hours a year which Mr. Baker estimated as necessary for a service.

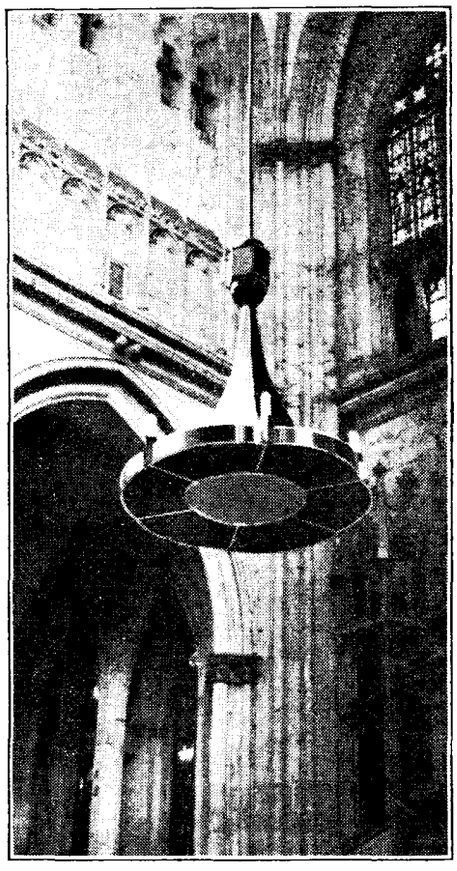
These observations must certainly make us stop and think in this country before we jump to any conclusions that broadcast service of television is ripe for public distribution here. We need not, of course, take all the above stupendous figures as applying equally in this country. For example, Mr. Baker's estimate of 5,000 hours a year seems unnecessarily high, unless he is visualising several independent programmes. With one programme 14 hours a day of television, would be provided for under such an estimate. We believe that something very much less would be accepted here as adequate. After all, television is suited only to leisure time, whereas sound broadcast is often enjoyed for long hours at a time during daily tasks. Again, the estimate of 80 stations for America is, we hope, in excess of what would be necessary here. On the other hand, the importance of good definition and quality, as well as good television programme material is, perhaps, greater here than in America. The public is educated to a high standard of performance with sound transmissions, and before buying television receivers in quantity, will expect to have some sort of assurance that the television programmes will give a service in some way comparable with that at present supplied on the sound side by the B.B.C. stations.

It does not look as if the finances of the B.B.C., on the basis of their present proportion of the licences, could stand the strain of endeavouring to provide television programmes, even if they might scrape together the cost of erecting the stations over a fairly long period of time.

Additional Licence Fee

It may be suggested as not unreasonable that an additional licence fee should be payable in connection with a television receiver. If this licence were, say, 5s. per annum, the revenue would assist in meeting the additional expense. It seems doubtful whether an additional licence for television could be introduced without special legislation, although it might well be argued that the P.M.G. already has the necessary authority under the Wireless Telegraphy Act. Whatever arrangements are made for television in its early stages, it is probable that a large proportion of the programmes will be made up of film, and one cannot expect that the film producers will supply their films for broadcast purposes at a cost which would look attractive to any broadcasting authority in this country. So that we may sum up by saying that although we may be in a position of having solved the most serious of the technical problems of broadcasting television, we have as yet made little or no progress in meeting the problems of the financial side.

Already a fairly considerable amount of money has been sunk in technical development of television, and we may assume that this is being done in the hope



A clever combination of electric light fitting and public address speaker installed in the cathedral at Regensburg, Germany. The design is by Telefunken.

of a fair reward in the not too distant future as a result of the establishment of a public service. Is it being pessimistic to suggest that the chances of this reward seem, as yet, very far off, when the capital expenditure necessary to stimulate public interest sufficiently to induce a large number of the public to buy television receivers is taken into account? Finally, we have to remember that television systems are likely to undergo substantial modifications as time goes on, modifications which very likely would necessitate drastic changes in the receivers. The public will hardly rush to buy sets until they can be reasonably satisfied that the sets will not become obsolete in a very short time. A possible solution of this difficulty would be the supply of sets to the public on hire, but this, again, at once limits the prospects of commercial prosperity to the manufacturers of such receivers.

Interference

Details of German Technique

GERMAN apparatus for the measurement of the radio-frequency electromotive forces generated by electrical plant has been described in a previous article. The German technique is directed towards a settlement of the radio interference question by a specific limitation of these parasitic voltages at the terminals of electrical plant.

In order to secure the most economical form of settlement, certain statistical data is requisite, one of the main items of which is (i) the value of the ratio of the radio-frequency signal and noise voltages in an antenna, necessary to ensure satisfactory reception in the average case. A figure of 50 for this ratio is regarded in Germany as adequate. It may here be of interest to note that in terms of the British technique, this figure appears to correspond with a limiting value for the noise field of 20μ.V./metre at a receiving site where the signal strength is 1 m.V./metre. The other items of statistical data are (ii) the average effective height of receiving antennæ, and (iii) the average total attenuation of the path lying between the terminals of interfering plant and the terminals of radio receivers.

As a result of a large number of observations, considerable data has been compiled in Germany. This data has been put into graphical form and was presented by the German delegation for discussion at the recent (June, 1934) Paris Conference of the I.E.C.

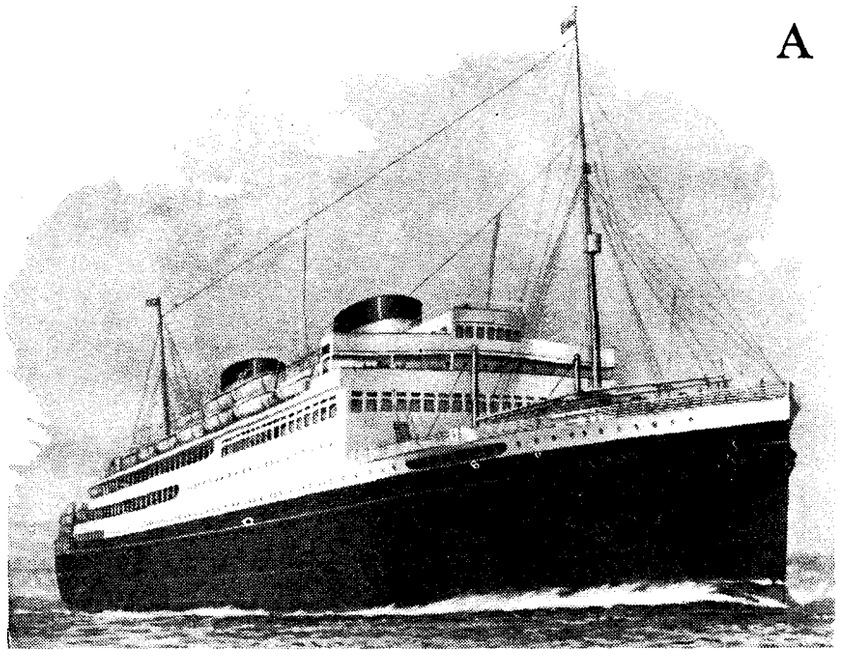
As an illustration of the manner in which this data is utilised, two examples will be given. These examples clearly demonstrate the very important fact that the extent of the necessary reduction of radio-frequency voltage at the terminals of electrical plant increases considerably as the body of listeners for whom amelioration is to be ensured progressively increases.

Thus, reception of a signal field of 1m.V./metre will be "interference-free," for 70 per cent. of the listeners, to the degree represented by the value of 50 for (i); if (based upon values of 0.3 metre for (ii) and 20 for (iii), expressed as a voltage ratio) the voltage across the plant terminals does not exceed $(1{,}000 \times 0.3 \times 20 \div 50)$ μ.V., i.e., 120 μ.V. If similarly satisfactory reception is to be accorded to 90 per cent. of the listeners, then (based upon values of 0.1 metre for (ii) and 5 for (iii)) the terminal voltage should not exceed 10 μ.V. These values show that a terminal voltage, smaller by about 21 decibels, is necessary, when the number of listeners to be catered for is increased from 70 per cent. to 90 per cent. of the total number.

In reference to the foregoing voltage values, it is of interest to note that the normal terminal voltages for small electric motors are of the order of 1 volt at 2,000 metres and 0.1 volt at 200 metres. For high-frequency medical apparatus the corresponding values are of the order of 10 volts and 1 volt respectively. A. M.

New Radio Aid to Navigation

A Special Direction-Finder for Foggy Conditions



Cunard-White Star Liner "Britannic"

GUIDED solely by radio beacons, ships may now be navigated through the narrow seas in dense fog without a glimpse of any landmark. Only the risk of collision with other ships remains, but that danger is likely to be minimised by this new development of wireless direction-finding

TO none of its now many practical users was the advent of wireless more welcome than to those who "go down to the sea in ships." And it is still true that perhaps the most important of all wireless applications is the marine one. Besides the use of wireless for ship-to-ship and ship-to-shore communication, the advantage of direction-finding as a practical aid to navigation is so great that it is an open secret that the attitude of shipping authorities is towards the fitting of direction-finding on all sea-going vessels.

At no time is the advantage of direction-finding greater than in conditions of fog. Marine and radio people alike are keenly alive to methods which permit the fullest utilisation of radio aids on these most trying of marine conditions. The greatest of all dangers is that of collision between vessels which may remain invisible to each other until, perhaps, collision is impossible to avert. This danger is particularly great in the more congested waterways, such as the Channel, North Sea, etc., but fog is at all times a terror to the mariner, and any radio device which has as its object the prevention of collision in foggy conditions is a potential boon to all seafarers.

Visual Indications

An apparatus designed for this purpose and having important features which have not hitherto appeared in marine wireless is a particular form of direction-finder developed at the Radio Research Station at Slough. This apparatus was demonstrated in the Radio Department of the National Physical Laboratory (of which the Radio Research Station is a part) during the recent annual visitation to the Laboratory, and the demonstration model is illustrated in the photograph on the next page.

Before considering its actual operation, however, it is perhaps desirable to explain briefly the general principles of the cathode-ray direction-finder, of which this is a particular form. Those principles are illustrated in Fig. 1. Two frame aerials are arranged at right angles to each other, so that an arriving signal can act simultaneously on both. From what was said of the principles of d.f. coil reception in a recent issue of *The Wireless World* (May 11th), the signal voltage in both frames will depend on the angle which the direction of the signal makes with each frame. The signal voltages set up in the frames are then applied to the deflecting plates of a cathode-ray oscillograph, it being borne in mind that the oscillograph spot is free to move in both directions. The combination of these voltage-effects on the spot is to move it along a single line on the screen of the tube, making the same angle with the North to South line of deflection as the signal direction makes with the North-South frame aerial, as shown in Fig. 1 (b). The direction of the signal is thus directly indicated on the screen of the oscillograph, which becomes, in effect, a compass card.

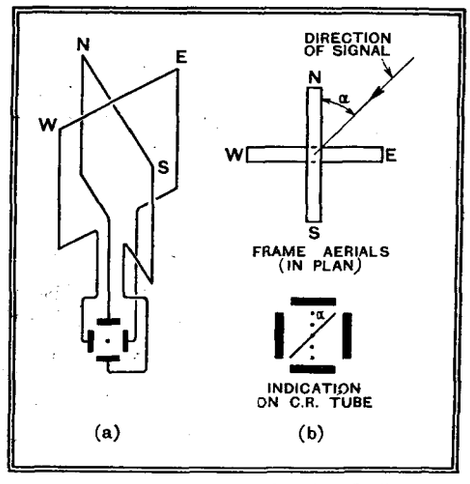


Fig. 1.—Principles of direction-finding by cathode rays.

Considerable amplification is, of course, usually necessary between frame aerials (of any practicable size) and the deflecting plates of the tube, and it is essential that the amplifiers in each branch of the complete receiver should be exactly alike, since this governs the final direction in which the spot moves.

The advantage of the system is to be found in the fact that the cathode-ray spot is very rapid, indeed instantaneous, in its response. It is this that has permitted its use as a direction-finder on individual atmospherics (as was also mentioned in our previous article), this being a feat that no other type of direction-finder could possibly emulate.

This same fact of instantaneous response is utilised in the collision-preventing apparatus in combination with the fact that this rapid response permits the use of very short signals.

As has been outlined in a suggested method of operation, it would be necessary for all ships in a foggy region to send out a very brief signal, say, on the distress and calling wavelength of 600 metres. These signals could be very short indeed—they need not last longer than 1-100 second—and would be sent out at quite wide intervals such as 10 or 15 seconds. In this case they would not interfere with other traffic on the same wavelength and could be superimposed (by an automatic switch or key) on any other traffic. These signals would then be picked up on a direction-finder of the type shown in the photograph, when, despite their brevity, the direction of the signal from each of several ships in the area could quite easily be read. The receiver for this purpose would not need to be

New Radio Aid to Navigation—

highly sensitive, since the region of interest as regards collision prevention is a limited one. It is understood that the apparatus illustrated is only intended to receive signals from ships within a range of ten miles, which seems very adequate for the purpose.

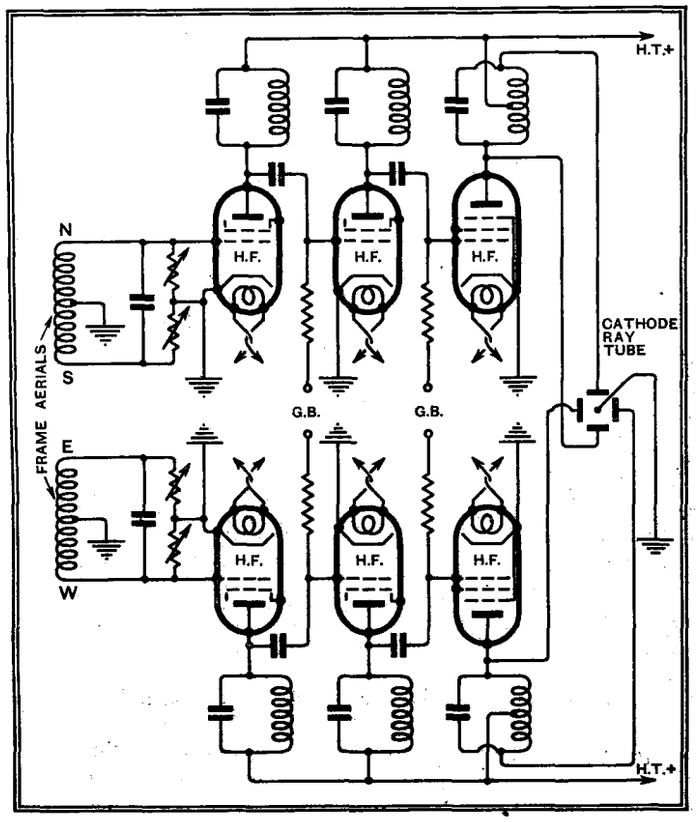


Fig. 2.—Circuits of cathode-ray direction-finder for collision prevention.

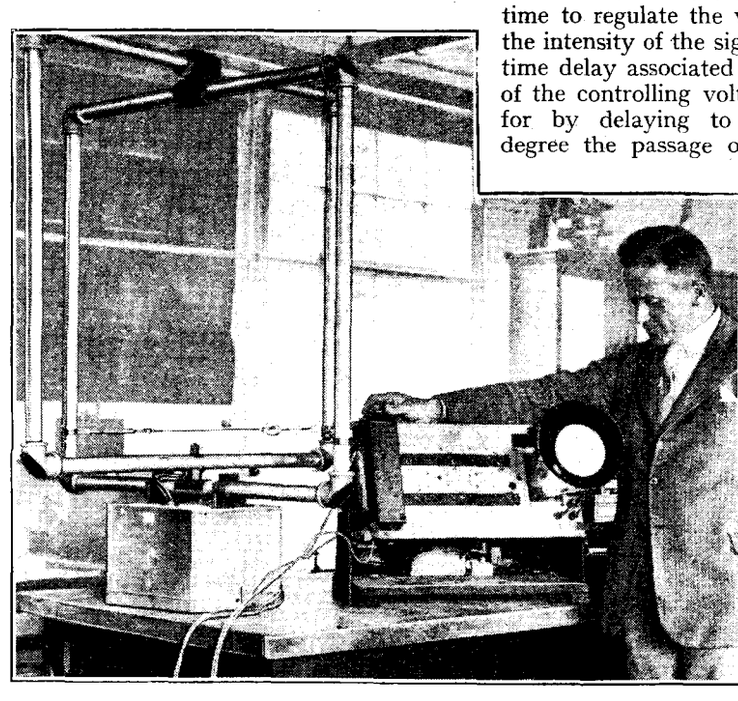
Practical Applications

The apparatus could be located on the bridge, directly under the inspection of the navigating officer, who could keep a more or less continuous watch on it during fog. As a means of observing for possible collisions, it is only necessary for him to see that no ship which is within the receiving distance of this apparatus produces a directional deflection of *constant direction and of increasing length*. It is easy to show by a simple drawing that in these conditions the two vessels, if following steady courses at constant speed, are ultimately going to collide. The navigating officer has thus an early indication of any such possibility, and has plenty of time to change course so as to avoid collision. No operating skill is necessary, and no attention need be paid to the absolute direction, so long as it is ascertained that no signal keeps the same direction and increases in size. Signals of the brief nature referred to would cause negligible interference with communication on the same wavelength, and would be comparable to atmospherics of not too frequent or serious incidence.

The apparatus designed for the purpose, and illustrated in the photograph, has been made in the most compact form possible. The complete receiver and oscillograph in the photograph are contained in the box shown, measuring just over 20in. by 10in. The connections of the receiver are shown in Fig. 2. The frame aerials and the three tuned circuits (of each amplifier) are all tuned to 600 metres, the tuning condensers shown in each circuit having small trimmers which can be adjusted by a screwdriver through holes in the front panel. The half megacycle frequency from the amplifiers is applied directly to the deflecting plates of the oscillograph to give the directional indication.

The resistances across the input grid circuits serve as volume controls and prevent overloading, which might give wrong indications of direction. When a deflection from a signal exceeds a certain size on the screen of the tube, it is cut down by manual operation of a ganged switch to avoid this overload, but the controls of the resistances are released by spring to avoid the receiver being accidentally left in the insensitive condition.

It is understood that the apparatus has not yet been tried out at sea, but it was demonstrated at the N.P.L., operating on brief local signals which were very easily observed. No doubt some organisation work would have to be done by the shipping authorities to put the scheme into operation, but this would be merely a small price for the advantage of the new wireless aid to safety of life at sea.



The D.F. apparatus demonstrated at the N.P.L. The two frames set at right angles and the end of the cathode-ray tube are easily picked out.

A "PROPHETIC" MONITORING DEVICE

IN attempting to design a system for automatically keeping the output volume from a low-frequency amplifier within bounds, engineers are often very soon brought up against the unpleasant fact that their efforts tend to be "wisdom after the event." Every automatic device takes time to operate, and, by the time the situation has been brought under control, the transmitter has already been heavily "blasted" or, in the case of gramophone recording, an ugly-looking "gash" has appeared on the surface of the wax "master."

What seems to be required is a prophetic knowledge of how loud the signal is going to be. In the absence, however, of a circuit or apparatus which will perform this miracle, the only thing to do is to make use of our present knowledge of how loud the signal is, and to pass the latter to its destination through a delaying device, so that by the time it reaches the final amplifier the circuits of the latter have "got wind" of the situation and adjusted themselves accordingly.

Mr. S. Aisenstein has suggested the use of a telegraphone for this purpose, the signals being recorded in magnetic form upon a travelling steel tape. Two pick-up devices are used in connection with this tape, the signals being picked up by the first after a short delay and by the second somewhat later. The output from the first pick-up device is used to obtain a controlling voltage, which is applied to an amplifier connected to the second device just in time to regulate the volume according to the intensity of the signal. The inevitable time delay associated with the generation of the controlling voltage is thus allowed for by delaying to a slightly greater degree the passage of the signals to be regulated.

The only doubt that arises in connection with a device of this character is whether the distortion and noise introduced by any existing telegraphone would not be too great to be tolerated where quality of reproduction is a first consideration. It is to be expected, however, that these defects will be largely overcome in the course of time.

BROADCAST BREVITIES

By Our Special Correspondent

Empire Music Director

THE most important news of the week concerns Empire listeners. I can reveal that the Empire programmes from Daventry will soon take on a new status, one of the first steps being the appointment of a Music Director. This might not in itself arouse frenzied delight in Bush, jungle or prairie, but the appointment will lead to the formation of an all-night wireless orchestra, so that Daventry's short-wave listeners will have real, as distinct from tinned, music throughout the twenty-four hours.

Artists at 3 a.m.

Nor is the development likely to stop here. There is no reason why music should be the only department to break away from the thraldom of electrical recording, and I understand that in the very near future dramatic artists, singers, comedians and other entertainers will attend the studios in the wee 'sma hours.

Technical Advances

There is no doubt that the B.B.C. is beginning to take Empire broadcasting very seriously. Technical advances are in hand, and already the Daventry site wears a different aspect with the completion of the new masts necessitated by the forthcoming increase in power.

Now the programme side takes a step forward, while potted entertainment recedes into the background.

Droitwich: The First Programme

IT looks as if the Belfast Wireless Orchestra will have the honour of giving the first official broadcast *via* the new Droitwich transmitter. As already announced in *The Wireless World*, the first public transmission will occur during the Press visit on September 6th. The journalists are due to arrive at 4 p.m., just when our Belfast friends are getting into their stride in the National programme.

No Synchronisation

I understand that while Droitwich transmits Daventry will close down. There will be no attempt to synchronise the two transmitters, though the results of such a test might be distinctly interesting.

Whither Television?

I HEAR that the Committee appointed by the Postmaster-General to consider the development of television has completed the spectacular side of its work, i.e., the actual viewing of television images by the Baird, Electrical and Musical Industries, and other rival systems. According to a high official at the Post Office, the Committee is now settling down to the big task of sifting the mass of contending evidence. An important statement may be expected very shortly.

No Provision in B.B.C. Charter

An interesting point has arisen concerning the position of the B.B.C. in regard to television. The present Charter, which was drafted in 1926, makes no provision for the transmission of moving images; in the clearest possible terms, the B.B.C. was established to broadcast to the public "by means of wireless telephony." If the P.M.G.'s Committee were now to report in favour of an immediate television service, the Charter would require revision by Act of Parliament.

The present 30-line television transmissions by the B.B.C. are "experimental."

An American Visitor

RECENT burlesques on American broadcasting have probably given British listeners exaggerated notions of what actually goes on in the U.S. studios.

Perhaps Mr. John S. Young will clear the air. Mr. Young, who has just landed in England, is an announcer of the American National Broadcasting System, and, by the special invitation of Sir Henry Penson, Warden of the King's English, he is to give a series of addresses at Oxford on American radio methods. At Pembroke and Balliol he will explain how the theory and technique of broadcasting are applied to programmes sponsored by commercial interests.

1914 Again

THE tense days just before the outbreak of the Great War will be re-lived in an actuality programme entitled "Twenty Years Ago," to be broadcast in the National programme to-morrow evening (Saturday). It will be a radio report of the chain of events which led from the firing of a revolver by a Serbian fanatic in Sarejevo on June 28th to Great Britain's declaration of war upon Germany at 11 o'clock on the night of August 4th.

"TOUR DE FRANCE." The world's biggest "O.B."—that of the great cycle race round France—concluded a few days ago. Here are some typical riders at the microphone. Nearly all French stations gave daily accounts.

Events Speak for Themselves

The programme will show how, in July, 1914, the man-in-the-street had no accurate knowledge of the diplomatic cross-currents that were carrying him into war.

"Twenty Years Ago" has been compiled from original sources by Harold Temperley, Professor of Modern History at Cambridge and Joint Editor of the Official British Documents bearing on the period, and will be produced by Laurence Gilliam.

No attempt will be made to heighten the dramatic effect of the supreme event in modern history by special treatment. The words and actions of the rulers, politicians, statesmen, and soldiers who framed Europe's destinies in those days will be left to speak for themselves.

Lesser-known Dance Bands

DURING the absence from the studio of the B.B.C. Dance Orchestra, directed by Henry Hall, who will be on the stage at the Radio Exhibition at Olympia from August 16th-25th, Will Hanson, organiser of dance band broadcasting, will carry into effect his policy of giving lesser-known combinations a turn at the microphone.

The bands which listeners are to hear during the middle weeks of August are all extremely capable and able to put up an excellent show. In the first week, starting on August 13th, the 17.15-18.00 (5.15-6.0 p.m.) period will be filled on successive days by Percival Mackey and his Band, Reginald Foresythe and his New Music, The Barnstormers, Harry Leader and his Band, and Joe Loss and his Kit-Kat Band. The midday period on August 17th will be filled by Tommy Kinsman and his Band.

A Varied Selection

The 5.15-6.0 period of the second week of Henry Hall's absence at Radiolympia opens with Billy Mason and his Dance Orchestra (August 20th), followed by Terry Mack and his Serenaders, Dare Lea and his Band, Rudolph Dunbar and his Coloured Orchestra, and Don Sesta and his Gaucho Orchestra in the order named.

In the midday period on August 24th Henry Hall and the B.B.C. Dance Orchestra.

Down on the Hop Farm

A CHEERFUL radio picture of hopping and the hopping season is to be embodied in a programme entitled "'Opping 'Oliday," which Laurence Gilliam and Pat Forrest are preparing for listeners on September 15th.

The programme will deal with hopping in progress. The whole of this will be done by an actual relay from a hop farm. The programme will conclude with a relay of a hop-pickers' sing-song from a public-house.

Vienna Broadcasting Tragedy

A Visitor's Impressions

THE temporary capture of the Vienna studios by Nazi insurgents last week and the broadcasting of spurious messages startled the world, but, according to our contributor, who himself visited the station a few months ago on behalf of "The Wireless World," such a coup was always possible. In these impressions he describes the elaborate defence measures at the transmitter and the absence of precautions at the studio.

By CECIL W. LUSTY

IT is not surprising that the broadcasting station should have been the first object of attack in the tragic events in Vienna last week. I have visited nearly every European station, and have met armed guards at Moscow and other transmitters; never have I seen a station garrisoned like Bisamberg.

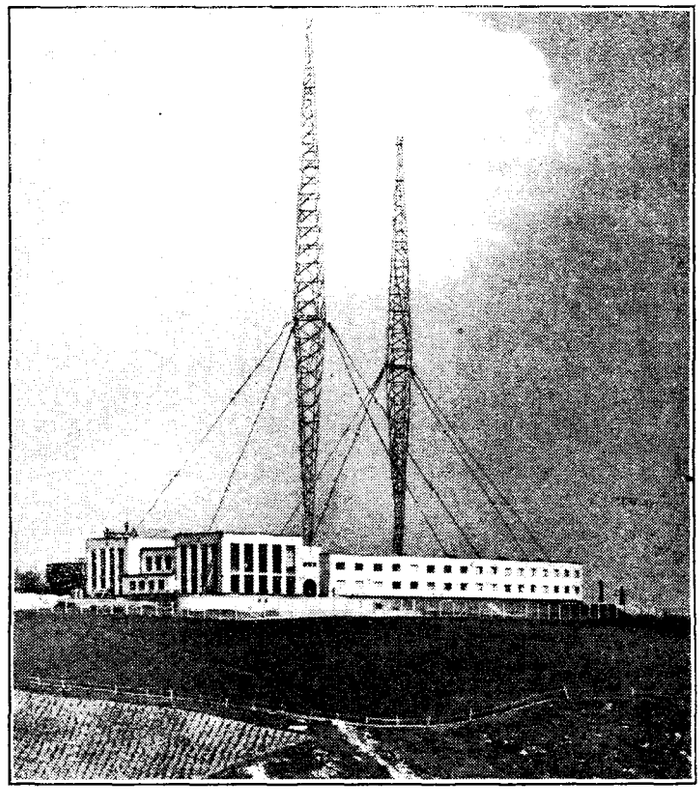
At the time of my visit a few months ago the transmitter was guarded day and night. Even while it was under construction attempts were made to burn the building. It would seem, however, that in concentrating defence on the transmitter the authorities forgot the vulnerability of the studios. One reaches them along the fashionable Karntnerstrasse—the Oxford Street of Vienna — turning right into Johannesgasse; the graceful white building, No. 4b, is the "Ravag" Broadcasting House.

It is true that some precautions were taken for the safety of the headquarters after the February rising, but this did not prevent, on July 2nd, the explosion of a bomb in the basement which did some damage.

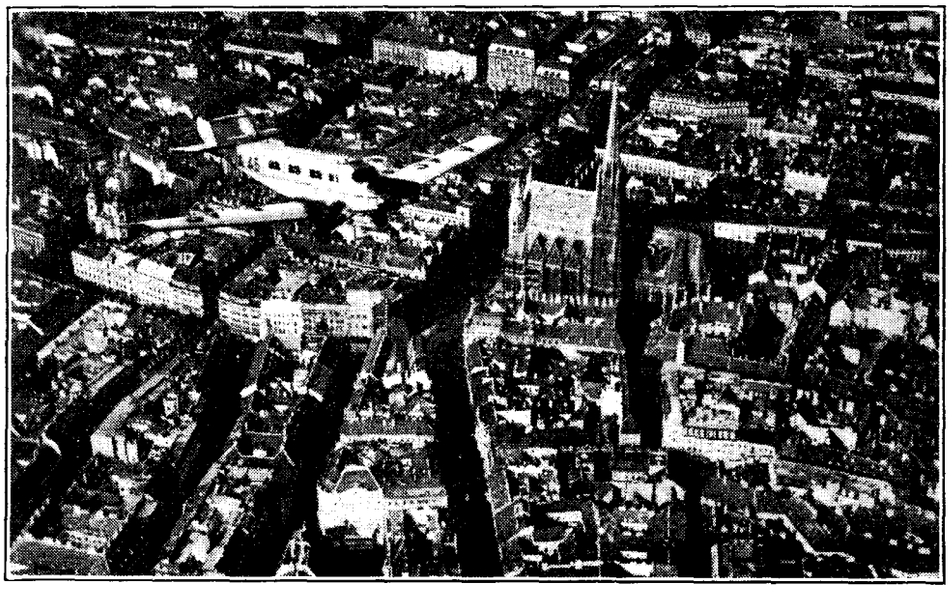
In conversation with officials I learnt facts which, in the light of last week's events, show why the Nazi insurgents brought the broadcasting station into their plans for a *coup d'état*.

Broadcasting in Austria, as in Germany, Russia, and, indeed, practically the whole of Europe, is virtually State-controlled. The Austrian Government owns only half the shares in the Ravag organisation, but a clause in the agreement enabling the State to use the radio for announcements and talks virtually places the service under the thumb of the Government. With the recent boiling up of the political cauldron, the late Chancellor Dollfuss had been forced to make more and more use of the broadcasting system as an instrument of the State.

Perhaps the main reason for erecting the costly 120-kilowatt transmitter at Bisamberg—a severe strain on the Ravag finances—was the official desire to possess a strong weapon of defence against "broadcast bombardment" from other countries. I understand that Austria first appealed to the International Broadcasting Union for help in suppressing foreign radio propaganda, and it is no secret that this request was gravely discussed by the Union, but, as I explained in a recent *Wireless World* article, the Union is not "an armed policeman of the ether," and any censure for its apparent failure to eliminate the propaganda element is unjustified. At the same time, the Austrian attitude was noted by the League of Nations, which circularised European Governments with a view to preventing broadcast propaganda likely to offend neighbouring countries.



The Vienna transmitter is situated outside the city, amidst quite rural surroundings.



Vienna from the air. In the centre is St. Stephen's Cathedral, which was threatened by a bombing plot. Services are frequently broadcast from the Cathedral.

No Studio Guard

When the news came through of the temporary seizure of the Vienna station by the Nazis last week, I remembered my afternoon at Bisamberg. Gendarmes with gleaming bayonets unbarred the gate to allow the party of Ravag officials and myself to pass through. There were soldiers patrolling the grounds, fenced in with barbed wire, and there were soldiers in the courtyard.

But when, later, I visited the studios, there were no soldiers, and it was here, last week, that several Ravag officials, including the Director-General and a visiting artist, met their deaths.

News of the Week

Current Events in Brief Review

More People's Receivers

THE German "People's Receiver" has set a new vogue. We understand that both Norway and France are considering the development of receivers on the same lines.

Asking for It

ROUMANIAN listeners are being invited to submit criticisms of the programmes broadcast on Saturday evening. At present the broadcasting organisation receives between 600 and 1,000 letters a month in response to the invitation.

The Sub-Midget

NINETY per cent. of the receivers at the recent show in Wellington, New Zealand, were superheterodynes. Most sets had the new type 6- and 7-pin valves. The only car radio set was a British model.

An American "sub-midget" was in a cabinet 7in. square by 4in. deep.

Bombay Asks for Reports

THE Bombay station of the Indian State Broadcasting Service is continuing short-wave transmissions on Mondays and Wednesdays from 16.00 to 17.50 G.M.T. The wavelength is 31.36 metres.

Reports are welcomed by the Station Director, Irwin House, Sprott Road, Ballard Estate, Bombay.

Tuning-in Atlantic Flight

DURING the next few weeks short-wave listeners have an excellent opportunity to pick up signals transmitted on 34 metres by Mr. John Grierson during his flight to America *via* the Arctic air route. As we go to press, Mr. Grierson has reached Reykjavik, Iceland, and his route lies *via* Augmagssalik — *Godthab* — Resolution Is.—Payne River — *Povunggnetuk* (Hudson Bay)—*East Maine—Ottawa*. Places in italics are bases at which stops will be made. Transmissions take this form: AA AA AA GACRK BT, and the text consists essentially of four parts: (a) Position, (b) Weather, (c) General, and (d) Time. Reports will be welcomed by the Radio Society of Great Britain, 53, Victoria Street, London, S.W.1.

Mr. Grierson's machine is fitted with a Marconi-Robinson "homing" device which enables him to fly accurately to any wireless station on his route.

Blow to Radio Crooning

LIGHT opera topped the poll in a broadcast popularity contest just conducted by the *Radio Record*, of Wellington. Over 33,000 votes were recorded as follows: Light opera, 7,322; old-time melodies, 6,755; dance music, 5,824; classical music, 5,194; grand opera, 4,650; and—crooning, 3,518. Our New Zealand correspondent adds that crooning "fans" started the argument!

New Czech Station

A NEW Czechoslovakian broadcasting station of 6 kilowatts is to be erected between Kosice and Uzhorod. It will operate on the Kosice wavelength of 269.5 metres.

The Passing of Poldhu

THE news that the site of the Poldhu (Cornwall) wireless station is for sale by order of the Marconi Wireless Telegraph Co., Ltd., recalls some interesting wireless history.

It was in December, 1901, that Marchese (then Mr.) Marconi, with an aerial wire attached to a balloon at St. John's, Newfoundland, picked up the letter S in Morse sent out from the new station at Poldhu. The actual power employed in Cornwall was not more than 10 or 12 kilowatts, the transmitting aerial consisting of 50 bare stranded copper wires suspended from a triadic stay strained between two masts 60 feet in height and 200 feet apart. In February, 1902, Poldhu became a permanent Transatlantic station for communication with Cape Cod, Mass., and Cape Breton, Nova Scotia. In recent years it has been used for experimental purposes.

A great occasion in the history of the station occurred on July 18th, 1903, when Their Majesties the King and Queen (then Prince and Princess of Wales) paid a visit.

Beer and Broadcasting

THIRST spoilt a recent Danish radio programme which included a report of a railway trip starting from Roskilde. This was to begin with a "picture" of the arrival of the express from Copenhagen and, in order to heighten the realism, vendors of newspapers and sweets at the station were invited to make their cries with special energy. At the last moment, however, these improvised artists developed a fierce, diplomatic thirst, demanding a certain number of bottles of beer before their manifestation before the "mike." The radio commentator, having no authority to engage artists on this basis, was obliged to exclude the strikers from the picture and, as a correspondent says, they remained mute, inglorious and thirsty.

Running Commentaries —with a Difference

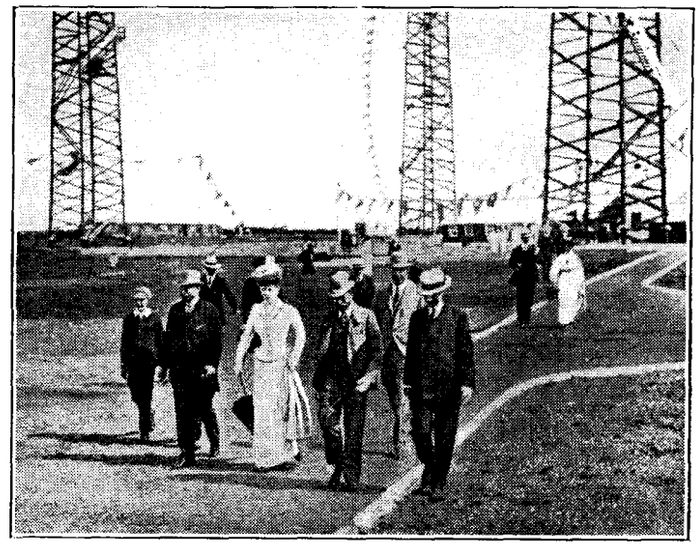
A PECULIAR type of "running commentary" is enabling Australian listeners to believe that they are listening to actual accounts of the Test Matches.

The method employed is to cable, or send by beam wireless, full particulars of every individual stroke to selected radio stations, which then add the necessary background, by means of gramophone records, of crowd noises, while skilled commentators pore over each cable as it arrives and construct a word picture.

During a recent commentary certain time discrepancies made it obvious that every station was not receiving simultaneously a direct commentary. For example, writes a correspondent, one listener who heard Oldfield dismissed from one station was a little surprised to find him still batting at another.

Records on Record

RAVAG, the Austrian broadcasting organisation, has issued a report on the number of record broadcasts given in 1933. During the twelve months there were broadcast 12,700 metres of film, lasting 1,260 minutes; 920 wax records, lasting 3,600 minutes; and 700 records on gelatine, lasting 2,800 minutes.



POLDHU IN ITS PRIME. The King and Queen (then Prince and Princess of Wales) on their visit to the Marconi Company's Transatlantic Wireless station in July, 1903. Marchese (then Mr.) Marconi is on the right.

One in Eighty

AUCKLAND, New Zealand, has one radio dealer for every eighty licensed listeners.

New U.S. Radio Control

THE new Federal Communications Commission of the United States has already been split up into three divisions, which are now linked only by the fact that Judge Sykes, the chairman, is a member of each, writes our Washington correspondent. The divisions are (1) broadcasting, (2) telegraph, (3) telephone.

To the broadcasting division will fall the task of regulating the 75-million dollar American broadcasting industry, which includes all programme stations on medium and short waves.

A Robot Tuner

THE latest tuning gadget in America is a pre-selector tuner device which enables the listener to select various programmes over a 12-hour period; the set does the rest.

The Atwater-Kent receiver which introduces this "clock tuner" carries an electric clock having around its rim tiny holes, each representing quarter of an hour periods and serving as the connecting link between the tuning mechanism and the clock. The tuner has sixteen outlets in the form of miniature telephone switchboard cords, two to each of seven stations, and providing for fourteen different programme periods, with two extra cords for intermission periods. The listener, in choosing his programme, plugs the cords into the holes at the desired programme periods. The receiver then operates automatically, changing from station to station at the times scheduled.

R.N.W.A.R. : More Recruits Wanted

THE Secretary of the Admiralty announces that it has been decided to increase the membership of the Royal Naval Wireless Auxiliary Reserve, which came into being at the end of 1932 and now has a membership of approximately 400.

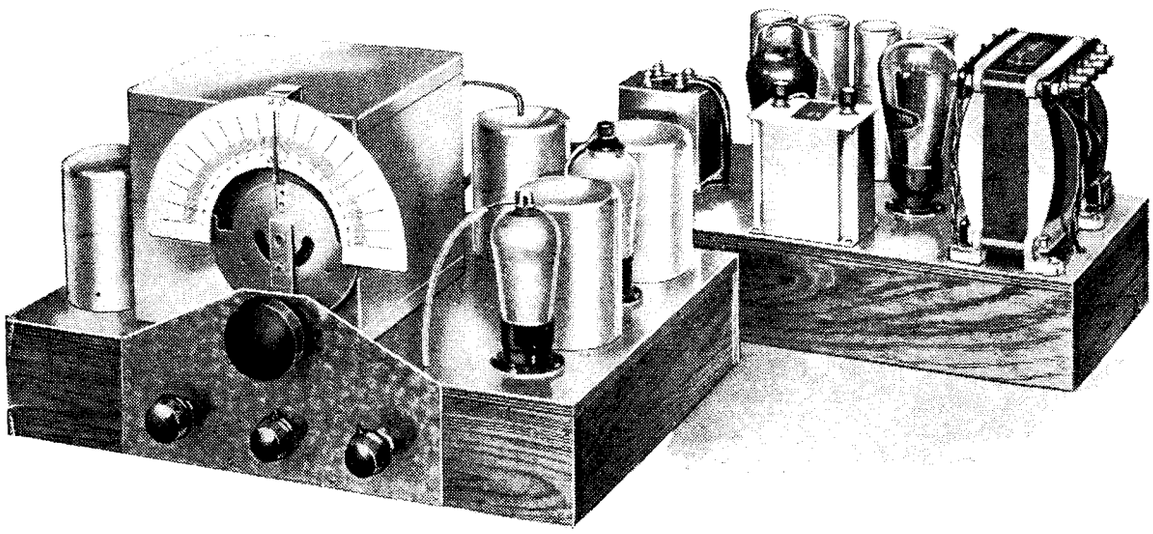
Its object is to provide a reserve of wireless operators trained in naval procedure for naval service afloat or ashore, at home or abroad, in time of war. Applicants, who must be British and between the ages of eighteen and fifty-five, need not have any special wireless qualifications, but it is greatly to their advantage to know Morse and to be either in possession of, or in a position to construct, a wireless transmitter.

Those interested are requested to apply for further particulars by post to: The Admiral Commanding Reserves, Queen Anne's Chambers, Tothill Street, London, S.W.1.

Page 81 follows after the Programme Supplement

Olympic S-S Six

A New Single-Span Receiver for Distant Reception



To be Fully Described in Aug. 10th and 17th Issues

THE single-span system of tuning is now well established as a definite advance on older methods inasmuch as it eliminates ganging and waveband switching and so greatly simplifies both the construction and adjustment of a receiver. The set to be described in forthcoming issues of *The Wireless World* is of high sensitivity and possesses a much higher degree of selectivity than earlier single-span receivers. Six tuned circuits are used, and the combination of reaction with automatic volume control gives variable selectivity, and so permits the quality of reproduction to be always as high as possible, consistent with the conditions of interference prevailing on a particular station.

With minimum selectivity, a condition used chiefly for local reception, the overall frequency response is flat within some 3 db. from 40 cycles to 10,000 cycles and an output of about 3.5 watts can be obtained. The receiver, therefore, is as suitable for local reception as for distant listening.

Both quality and selectivity are unaffected by the wavelength to which the set is tuned, with the result that the excessive sideband cutting of long-wave stations, which is so common, is not present in this receiver. This is chiefly noticeable by the increased brilliance of reproduction of long-wave stations,

Mains hum proved inaudible in all tests and background hiss could only be heard on the weakest stations. Both sensitivity and selectivity proved adequate for all normal purposes, and complete freedom from second channel and kindred forms of interference was found.

LIST OF PARTS

After the particular make of component used in the original model, suitable alternative products are given in some instances.

RECEIVER UNIT

1 Variable condenser, 0.00016 mfd. **Polar Type "E"**
1 Dial, Slow-motion type **Eddystone 973**
1 Slow-motion condenser, 0.0002 mfd. **Polar "Q.J."**
(Eddystone)
1 Potentiometer, 250,000 ohms **Claude Lyons S.T.250**
(Ferranti, Magnum, Rothermel)
1 Rotary D.P.D.T. switch **Claude Lyons 2163**
1 Valve holder, 7-pin **W.B. Baseboard Type**
3 Valve holders, 7-pin **Clix Chassis Mounting Type**
1 Valve holder, 9-pin **Clix Chassis Mounting Type**
1 Compression condenser, 100 mmfds. **Colvern**
6 Microdensers, 100 mmfds. **Eddystone 900**
4 Fixed condensers, 0.0001 mfd. **T.C.C. Type "M"**
1 Fixed condenser, 0.0001 mfd. **T.C.C.34**
1 Fixed condenser, 0.0002 mfd. **T.C.C.34**
3 Fixed condensers, 0.001 mfd. **T.C.C. Type "M"**
2 Fixed condensers, 0.01 mfd. **T.C.C. Type "M"**
9 Fixed condensers, 0.1 mfd. Tubular, 350 volts D.C. working **T.C.C.250**
(Dubilier, Graham-Farish, Peak, T.M.C. Hydra, Telsen)
2 Electrolytic condensers, 50 mfds. 12 v. working **T.C.C.501**
(Dubilier, Telsen)
1 Resistance, 100 ohms **Graham-Farish "Ohmite"**
2 Resistances, 250 ohms **Graham-Farish "Ohmite"**
4 Resistances, 2,000 ohms **Graham-Farish "Ohmite"**
3 Resistances, 10,000 ohms **Graham-Farish "Ohmite"**
2 Resistances, 50,000 ohms **Graham-Farish "Ohmite"**
3 Resistances, 100,000 ohms **Graham-Farish "Ohmite"**
2 Resistances, 1 megohm **Graham-Farish "Ohmite"**
2 Resistances, 2 megohms **Graham-Farish "Ohmite"**
1 Resistance, 4,000 ohms **Graham-Farish "Ohmite" Heavy Duty Type**
1 Resistance, 6,000 ohms **Graham-Farish "Ohmite" Heavy Duty Type**
(Dubilier, Erie, Ferranti, Claude Lyons, Seradex, Watmel)
4 Resistance holders, horizontal type **Graham-Farish**
1 6-way Connector **Bryce**
1 5-pin Plug **Bulgin P.3**
(British Radio Gramophone Co., Goltone)
1 5-way Cable, with twin 70/36 leads **Harbros**
(Goltone)
6 Knobs **Bulgin K.6**
4 Ebonite shrouded terminals, A., E., Pick-up (2) **Belling-Lee Type "B"**
2 Valve cap connectors, thimble type **Clix**
6 Coil screens, 3¾ x 2½in. diam. **Mains Power Radio Co. C.S.1.**
1 Coil screen, 4 x 3⅝in. diam. **Colvern**
(Goltone)
1 Screening box, 6½ x 6¼ x 6in. **Magnum**
Materials for Coils:
16in. Paxolin tube, 1in. diam. **Wright & Weaire**
2½in. Paxolin tube, ⅜in. diam. **Wright & Weaire**
Quantity No. 32, 36 and 38 D.S.C. wire, **or 1 Set of Coils.**
2 Lengths screened sleeving **Harbros**
(Goltone)
4 ozs. No. 20 tinned copper wire, 10 lengths Systoflex, wood, etc.
Plymax baseboard, 12 x 16 x ⅜in. **Peto-Scott**
Aluminium front plate **Peto-Scott**
Screws:—
20 ¼in. No. 4 R/hd.; 8 ⅜in. No. 2 R/hd.; 18 ⅜in. No. 4 R/hd.; 16 ½in. No. 4 R/hd.; 6 ¾in. No. 4 R/hd., all with nuts and washers.
2 ¾in. No. 6 B.A. with metal threads and nuts and washers.
Valves:—1 Ferranti HI4D; 1 Mazda AC/TP; 2 Cossor MVS/Pen.; 1 Osram or Marconi MX40.

POWER UNIT

1 Mains transformer, primary 200 to 250 volts 50 cycles; secondaries, 350-0-350 volts, 100 mA., 4 volts, 2.5 amps. centre-tapped; 4 volts, 2 amps. centre-tapped; 4 volts, 6 amps. centre-tapped **Rich & Bundy Type 239**
(Davenset, Parmeko, Sound Sales, Vortexion, Wearite)
1 L.F. transformer, 1: 3 **Telsen DR3**
1 Smoothing choke, 15 henrys, 100 mA. **Bulgin L.F.21**
(Davenset, Parmeko, Sound Sales, Varley, Wearite)
1 Fixed condenser, 0.5 mfd. Tubular, 350 volts D.C. working **T.C.C.250**
1 Fixed condenser, 0.005 mfd. **T.C.C. Type "M"**
1 Electrolytic condenser, 4 mfds. 440 volts working **T.C.C.802**
4 Electrolytic condensers, 8 mfds. 440 volts working **T.C.C.802**
1 Electrolytic condenser, 50 mfds., 50 volts working **T.C.C.521**
(Dubilier, Graham-Farish, Peak)
1 Resistance, 100 ohms **Graham-Farish "Ohmite"**
1 Resistance, 140 ohms **Graham-Farish "Ohmite"**
1 Resistance, 5,000 ohms **Graham-Farish "Ohmite"**
1 Resistance, 10,000 ohms **Graham-Farish "Ohmite"**
1 Resistance, 20,000 ohms **Graham-Farish "Ohmite"**
1 Resistance, 1,500 ohms **Graham-Farish "Ohmite" Heavy Duty Type**
(Dubilier, Erie, Ferranti, Claude Lyons, Seradex, Watmel)
1 Valve holder, 5-pin **Clix Chassis Mounting Standard Type**
1 Valve holder, 7-pin **Clix Chassis Mounting Type**
1 Twin safety fuseholder with 1 amp. fuses **Belling-Lee 1033**
(Bulgin)
1 5-pin Plug **Bulgin P.3**
(British Radio Gramophone Co., Goltone)
Loud speaker: 2,500 ohm field **W.B. "E.M.2"**
Quantity No. 20 tinned copper wire, 4 lengths Systoflex, wood, etc.
Plymax baseboard, 8 x 15 x ⅜in. **Peto-Scott**
Screws:—
24 ⅜in. No. 4 R/hd.; 6 ½in. No. 4 R/hd., all with nuts and washers.
Valves:—1 Osram or Marconi MU12, 1 Mazda AC/2/Pen.

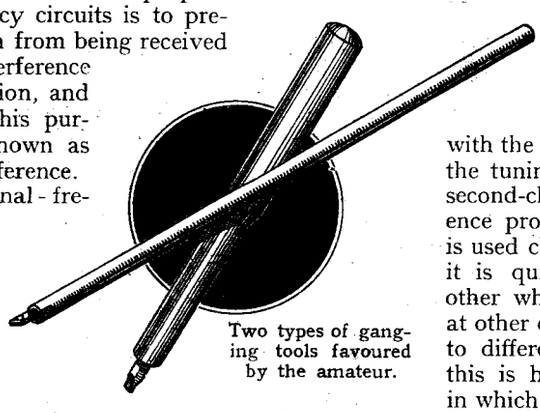
The Art of Ganging

IX. Checking the Intermediate Frequency

THE ganging adjustments of both straight and superheterodyne receivers have been thoroughly dealt with in the earlier articles of this series, and this concluding instalment deals with the question of determining the exact intermediate frequency employed. This is often necessary, for in many designs the frequency chosen for the I.F. circuits has an effect upon the ganging.

IF the most accurate ganging is to be secured in a superheterodyne, it is important that the I.F. circuits be adjusted to the correct frequency, and it is possible to check their frequency through the phenomenon of second-channel interference. It has already been pointed out that the oscillator works at a frequency higher than that of the tuned circuits by a figure equal to the intermediate frequency. Apart from questions of ganging, however, it would be equally possible to work with the oscillator at a frequency lower than that of the signal frequency circuits by the intermediate frequency. It will thus be seen that there are two different possible oscillator frequencies for the reception of any station. Similarly, for any oscillator frequency there are two possible signal frequencies which can be transferred to the intermediate frequency. Thus, if the oscillator be set at 1,000 kc/s for the reception of a station on 890 kc/s, in the absence of the signal-frequency tuned circuits, the reception of a station on a frequency of 1,110 kc/s would be just as good. The chief purpose of the signal-frequency circuits is to prevent the latter station from being received and so causing interference with the wanted station, and when they fail in this purpose the result is known as second-channel interference.

Two tuned signal-frequency circuits are provided in the vast majority of superheterodynes using intermediate frequencies between 100 kc/s and 130 kc/s, three in receivers using lower intermediate frequencies, but often only one in a set operating with an intermediate frequency in the neighbourhood of 450 kc/s. A few of the larger and more expensive types of receiver with an intermediate frequency around 110 kc/s employ three signal-frequency circuits, and this is the ideal number. Two circuits, however, are sufficient to prevent second-channel interference from being noticeable except in the case of reception close to a powerful local station. Second-channel interference proper can only occur at one point on the dial for every station which is causing it. Since there are but rarely more than two locals, only two points of second-channel interference are possible in most cases.



Two types of ganging tools favoured by the amateur.

If a superheterodyne be tried out in the daytime close to a local station, that station will tune in at its correct dial setting, but it may also tune in at another point at which the circuits are set for the reception of a station working on a frequency lower than that of the local by twice the intermediate frequency. Thus, if the local station works on 1,000 kc/s, and the intermediate frequency is 110 kc/s, the repeat point of the local will be 780 kc/s. If the test be carried out at night, or when another station is working at the repeat point, it is probable that the programme of the local will not be heard, but the distant station will appear accompanied by a whistle, the pitch of which varies with the precise setting of the tuning dial. This is second-channel interference proper. If the set is used close to the local, it is quite possible for other whistles to appear at other dial settings, due to different causes, and this is hardly the place in which to discuss them. The true second-channel whistles, however, are usually readily distinguishable on account of their much greater strength.

It should be noted that if the station upon which the second-channel whistle occurs is spaced from the local by exactly twice the intermediate frequency (usually by 220 kc/s) the whistle will disappear when the station is tuned in exactly, because it will be at zero beat. Should the second-channel point fall midway between two stations, moreover, then the whistle will usually be audible on both, but be quite high-pitched when either is tuned in. In general, it is unimportant that the intermediate frequency should be accurately set, and a discrepancy of 5 kc/s rarely matters.

Calculating the I.F.

The procedure, therefore, for checking the intermediate frequency is to tune in the station upon which the second channel interference occurs, identify it, and find its frequency from the list of stations published each week in *The Wireless World*. Deduct this figure from the frequency of the local station causing the interference and halve the result. This will give the intermediate frequency actually being used with sufficient accuracy. If it be within about 5 kc/s of the desired frequency all is well, but if the difference be greater it will be necessary to readjust the I.F. circuits. This is most easily done by altering the trimmer settings roughly, without any attempt at accurate trimming, until the whistle falls at the correct point, and then trimming the I.F. circuits accurately once and for all. Thus, if the I.F. is found to be too high, deduct twice the correct intermediate frequency from the frequency of the local station, and look up in a list of stations the one which works on a frequency nearest to the figure so obtained. The settings of all I.F. trimmers should now be increased, and the tuning altered to keep the second-channel whistle audible, and this process should be continued until the whistle falls upon the correct station.

It should be noted that the checking of the intermediate frequency should really be carried out whether ganging is accomplished with a shaped plate condenser or whether the padding circuit be used. In general, however, it is not so important with the latter, since the effects of an incorrect value of intermediate frequency

The Art of Ganging—

may often be balanced out in the padding condenser. The highest accuracy of ganging would not be possible, however.

The procedure recommended for checking the intermediate frequency is only applicable to those users of a superheterodyne who are situated near enough to a local station for them to obtain a definite second-channel whistle from a known station. Others must perform the check by a somewhat different method which is not quite so simple, and which relies upon the accuracy of the ganging obtainable to denote whether the frequency is correct or not. The procedure should then be to make a rough adjustment of the I.F. circuits, and then to attempt to gang accurately. If the ganging cannot be made to hold accurately, and with a shaped plate condenser, the process of ganging leads to the oscillator trimmer being fully screwed home or fully unscrewed, then, in the absence of the other defects which have previously been enumerated, the trouble lies in the use of an incorrect value for the intermediate frequency.

It is sometimes a little confusing to know whether the intermediate frequency is too high or too low from a particular adjustment of the oscillator trimming condenser, but reasoning from first principles will soon reveal the truth. Thus, if it be found that the process of ganging leads to the oscillator trimmer being fully screwed home, it means that the signal-frequency circuits are tuned to too low a frequency when the tuning dial is set for the reception of any particular station. This follows from a consideration that adding more capacity to the oscillator circuit would result in a station being tuned in at a lower dial setting; and, as this gives greater signal strength, and less capacity is used in the signal-frequency circuits, they were previously tuned to too low a frequency (too high a wavelength). Such a change has not altered the oscillator frequency, for the circuit has been retuned after adding capacity, therefore the frequency difference between the oscillator and signal-frequency circuits is now less than before. Increasing the intermediate frequency, therefore, will achieve the same result as adding further capacity to the oscillator circuit as regards this particular station. The result, therefore, shows that the intermediate frequency is too low, so that the I.F. trimmers should all be unscrewed somewhat. If the converse effect be found, namely, that the ganging procedure leads to the oscillator trimmer being fully unscrewed, the intermediate frequency is too high, and all the trimmers should be screwed up somewhat.

It is by no means difficult to arrive sufficiently near the correct frequency by proceeding in this manner, and, as there will be no local stations in those cases where it is necessary to do it, accuracy of ganging will not be so important. Slight inaccuracies of ganging in a superheterodyne are not usually noticeable as causing a reduction of selectivity or sensitivity, since both these qualities are normally so high. Inaccurate ganging is usually detectable by the production of multitudinous whistles similar in nature to the second-channel types.

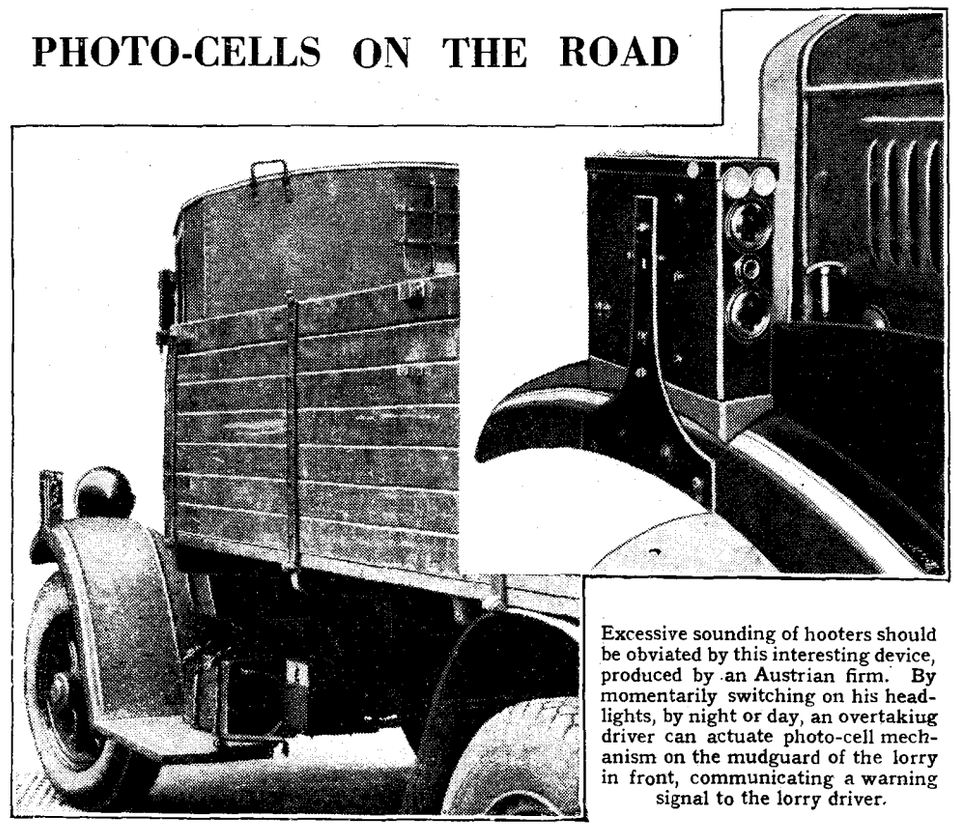
Although the processes of ganging and trimming may appear somewhat complicated, this is largely because it has been thought desirable to point out the pitfalls in the path of the unwary. There is no reason to expect that all the troubles which have been mentioned will occur in any one receiver; in fact, if the set be built to a good design, if care is taken in the construction and only good-quality components be used, there is no reason why any of them should be present. Ganging and trimming is then a very simple process, and can be carried out in far less time than it takes to describe.

Ganging is an art rather than a science, and the best advice to the unskilled is to proceed slowly, satisfying oneself that one adjustment is at its best before proceeding with the next. Facility will come with practice, but, until it does, have patience, be slow but sure, and use a tuning meter. It is possible to gang a complicated superheterodyne fitted with A.V.C. in a quarter of an hour or so without a tuning indicator, but this is quite beyond the capabilities of any but the most highly skilled. The whole secret lies in carrying out the adjustments in the correct order with the aid of a tuning indicator of some kind. A turn of one trimmer and then of another at haphazard will never lead to good ganging.

The difficulties may appear considerable, but they will be found to vanish when a determined attack is made, and it is the writer's belief that no one need be afraid of tackling the adjustments of even the most ambitious receiver provided that he adopts the correct procedure, understands the purpose of each adjustment, and uses a tuning meter. It is his hope that these brief notes will be of service in indicating the correct procedure, and, by pointing out the most common troubles, will lead to the avoidance of those constructional defects which affect the accuracy of ganging.

The previous articles in this series appeared in "The Wireless World" *for May 18th and 25th, June 1st, 8th, 22nd and 29th, July 20th and 27th,* 1934.

PHOTO-CELLS ON THE ROAD



Excessive sounding of hooters should be obviated by this interesting device, produced by an Austrian firm. By momentarily switching on his headlights, by night or day, an overtakiug driver can actuate photo-cell mechanism on the mudguard of the lorry in front, communicating a warning signal to the lorry driver.

New Apparatus Reviewed

Latest Products of the Manufacturers

DYNAMIC TUNED ANTENNA

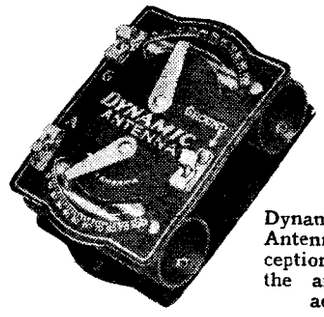
THIS is a small unit consisting of two coils whose inductance can be varied, and a fixed condenser joined across one of the coils and forming a tuned circuit. It is intended to be used in place of an aerial, but necessitates the attachment of an earth connection, for, so far as we can ascertain from an examination of the circuit, it appears to function by virtue of the currents flowing in the earth lead.

The tuned circuit is adjusted to suit the input conditions of the receiver, and the tuning is quite sharply defined, but the adjustment of the untuned coil is less critical.

The device is certainly superior to an average indoor aerial, but, of course, must not be regarded as giving results comparable with that obtained when an orthodox outside one is employed. It can be recommended for use in flats or where conditions preclude the erection of an aerial, and it has the advantage of compactness.

For best results we found it necessary to adjust the moving contact on the coils for each waveband, but, as the arc described by each arm is accompanied by a calibrated scale once the best settings have been found, they can always be repeated for each waveband with little trouble. It can be used, also, as a wave trap in conjunction with an aerial.

The Dynamic Tuned Antenna is distributed by E. M. Berriman, Broadway Chambers, Ludgate Hill, London, E.C.4, and the price is 7s. 6d.



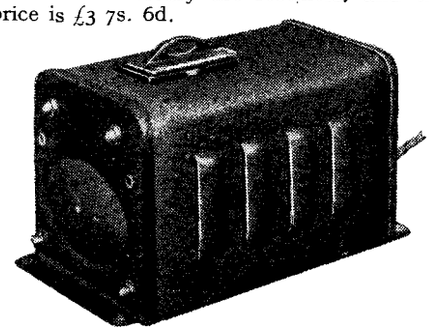
Dynamic Tuned Antenna for reception without the aid of an aerial.

BELLING-LEE D.C. RIPPLE SUPPRESSOR

THIS unit has been developed by Belling and Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex, for suppressing all interference of an L.F. nature that may be conveyed to the receiver by the D.C. supply mains. It is suitable for use only with D.C.-operated sets, and consists of a heavy-duty smoothing circuit capable of carrying 0.35 amp. continuously. A choke of some 20 ohms resistance and two henrys inductance is joined in one supply lead, and across the mains on the receiver side of the choke is a large-capacity condenser. Fuses rated at 2 amps. are inserted in each supply lead, where they enter the unit, and they are mounted in a Belling-Lee easily replaceable fuse-holder.

The Ripple Suppressor is fitted between the receiver and the D.C. mains point, a lead terminating in a universal adaptor providing the mains connection, while for the set a two-pin socket of standard size is fitted in one end of the unit.

Tests made with this unit and a D.C. set operated under bad conditions, so far as interference is concerned, resulted in the worst of the crashes and crackles being eliminated; the residue was probably of an H.F. character, and required a different form of treatment. There is, however, a Belling-Lee unit suitable for dealing with the H.F. components, and a combination of the two should provide complete immunity from all interference conveyed to D.C. sets by the supply mains. It is stated to be particularly effective where the disturbances arise from the use of mercury arc rectifiers, and the price is £3 7s. 6d.



Belling-Lee Ripple Suppressor for use with D.C. operated sets to combat mains interference.

COSSOR NEW BATTERY H.F. PENTODES

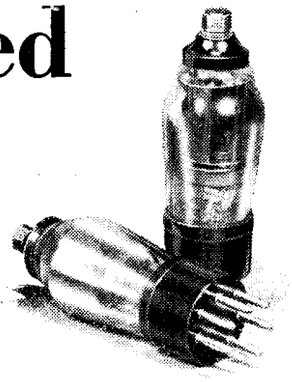
A. C. COSSOR, Ltd., Highbury Grove, London, N.5, has introduced two new H.F. pentode valves for battery operation and described as the 210 S.P.T. and the 210 V.P.T. respectively, the latter having variable-mu characteristics. The filament current in each case is 0.1 amp. at 2 volts, and either type can be obtained fitted with a four-pin or with a seven-pin base. The seven-pin models at present have plain glass bulbs, and the suppressor grid is brought out to a separate terminal, while the four-pin type are metallised, the metallising and the suppressor grid being joined internally to the filament. The top terminal in both valves and in either style is joined to the anode.

Some specimens of each type have been tested, and their measured characteristics found to conform to the maker's figures. The 210 V.P.T., when operated with 150 volts on the anode and 80 volts on the auxiliary grid, will give very good control of volume with a maximum grid bias change of 9 volts, as the tabulated list of our measurements show.

COSSOR 210 V.P.T. VALVE.

Grid Bias Volts.	Amplification Factor.	Mutual Conductance. mA./v.	Anode Current.	Aux. Grid Current.
− 1.5	800	1.32	3.1 mA.	0.7 mA.
− 3	920	0.8	1.8 ,,	0.33 ,,
− 4.5	760	0.375	0.87 ,,	0.15 ,,
− 6	480	0.15	0.56 ,,	0.08 ,,
− 7.5	400	0.09	0.4 ,,	0.05 ,,
− 9	455	0.075	0.3 ,,	0.04 ,,
−10.5	480	0.06	0.23 ,,	0.03 ,,

If the volume control is manual-operated, a 9-volt battery with a high-resistance potentiometer joined across it will suffice for this valve, for, as the table shows, the greatest change in mutual conductance occurs between 0 and −6 volts.



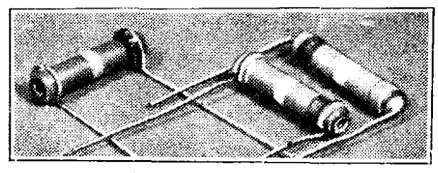
Cossor 210 S.P.T. and 210 V.P.T. two new H.F. pentodes for battery use. The latter is a variable-mu type.

The 210 S.P.T., when used as an H.F. or I.F. amplifier, requires a grid bias of about −1.5 volts, if operated with the maximum anode and auxiliary grid potential, which are 150 volts for the former, and 80 volts for the latter. Its anode current was found to be 3.55 mA., and the auxiliary grid passed 0.66 mA. The measured amplification factor was 850, and the mutual conductance 1.42 mA. per volt.

Both valves have been given a practical test in a receiver, and with the voltages adjusted according to the maker's recommendations gave exceptionally good results. They are efficient and economical in their filament and H.T. demands, and form most useful additions to the Cossor range of battery valves. The price of each type is 15s. 6d.

BRYCE METALLISED RESISTANCES

THE latest addition to the range of components made by W. Andrew Bryce and Co., Woodfield Works, Bury, Lancs, is a series of metallised resistances which are available in five types from ½-watt to 4 watts. The specimens tested are of the one-watt type, and are made in all the usual sizes from 250 ohms to 500,000 ohms. They consist of a porcelain former ¼in. in diameter and 1⅛in. long, with the resistance material deposited on the outside. Brass end-caps are fitted, and to these are securely attached the wire connecting leads.



Bryce one-watt metallised resistances.

The resistors are coated with a hard vitreous enamel, which does not soften or discolour under full load. Out of five resistances measured one only showed a deviation of more than 5 per cent. from its nominal value, and in this case the difference was but 6 per cent.

The temperature rise is not excessive, but quite normal for this style of resistor. Values are indicated by the now standardised colour code, which is made very distinctive in this make by painting a ring round the centre of the body in place of the more customary spot to indicate the final ciphers of the resistance value. These resistances are very tough and not easily broken, and the wire-ends are sufficiently pliable to stand a considerable amount of bending without coming away from their fixing. The one-watt size cost 9d. each for all values.

HINTS and TIPS

Practical Aids to Better Reception

IT is wise to make it a rule never to mount a detector grid condenser of the "flat" type directly on a metal baseboard. A little thought will show that, mounted in this way, the plates of the condenser will lie parallel to the baseboard, and as the bakelite casing of the modern component is usually thin, the spacing will amount to a very small fraction of an inch. Accordingly, a high capacity, amounting often to an appreciable number of micro-microfarads, will exist between the condenser and earth; this capacity will be additive to the other stray capacities across the detector grid circuit, and so the tuning range of the receiver may be unnecessarily restricted.

Unnecessary Stray Capacity

EVEN though ready-made tuning coils of almost every type are now so readily obtainable and are relatively so cheap, there are still occasions when one wishes to wind one's own, or, perhaps more often, when a knowledge of internal connections is useful. This applies more particularly to double-wound H.F. transformers, whether aerial-grid or inter-valve, of which the connections are rather more complicated than are those of the straightforward tuning coil or auto-transformer.

H.F. Transformer Connections

In almost every case the rule with regard to the connections of the primary and secondary windings is that the adjacent ends should be joined to the low-potential side of the circuit. Referring to Fig. 1(a), which represents in simplified form a typical arrangement, it will be seen that the low-potential end of the primary is immediately over the corresponding end of the secondary, and that these points are connected respectively to H.T. plus and to earth. In an aerial-grid transformer the aerial and earth would be connected respectively to the points marked "anode" and "H.T.+."

The same principle applies when pairs of cylindrical coils are mounted "end on," as shown in diagram (b). An arrangement of this nature is generally used only in double-tuned couplings of the band-pass type.

When the transformer consists of two narrow "pancake" coils on a common axis (as in superheterodyne I.F. transformers), the actual connections to the ends are usually not of any importance.

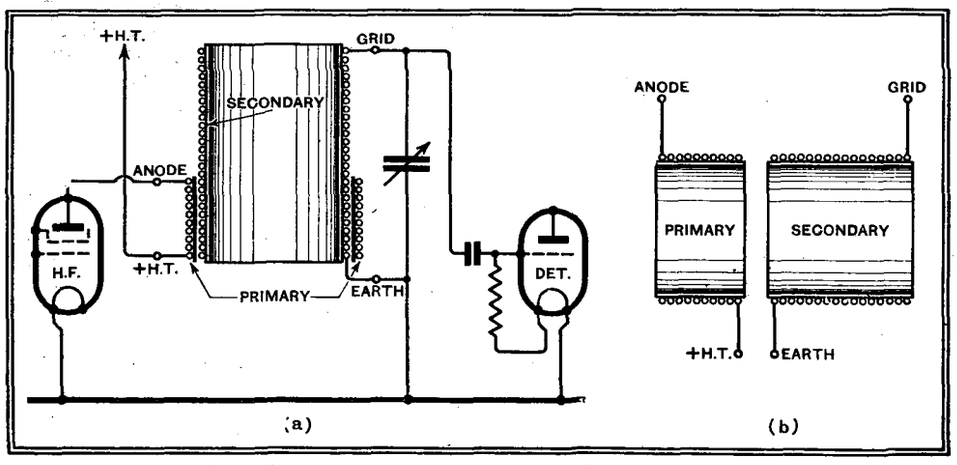


Fig. 1.—Illustrating the normal connections of high-frequency transformers.

THOSE who succeed in improving out-of-date receivers deserve all praise and commendation; but, without wishing to be discouraging, it is perhaps well to point out that the task of modernising a self-contained portable is not to be undertaken lightly. Frame aerial sets differ from others in that all the components are mounted within the field of the frame aerial, and so the prevention of undesirable interaction is likely to be much more difficult than in an "open aerial" set. Obviously, one cannot screen the frame aerial, or it would no longer act as a collector of signals; accordingly, screening of H.F. components and wiring, and also H.F. filtering, must be exceptionally complete.

Modernising the Portable

Even the most experienced of designers cannot always foresee all the possible sources of unwanted interaction, and so the layout of a portable has to be determined largely by trial and error. If one realises this, there is no reason why, with the help of a little patience, satisfactory results should not be obtained, and, indeed, the task is often a very interesting one.

IT is well known that an ordinary domestic electric bell may act more or less as a miniature spark transmitter, and so cause interference with broadcast reception. Fortunately, the trouble is not usually very serious, as it is intermittent, and in any case it is generally cured quite easily by connecting a large condenser, sometimes in series with a 20-ohm resistance, across the vibratory contact of the bell.

The Home Transmitter

On occasion, the radiating properties of an electric bell are distinctly useful; while the broadcast receiver is in operation the sound-wave radiation of the bell may be inaudible, but its electrical radiation will be heard through the loud speaker. But,

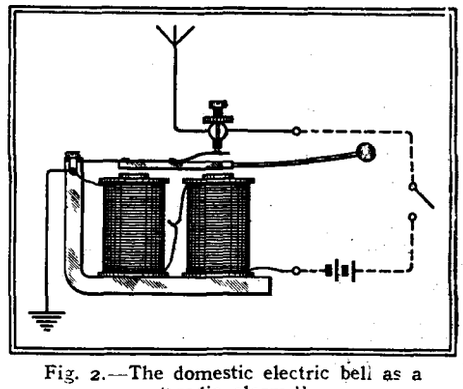


Fig. 2.—The domestic electric bell as a "radio alarm."

with the perversity of inanimate objects, a bell sometimes refuses to radiate when it is wanted to do so, and it may be useful in such circumstances to know that its efficiency as a miniature transmitter of electro-magnetic waves may be increased by connecting an extemporised aerial to the back contact in the manner shown in Fig. 2. This aerial may consist of a short length of wire, led in the most inconspicuous manner possible in the direction of the receiver or of the aerial It will generally be found that effectiveness will be increased by connecting an "earth," in the manner shown, to the bell.

It should be emphasised that the greatest care should be taken that the radiating properties of the bell are not increased to such an extent that the reception of neighbouring listeners is affected.

IT should hardly be necessary to say that perfect insulation should exist between the various electrodes of a valve. When making a test, continuity is, of course, shown when the testing apparatus is applied across the heater or filament pins, but high insulation should be shown between all other pins.

Valve Electrode Insulation

Occasionally, the electrodes become displaced, with the result that two or more of them make contact internally; the fact that this defect exists is easily ascertained

with almost any form of tester. The most probable fault of this nature is contact between grid and cathode or filament.

It will sometimes be found that a collapse of the electrode system only becomes evident when the valve is warm, and so a test between the various pins may be made while the heater or filament is connected to the normal source of voltage.

An internal disconnection, though uncommon, is by no means unknown. Continuity of connections to anodes and screening grids, etc., may be checked readily with the help of a milliammeter while the valve is *in situ*, and, of course, the method of testing the heater is obvious. A break in the grid circuit is rather more difficult to find; perhaps the easiest and most definite way of making a test is to connect a sensitive meter and a battery, or a pair of phones and a battery, in series between grid and cathode; the polarity of the battery should be such that the grid is made positive when the testing circuit is completed. If a detectable current flows, we have proof positive that internal continuity exists. For making a test of this sort, a 9-volt grid bias battery is generally suitable; one should use the lowest possible voltage, but this will depend on the sensitiveness of the testing device.

A Logical Deduction

WHEN tracing a fault in a superheterodyne receiver, the field of search may sometimes be narrowed down considerably if it is remembered that, provided the receiver works normally on *either* waveband, it may be concluded definitely that the I.F. amplifier, second detector, and L.F. circuits are free from suspicion. A failure on one waveband only must be due, then, to the signal-frequency circuits, or possibly to the oscillator.

The World's Smallest ?

A Visit to Sofia's 300-watt Broadcasting Station

TO Sofia, the capital of Bulgaria, I would award the palm for possessing the world's smallest State-recognised broadcasting station. True, I have seen amateur stations in far-flung corners of the Empire using only five watts, but the 300-watt station at Sofia is more than an amateur plant; it is the official "voice" of Bulgaria.

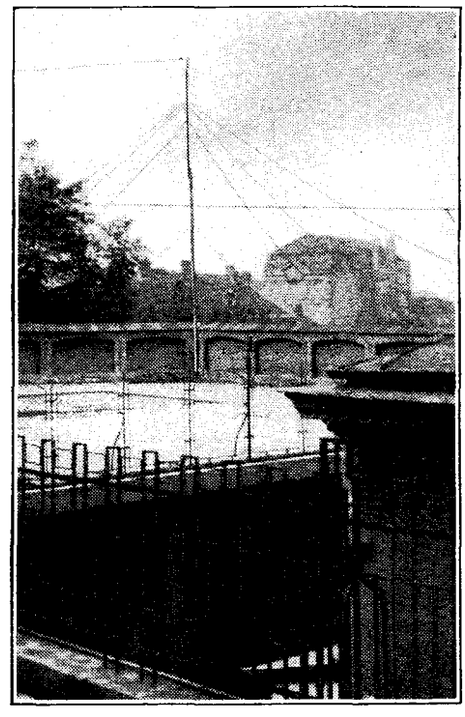
I have watched artistes performing in our own palatial studios in Portland Place and in many of Europe's leading stations, but some of my happiest evenings have been spent sitting on old batteries, coils and other paraphernalia in "Broadcasting House," Rue Benkovsky, Sofia. Imagine three small rooms in a very ordinary building above which two wooden aerial poles proclaim Rodno Radio. In the tiny transmitter room you will find the familiar Hartley circuit at work, giving reliable reception to crystal sets up to six miles distant. Good signals have been reported with detector and two L.F. sets at over sixty miles, while with an H.F. stage Rodno Radio has been heard 124 miles to the North and 186 to the South. Northern reception is somewhat restricted by the Stara-Planina mountains.

Planning New Stations

In the "studio" next door you will hear the voluntary artistes giving highly creditable performances. The third room is used as a spare studio, committee room, green room and office.

During the recent *coup d'etat* in Bulgaria, Rodno Radio played a dramatic part, the military forces taking over the station and broadcasting national music on records. The proclamation of the new dictatorship was subsequently broadcast.

These are Writtle days for Bulgarian broadcasting, for before the year is ended, there will be a 50-kilowatt State station.



All that can be seen of "Rodno Radio" in the Rue Benkovsky, Sofia. The transmitter, studios, green rooms and offices occupy three apartments.

In the meantime, Rodno Radio carries on while its amateur supporters are busily constructing a 3-kilowatt plant.

C. W. L.

A NEW BOOK

Television: Theory and Practice. By J. H. Reyner, B.Sc., A.C.G.I., A.M.I.E.E., M.Inst.R.E. Pp. 196, with 88 figures and 12 plates. Published by Chapman & Hall, Ltd., 11, Henrietta Street, London. Price 12s. 6d.

Current interest in television makes the present time an appropriate one for the appearance of a new book on the subject. A very useful and up-to-date review is provided in this new book by Mr. J. H. Reyner. Its up-to-date character is indicated by the date of the author's preface, "March, 1934," while the same preface says: "An attempt has been made to convey fundamental information which will be of real value to the student of the subject . . . descriptive matter has been reduced to a minimum, only those examples having been included which are likely to point the way to future developments."

The author succeeds in this object of giving a good general picture of the principles of television not overloaded with details of any particular system. As a criticism, indeed, it could even be said that at times more details of certain systems might have been welcome, but, within the scope of a book of modest dimensions, the present state of the art is well presented in clear language with a very minimum of mathematics. Modern cathode-ray methods are discussed in reasonable detail, including the method of velocity-modulation, which has recently made its appearance in British practice. Modern film methods are briefly discussed, and Continental and American tendencies indicated, while a brief chapter deals with short-wave reception such as is likely to be of importance in forthcoming television practice.

The Radio Industry

THE price of the Eelex Duplex short-wave coil and base, reviewed in our issue of July 27th, is now 4s., and not 7s. 6d. as stated in the review.

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During the month of August work is to begin on the installation of a new short-wave Philips transmitter at Tandjong Priok in the Dutch East Indies.

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A new firm, trading under the name of Marrison and Catherall, Ltd., of Forncett Street, Sheffield, 4, has been formed to manufacture permanent magnets of various types.

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A leaflet issued by the Central Technical College, Suffolk Street, Birmingham, contains the syllabus of a part-time course of technical training to meet the requirements of the radio industry. Information regarding the course can also be obtained from Mr. C. C. Shipway, Hon. Secretary of the Midlands Radio Luncheon Club, at 31, Holloway Head, Birmingham, 1.

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We have just had an opportunity of examining the new series of Telsen receivers; the principal model embodies an extremely promising superheterodyne chassis with a stage of signal-frequency amplification.

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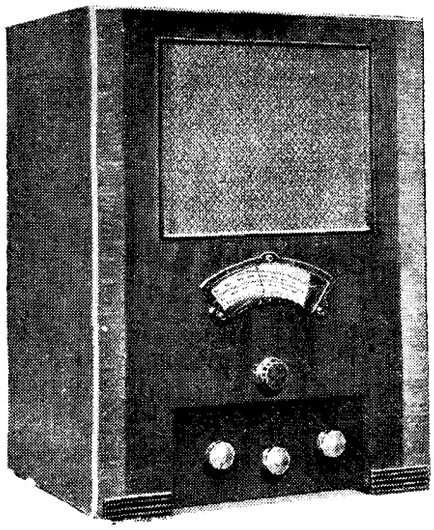
Under the title of "Modern Service Methods," a thirty-two-page book (price 7½d., post free) has been issued by Everett, Edgcumbe and Co., Ltd., Colindale Works, London, N.W.9. It describes the uses of the Radiolab Set Tester.

C.A.C. "Austin" Battery Receiver

High Sensitivity and "Mains" Volume and Quality



FEATURES

***Type.**—Table-model battery superheterodyne receiver with A.V.C. **Circuit.**—Heptode frequency changer—var.-mu pentode I.F. amplifier—double-diode-triode second detector—triode driver valve—Class "B" output valve. **Controls.**—(1) Tuning. (2) Volume control and on-off switch. (3) Wave-range switch. (4) Tone control. **Price.**—16 guineas. **Makers.**—City Accumulator Co., Ltd., 18/20, Norman's Buildings, Central Street, London, E.C.1.*

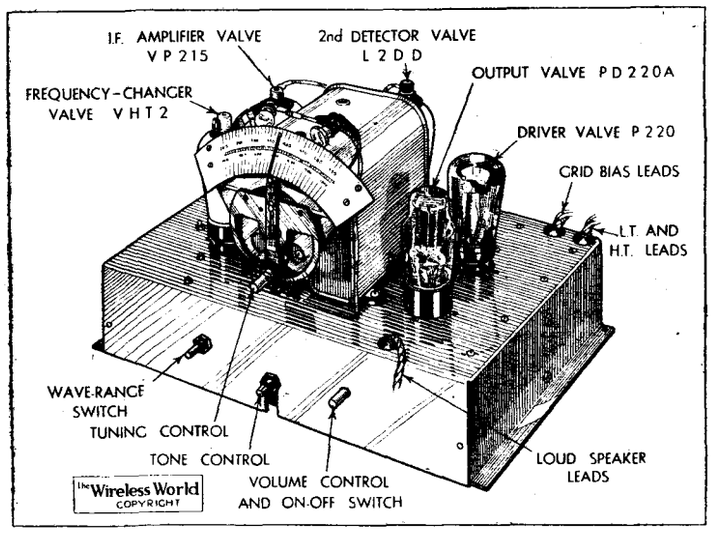
THE A.C. mains predecessor of this receiver was reviewed in this journal on March 2nd of this year, and it will be remembered that one of the outstanding qualities of its performance was the high overall efficiency of the circuit. In designing the equivalent battery model the makers have set out to sustain the favourable impression created, and there is little doubt that their efforts have met with success.

Daylight reception of Continental stations on medium waves gives a good indication of the range of the set, no fewer than nine stations being received at excellent programme strength on this waveband during a rapid search round the dial in the morning. The long-wave performance in this respect is also outstanding, and the volume from Huizen is equal to that which is obtained from Radio Paris on the majority of four-valve superheterodynes. The automatic volume control works well, and there is very little to choose between the volume from the London, Midland and North Regional transmitters.

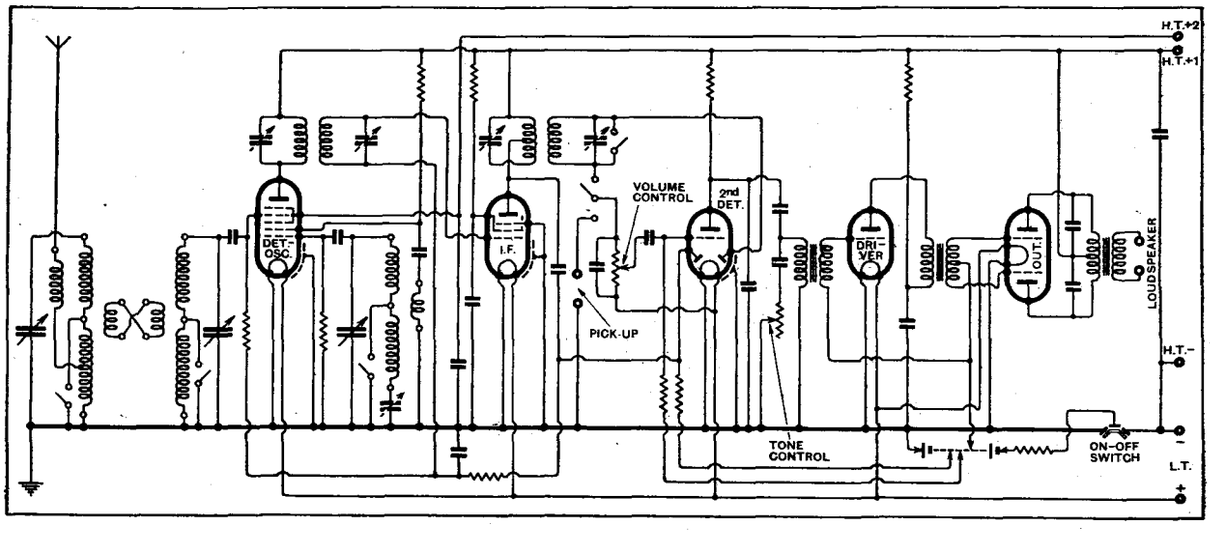
As regards selectivity, three channels on either side of the Regional transmitter and two channels on the National transmitter were lost in Central London, and on long waves Königswusterhausen could be tuned in clear of modulation interference from Daventry and Radio Paris but with the usual trace of sideband splash. Incidentally, the long-wave reception was noticeably free from background noise, due to the high degree of sensitivity and to the fact that the automatic volume control is brought into use on most of the stations. A single second-channel whistle on 472 metres, due to the London Regional transmitter, was the only interference of this type to be found on either waveband.

The permanent magnet loud speaker has a 9in. cone, and the quality is notable for the fullness of the bass response, which is much above the average, and is not due to unnatural resonance. There is also an ample output of the higher audio frequencies which may be modified by the tone control to provide an acceptable balance.

There is nothing freakish about the circuit design, and the results have been obtained by careful attention to detail. A band-pass filter with link coupling precedes the heptode frequency-changer valve, while a variable-mu H.F. pentode is employed in the I.F. stage. A double-diode-triode is used in the second detector stage, one of the diodes being used for rectification and the other for A.V.C. The H.F. input to the latter diode is taken from the primary of the second I.F. transformer. A separate driver valve has been included to supply the grids of the Class "B" output valve, so that with the additional amplification of the triode portion of the detector and with the voltage step-up of two transformers it is obvious that the L.F. stages make a considerable contribution to the high overall gain of the set. The tone control is connected across the primary of the first L.F. transformer, so that, like the volume control, it is operative both on radio and gramophone. A milliammeter connected in the negative H.T. lead showed the total quiescent current to be 12.5 mA. On sustained loud passages the current rose to between 20 and 25 mA., but it would be reasonable to fix the average discharge at about 15 or 16 mA. The grid bias cells are included in the H.T. battery itself, and a third contact on the on-off switch connects a resistance across these cells in order that they may be discharged approximately at the same rate as the H.T. cells. This is done to avoid over-biasing as the H.T. voltage falls.

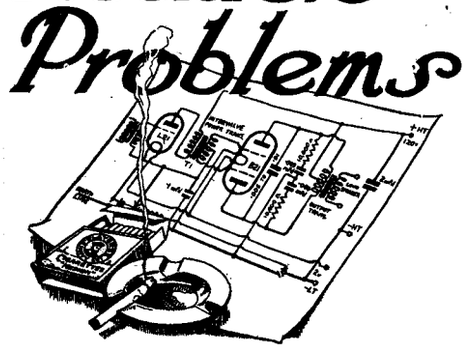


The chassis is constructed of cadmium-plated steel and the tuning condenser is mounted on rubber.



Complete circuit diagram. Two stages of L.F. amplification precede the output valve and the tone control operates both on radio and gramophone.

Readers' Problems



THESE columns are reserved for the publication of matter of general interest arising out of problems submitted by our readers. Readers requiring an individual reply to their technical questions by post are referred to "The Wireless World" Information Bureau, of which brief particulars, with the fee charged, are to be found at the foot of this page

Simplest Volume Control

THE owner of a somewhat out-of-date set, without any form of volume control and without variable-mu valves, asks us to recommend some easily fitted form of regulation, which can be added without any difficulty and used temporarily until a more up-to-date set is assembled.

Some type of predetection control is clearly desirable, and we think our correspondent cannot do better than adopt the simple plan of connecting a variable resistance of some 5,000 ohms across the aerial and earth circuit of the set. The variable resistor should preferably be of the tapered type, but this is not very important if a plain variable resistance should happen to be available. A volume control of this type is by no means perfect, but it will probably serve well enough as a temporary measure.

Condensers in Series

AT first sight there would seem to be no theoretical objection to using two 4-mfd. condensers, rated for working at 250 volts and connected in series, in a position where a 2-mfd. condenser of the 500-volt type would normally be employed. The capacity of the two condensers would obviously be of the desired value, and as the applied voltage would presumably be divided equally between them, there should be no risk of breakdown.

This would be true enough were it not for the fact that the insulation resistance of condensers is by no means infinity, and, worse still from our present point of view, is not always a constant quantity. It is by no means uncommon to find that the resistance of two ostensibly similar condensers differs to the extent of 100 per cent. or more. The proportion of the total applied voltage that each condenser will have to withstand is inversely proportional to its insulation resistance, and, in the conditions we are considering, the actual voltages might easily be under 200 and over 300 volts for individual condensers of the series-connected pair.

The reader who raises the question of connecting low-voltage condensers in series will therefore realise that the matter is not so straightforward as it would appear. His best plan is to equalise the working voltage of each of the series-connected condensers by connecting resistances of equal value across each of them; values should be low enough to "swamp" the internal leakages, but high enough to avoid the imposition of an undue drain on the source of supply voltage. In most cases resistances of 1 megohm may safely be used for the purpose.

A Switching Problem

IN the older type of battery-fed receiver the problem of devising an on-off switching system could hardly have been simpler; it was merely necessary to provide a single-pole switch for making or breaking the supply of L.T. current to the filament circuit. It was really quite unnecessary to provide for interrupting the grid bias or H.T. leads.

Since variable-mu valves have become almost universal the position has changed,

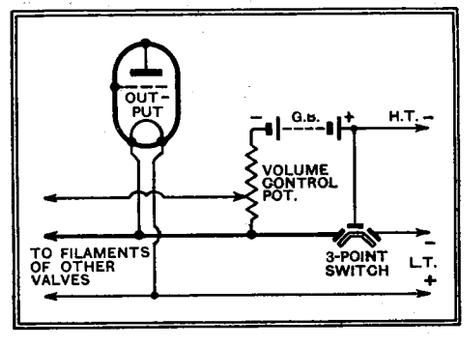


Fig. 1.—Connections of a three-point switch for interrupting L.T., H.T., and grid bias battery circuits.

as there is generally a flow of current from the grid bias battery through the volume-control potentiometer while the set is in operation. Although the devising of a suitable switching system to meet these new conditions is not a difficult matter, it is fatally easy to do it in the wrong way, especially if one aims at over-simplification of the connections.

These remarks are prompted by a letter from a correspondent who proposes a method of switching which, though simple enough, is open to criticism on several points. It is doubtful whether one can do better than adopt the standard arrangement employed in most *Wireless World* battery sets, which is shown diagrammatically in Fig. 1.

A.V.C. and Self-Oscillation

THE fitting of A.V.C. to a receiver tends to mask the presence of uncontrollable self-oscillation in the H.F. amplifier; at any rate, it causes the defect to manifest itself in an unusual way. This point is illustrated by the experiences of the constructor of a "straight" set with A.V.C., who finds that the receiver oscillates uncontrollably over certain sections of the tuning scale when the A.V.C. lead is disconnected. On replacing this connection, self-oscillation disappears, but, instead, violent motor-boating becomes evident at the same tuning positions.

What is probably happening can best be explained by referring to Fig. 2. As soon as the H.F. valve reaches a condition of self-oscillation an excessively high voltage is applied to the detector and A.V.C. device which succeeds it; as a result, an abnormally high negative A.V.C. voltage is fed back to the H.F. grid. The mutual conductance of

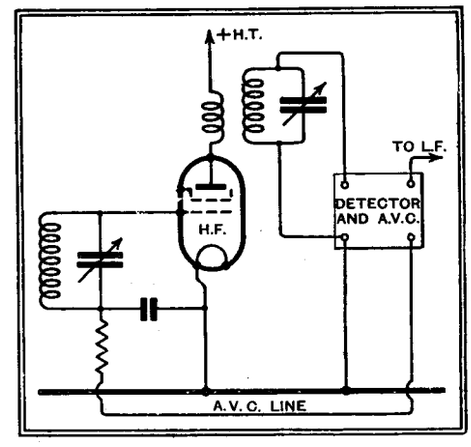


Fig. 2.—Explaining the production of fictitious motor-boating in a receiver with A.V.C.

the H.F. valve is accordingly reduced, and so self-oscillation can no longer take place. This cycle of events goes on repeating itself with a periodicity determined by various constants of the circuits, and gives the audible effect of low-frequency self-oscillation. We do not imagine that the A.V.C. system itself is at fault; the trouble lies purely in the H.F. circuits.

Insufficient Bias Indicated

WE are asked to say what may be deduced from the fact that rotation of a gramophone volume-control potentiometer produces small but quite definite changes in a tuning indicator meter which is connected in the detector anode circuit of our querist's receiver. It is rightly concluded that the meter should be inoperative, so far as gramophone reproduction is concerned. As a radio receiver the set gives no grounds for complaint, but quality of reproduction is not thought to be so good when gramophone records are being played.

In view of our correspondent's statements, it is logical to assume that the detector valve, when converted for operation as a gramophone amplifier, is insufficiently biased—or, perhaps, not biased at all. If this be so, a continuous flow of grid current will be taking place, and the effect of manipulating the gramophone volume control will be to vary the amount of resistance in the detector grid circuit, and consequently the bias voltage developed across this resistance by the flow of grid current. Anode current will change in sympathy, and so the variations of the tuning indicator are readily explained. If our deductions are correct the remedy is obvious, but the possibility of a "soft" detector valve is not entirely precluded.

The Wireless World

INFORMATION BUREAU

THE service is intended primarily for readers meeting with difficulties in connection with receivers described in *The Wireless World*, or those of commercial design which from time to time are reviewed in the pages of *The Wireless World*. Every endeavour will be made to deal with queries on all wireless matters, provided that they are of such a nature that they can be dealt with satisfactorily in a letter.

Communications should be by letter to *The Wireless World* Information Bureau, Dorset House, Stamford Street, London, S.E.1, and must be accompanied by a remittance of 5s. to cover the cost of the service.

Personal interviews are not given by the technical staff, nor can technical enquiries be dealt with by telephone.

MISCELLANEOUS ADVERTISEMENTS

NOTICES.

THE CHARGE FOR ADVERTISEMENTS in these columns is

12 words or less 3/- and 3d. for every additional word.

Each paragraph is charged separately and name and address must be counted.

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ADVERTISEMENTS for these columns are accepted up to FIRST POST on MONDAY MORNING (previous to date of issue) at the Head Offices of "The Wireless World," Dorset House, Stamford Street, London, S.E.1, or on SATURDAY MORNING at the Branch Offices, 19, Hertford Street, Coventry; Guildhall Buildings, Navigation Street, Birmingham, 2; 260, Deansgate, Manchester, 3; 26B, Renfield Street, Glasgow, C.2.

Advertisements that arrive too late for a particular issue will automatically be inserted in the following issue unless accompanied by instructions to the contrary. All advertisements in this section must be strictly prepaid.

The proprietors retain the right to refuse or withdraw advertisements at their discretion.

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The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

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For the convenience of private advertisers, letters may be addressed to numbers at "The Wireless World" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge, which must include the words Box ooo, c/o "The Wireless World." All replies should be addressed to the Box number shown in the advertisement, c/o "The Wireless World," Dorset House, Stamford Street, London, S.E.1. *Readers who reply to Box No. advertisements are warned against sending remittance through the post except in registered envelopes; in all such cases the use of the Deposit System is recommended, and the envelope should be clearly marked "Deposit Department."*

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Readers who hesitate to send money to advertisers in these columns may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Wireless World," both parties are advised of its receipt.

The time allowed for decision is three days, counting from receipt of goods, after which period, if buyer decides not to retain goods, they must be returned to sender. If a sale is effected, buyer instructs us to remit amount to seller, but if not, seller instructs us to return amount to depositor. Carriage is paid by the buyer, but in the event of no sale, and subject to there being no different arrangement between buyer and seller, each pays carriage one way. The seller takes the risk of loss or damage in transit, for which we take no responsibility. For all transactions up to £10, a deposit fee of 1/- is charged; on transactions over £10 and under £50, the fee is 2/6; over £50, 5/-. All deposit matters are dealt with at Dorset House, Stamford Street, London, S.E.1, and cheques and money orders should be made payable to Iliffe & Sons Limited.

SPECIAL NOTE.—Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post. When sending remittances direct to an advertiser, stamp for return should also be included for use in the event of the application proving unsuccessful.

IMPORTANT NOTICE.

Owing to the August Bank Holiday, the next issue of "THE WIRELESS WORLD" (dated August 10th) is closing for press earlier than usual.

In accordance with the Notice that appeared last week, the latest date upon which Miscellaneous Advertisements could be accepted for the above issue was

FIRST POST FRIDAY, August 3rd.

Set Manufacturers' Surplus, Clearance and Bankrupt Stocks offered in any of these columns may not be Manufacturers' current lines. Radio components advertised at below the list price do not carry any manufacturer's guarantee.

RECEIVERS AND AMPLIFIERS, ETC.

L. EASTWOOD Sound System.

"REPRODUCTION that is Almost Perfect."

TYPE PPR25.2 Two Stage Push-pull Amplifier Having an Undistorted Output of 25 Watts; this amplifier is very suitable for use in skating rinks, swimming baths, stadiums or anywhere where extremely large output is required for speech or music; supplied complete with valves and meter in steel case; price 30 guineas.—Write Dept. A.

70, Pitfield St., N.1. Clerk. 7693. [6189

"PHILCO" 5-valve Superhet, D.C., 220-250 volts, 7 guineas; "Ferranti" A.F.5, £1.—Hopkins, Drumshantie Rd., Gourock. [6203

SHORT Waves!—1934 New Eelex M.2 Super Universal A.C. S.W. converter, less valves; listed £7, bargain at £4/15.—18, Prince of Wales Rd., Norwich. [6205

1935 Models 4 Valve Superhet, A.C. or D.C., M.C. Speaker, £3/19/6; 5 valve, £5 5s. including valves; approval.—Royal, 5, Buckingham Rd., London, E.18. [6126

25-WATT A.C. Mains Amplifier by Partridge and Mee, output P.P. 5-400, perfect condition in every detail. —36, Breakspears Rd., S.E.4. 'Phone: New Cross 3102. [6223

OUR Kit of Parts for "Wireless World" Quality Amplifier, complete in every detail, including valves; amplifier only, £8/10; feeder unit, 36/-; send for detailed list of components.

WE Can Supply Kits for Any "Wireless World" receiver or amplifier; carriage paid, cash with order or c.o.d.

WARD, 45, Farringdon St., London, E.C.4. 'Phone: Holborn 9703. [6164

SPECIAL Clearance.—New 1933-34 models Ultra Tiger 4v. Superhets, list 14 guineas, £8/15; also Alba, Ekco, Cromwell and G.E.C. sets; list on application.—R. B., 34, Ardern Terrace, Leicester. [6170

PYE G.B. Q.P.P., £7; Burgoyne transportable 3, £3; Osram 33, factory built, £4/10; Norman 6v. A.C.-D.C., 10-2,000 m., £10; all battery sets include valves, batteries, speaker.—Warren, 38, Inglis Rd., Ealing Common, W.5. [6180

55/-.—Class "B" 3-valve band pass, in superb horizontal 2-colour walnut cabinet, Radiophone 2-gang in metres, Rola P.M. (without valves, batteries), listed £9/9; c.o.d., carriage forward.—Kay, 167, City Rd., London, E.C.1. [6197

Receivers and Amplifiers, Etc.—Contd.

GECOPHONE 6 Valve Supersonic Heterodyne, including coils, 13 to 720 metres, connecting cords, etc., very excellent condition, hardly used, first reasonable offer accepted.—Richard Nash, Rackenford Lodge, Queen's Road, Weybridge. Telephone: 1409. [6103

ARMSTRONG Latest Radio-Gram Chassis, incorporating advanced designs, Superheterodyne including Marconi valves, Royalties paid, £6/18/6; Armstrong 4 valve, 3 pentode chassis, complete, £5/18/6; Universal 4 valve chassis, complete, £5/18/6.—Armstrong Company, 100, King's Road, N.W.1. [6138

PUBLIC Address Amplifiers.—A.C. mains, three stage, 21 watts, undistorted A.C. output, complete with valves, £15; universal A.C./D.C. three stage, 7 watts output, complete, £13; guaranteed 12 months; trade supplied; deferred terms.—D. E. Clarkson, B.Sc. (Eng.), 45, Manor Rd., Wallington, Surrey. 'Phone: Wallington 3953. [6120

MIDGET Receiver, brand new, ideal for travellers, etc., working off A.C. and D.C. mains, 100-130 or 200-240 volts, by universal adapter supplied, all incorporate M.C. speaker, provision for gramophone pickup, L. and M. wave, complete with valves, etc.; Emerson 5-valve chassis (as above), sealed cartons, £3/15; above chassis, incorporated in handsome figured walnut cabinet (10×7½×5½), list 10 guineas, at £4/6/3; also (six only) Sparton "63" 6-valve, 7-stage, superhets, 3-point tone control, A.V.C., walnut cabinet (12½×7½×4½), guaranteed over 70 stations, at £7/10; carriage paid; cash with order or c.o.d.—Degalliers, 4-21, Upper Marylebone St., London, W.1. [6163

MAINS EQUIPMENT.

VORTEXION Leads Again.

VORTEXION Specified Single Span Model, 350-100 m.a., 4v. 5a. C.T., 4v. 2.5a. C.T., 4v. 1a. C.T.; 25/-, less terminals, 23/-, less 5-year guarantee 21/-; power chassis, complete, £3/10; steel chassis only, 7/6; also normal model, shrouded, at 16/-, special shrouded choke 12/6.

VORTEXION.—Quality amplifier or super monodial, 425-0-425, 120 m.a., 4v. 6-8a. C.T., 4v. 3a. C.T., 4v. 1a., 4v. 1a., super shrouded, core size 2¼in.×1½in., 2½% regulation primary engraved insulated terminals, weight 14lb., 26/-, carriage 2/-; normal shrouded, 22/-; open type, 20/-, post 1/3; speaker field replacement choke, 16/-; special output transformer, to "W. W." spec., 12/6.

VORTEXION 7-30h. 120 m.a. Choke, 215 ohms, in die cast shrouding to match; 12/6.

IMITATED, but unequalled. Good enough for a "Wireless World" specification is good enough for you.

VORTEXION Cost Little More than the Cheapest, but unequalled by the dearest.

VORTEXION Standards Despatched by Return.

VORTEXION A.C./34 used by author in construction of A.V.C. Three, as illustrated; 18/-.

GUARANTEED 12 Months, and within 5% normal and 2½% super models, neat shrouding, with detachable feet, as used by Government Departments, etc., etc.; any model guaranteed 5 years at extra cost of 2/-.

ALL Secondaries Centre Tapped.

VORTEXION.—250-0-250 60 m.a. 4v. 1 to 2a., 4v. 2 to 4a., open type, 10/-; shrouded, 12/6; post 9d.

VORTEXION.—Ferrocart III, 350-0-350, 60 m.a., 4v. 2.5 C.T., 4v 3.5 C.T.; open type 13/6, shrouded 16/-; post 9d.

(This advertisement continued on next page.)

Mains Equipment.—Contd.

(This advertisement continued from previous page.)

VORTEXION.—Super model for H.T.8 or 9 or 10, 4v. 1 to 2, 4v. 2 to 4; open type 14/6; shrouded 16/6; post 1/-.

VORTEXION.—350-0-350, 120 m.a., 4v. 2 to 5a., 4v. 2 to 4a., 4v. 2.5a.; open type, 14/6; shrouded, 16/6; super shrouded model, weight 11lb., 4 filaments to specification, 21/-; post 1/3.

VORTEXION.—400 or 450 or 500v. 120 m.a., 4v. 2 to 5, 4v. 2 to 5, 4v. 2, 5a.; open type, 19/-; shrouded, 23/-.

VORTEXION.—400 or 450 or 500, 150 m.a., 4v. 4a., 4v. 2.5, 4v. 2, 4v. 2, 4v. 2, core size 2¼×1¼in., a super job, 2% regulation, 35/-; shrouded, with terminals; less terminals, 30/-; open type, 26/-; post 1/3.

VORTEXION Auto Transformers to B.E.S.A. Specification, 100, 110, or 120v. to 200, 220, or 240 volts, 60 watts, 9/-; post 9d.; 120 watts, shrouded 12/6, open type 10/6, post 1/-; 200 watts, shrouded 16/6, post 1/-; 2,000 watts, £4/10.

VORTEXION 1,000-watt Transformers; £4/10, carriage free.

VORTEXION 30h. at 60 m.a. Chokes, 5/6; 40h. at 60 m.a., 8/6; 30h. at 150 m.a., 200 ohms, 10/6 open type, 12/6 shrouded

VORTEXION Transformers Made to Your Specification; price according to wattage, 6v. filaments same price unless wattage grossly exceeded; special quotations by return.

VORTEXION (S. A. BROWN), 182, The Broadway, Wimbledon, S.W.19. Tel.: Liberty 2814. [5901

TANTALUM for A.C. Chargers H.T. and L.T.—Blackwell's Metallurgical Works, Ltd., Garston, Liverpool. [5039

PARAMOUNT Mains Transformers, equal to any, and better than most; try them once and you will always use them!

PARAMOUNT, single-span model, 350-0-350v. 100 m.a. 4v. 5a., 4v. 1a., 4v. 2.5a., shrouded, screened primary 2½% regulation; 20/-.

PARAMOUNT.—350-0-350v. 120 m.a., 4v. 5a., 4v. 4a., 4v. 2.5a., shrouded, screened primary, suitable for single span; 16/-, post 1/-.

PARAMOUNT Mains Transformers are Guaranteed for 12 months and made from the very best British materials.

PARAMOUNT.—250-0-250v. 60 m.a., 4v. 1-2a., 4v. 2-4a., 10/-, post 9d.

PARAMOUNT.—Chokes, 30h. 60 m.a., 5/6, post 9d.; 20h. 120 m.a, shrouded, 11/-; open, 8/6, post 9d.

PARAMOUNT Products are Fitted with Neat Aluminium frames or shrouds, all filaments are centre tapped, insulating paper between each layer; every component must pass a stiff test before it leaves our works.

PARAMOUNT.—500-0-500v., or 450v., or 400v., 120 m.a., 4v. 5a., 4v. 4a., 4v. 2.5 amps., shrouded, screened primary, 21/-; open 18/-; post 1/3.

PARAMOUNT Transformers for Westinghouse H.T.8, 9, or 10, with 4v 2a., 4v. 4a., shrouded, 16/-, post 1/-; for H.T.11, 45/-, post 1/6.

PARAMOUNT.—Guaranteed electrolytic condensers, 4+4 mfd., 500v. peak, 3/6, post 3d.; let us quote you for any component you may need.

PARAMOUNT.—Auto-transformers, 100-120v. up to 200-250 volts, or vice versa, 60-watt, 8/6; 120-watt, 10/-; shrouded, 12/-; post 9d.

PARAMOUNT.—Any transformer made to your own specification; price according to wattage; quotations by return.

PARAMOUNT Mains Transformers, manufactured by Brock and Salter, 66, Hartfield Rd., Wimbledon, S.W.19. (one minute from Wimbledon Station). Tel.: Liberty 3226. [6216

HOYNE'S Transformers, fitted with tapped and screened primaries, filaments, all centre tapped, stout cast aluminium clamps and clearly marked terminal strips are fitted to all models: write for list.

HOYNE'S Components are Guaranteed for One Year; one type only manufactured, the best, as used by many well-known set manufacturers after testing all others.

HOYNE'S.—"W.W. transformers, wound strictly to specification of author; "W.W." test reports, June 22nd: "The insulation is particularly good throughout . . . the transformer is satisfactory in all respects."

HOYNE'S.—Push-pull quality amplifier transformer, 25/-, post 1/3; 7/30 henrys choke, 9/6, post 9d.; 20 henrys, 7/6, post 9d.

HOYNE'S.—Single span, 15/-, post 1/-; choke, 10 henrys, 7/6, post 9d.

HOYNE'S.—Everyman A.C. super transformer, 12/6, post 1/-; choke 10 henrys, 7/6, post 9d.

HOYNE'S.—A.V.C. Straight Four transformer, 18/-, post 1/3; choke, 26 henrys 120 m.a., 140 ohms, 9/6, post 9d.

HOYNE'S.—A.V.C. Three transformer, 12/6, post 1/-; choke, 30 henrys, 60 m.a., 7/6, post 9d.

HOYNE'S.—250-0-250v. 60 m.a., 4v. 1 to 2a, 4v. 2 to 4a., 10/-, post 9d.; with extra 4v. 1 to 2a. winding, 12/6, post 1/-.

HOYNE'S.—Ferrocart 111, 350-0-350v. 60-70 m.a., 4v. 2 to 3a., 4v. 2 to 4a., 12/6, post 1/-; with extra 4v. 1 to 2a. winding, 13/6, post 1/-.

HOYNE'S.—500-450-0-450-500v. 140 m.a., 4v. 2 to 4a., 4v. 4 to 6a., 4v. 2a., 4v 2a., 27/6, post 1/3; weight 11lb.

HOYNE'S Transformers, built to specifications up to 1 K.V.A., keenest prices, best materials and workmanship; quotation by return.

M. J. HOYNE, ALL-POWER TRANSFORMER, Ltd., Offices and Works, 8a, Gladstone Rd., Wimbledon, S.W.19. Tel.: Liberty 3303. [6079

LESDIX Chargers, all steel, A.C. and D.C. mains, 2 to 200 cells at low prices; state requirements; dynamos and rotaries in stock, all sizes; battery superseders for 2-volt input, 80-volt output, 37/6; fractional H.P. and sewing machine motors, 25/-.—Below.

LESDIX Measuring Instruments, 2½in. bakelite case, flush panel, any reading, A.C. or D.C.; from 6/- each; ask for full range instrument list.—Below.

LESDIX Microphones.—We are makers of 25 types for all uses; Home Radio mikes, solid bakelite body, 5/6; G.P.O. microphones, on stand, with mouthpiece, 7/6; P.A. mikes, 50/-; list free.—Electradix Radios, 218, Upper Thames St., London, E.C.4. [0398

Mains Equipment.—Contd.

A.C. or D.C. Chargers for 2 to 200 Cells at Low Prices; state requirements; dynamos and rotaries in stock; all sizes; Brown's Generometer, battery superseders for H.T. for 2v. or 6v. input, 37/6 and 52/6; television and sewing machine universal motors, 25/-; lists.—Electradix Radios, 218, Upper Thames St., E.C.4. [0398

CABINETS.

MANUFACTURERS' Clearance.

ULTRA "Panther," a modern cabinet, with contrasting figured walnut veneer panels, 20×17×11, 13/6; pedestal type, 35×22×12, 30/-, undrilled; photo sent on request.

SET and Speaker Cabinets; 5/- upwards

RADIOGRAM Cabinets; 37/6 upwards

SPEAKER Cabinets; 4/6 upwards

SEND Particulars of Your Requirements (giving size of set, etc.), or call and make your choice from our stocks of over 100 different types; from 3/6 to £4/10.

REFER to Previous Advts. for Detailed List of Bargains.

H. L. SMITH and Co., Ltd., 287-9, Edgware Rd., London, W.2. Tel.: Padd. 5891. [6052

ILLUSTRATED List of Radio-Gramophone Cabinets at Bargain Prices, and descriptive literature of the Howe box baffle, recommended by the B.B.C., post free.—Gilbert, Cabinet Maker, Swindon. [0431

COILS, ETC.

SET Ferrocart Coils, unused, G10, 11, 12, 13; 30/-.—A. G. Burgess, 189, Gunnersbury Lane, Acton, W.3. [6215

DYNAMOS, ETC.

5 Guineas.—Electro dynamic, complete with smoothing and soundproof case, input 50v. D.C., output 220 A.C., 100 watt; ditto 210 D.C. input; c.o.d., carriage paid.—Kay, 167, City Rd., London, E.C.1. [6198

WIRELESS Generators, hand driven, type E10, 800v. 30 m.a., and 6v. smooth D.C., £5; type M.G.23, 1,100v. 25 m.a., smooth D.C., £4; by Evershed & Vignoles.—Urquhart, 371, Earlsfield Rd., London, S.W. [6186

GRAMOPHONES, PICK-UPS, RECORDERS.

RETAILER'S Bankrupt 1934 Stock, sealed cartons, brand new pick-ups: Marconiphone, type 19, list 32/6, at 22/6; B.T.H. Senior De Luxe, list 37/6, at 28/-; Celestion W8, list 35/-, at 17/-.

GRAMOPHONE Motors, changers, etc.: Garrard automatic record changers, complete with pick-up, etc., list £10, at £7/10 (crate 5/- extra, returnable); Garrard radiogram units, complete with pick-up, etc., 202A, list £4/1/9, at £3; A.C.4, list £3/15, at £2/16; Garrard double spring (clockwork), with unit plate, 11B, at 25/-; Collaro unit, complete with pick-up, auto. stop, etc., list £4, at 47/6; all carriage paid.—D.galliers, 4/21, Upper Marylebone St., London, W.1. [6211

LOUD-SPEAKERS.

FERRANTI M1; cost £9/10, sell £3/5.—82, Tetley Rd., Hall Green, Birmingham. [6209

27/6!!!—Brand new B.T.H.-R.K. speakers, 6v. field, suitable for P.A. work, etc.

£2/7/6!!!—B.T.H. speakers, as above, for 100-250v. A.C., complete with field rectifier.

MAGNAVOX D.C.152 (9in. cone), 22/6; Magnavox 154 (6½in. cone), 16/3; all with hum-bucking coils, power or pentode transformers and 2,500 or 6,500-ohm fields; Magnavox P.M.254, 18/-.

ATTENTION to All Orders Within 24 Hours; carriage paid; cash with order or c.o.d.

WARD, 2nd Floor, 45, Farringdon St., London, E.C.4. Telephone; Holborn 9703. [5723

ROLA F62,000 Humbucker, used, 13/-; Epoch cabinet, 8/6.—Quicke, Dunstone Park, Paignton. [6185

VAUXHALL.—Magnavox permanent magnets, universal, suitable for Class "B," power or pentode, 6in. cone 15/6, 7in. cone 17/6, 10in. cone 23/-; mains energised, 2,500 or 6,500, 10in cone 23/-, 7in cone 15/3; brand new, with humbucking coils; state power or pentode transformer; unused manufacturers' stock; immediate delivery, carriage paid, cash with order or c.o.d.—Vauxhall Utilities, 163a, Strand, W.C.2. Temple Bar 9338. [6220

DEGALLIERS Offer Set Manufacturers' 1934 boxed Surplus, positively last lot until October, all carriage paid, cash with order or c.o.d. Moving coil speakers: Utah Midgets, 2,500, at 14/6 (U.S.A.); Rolas F.6 (7¾in. diameter), 2,500 ohms (110-175v. D.C.), 6,500 ohms (200-250v. D.C.), list 35/-, at 18/-; F.7 (9in.), voltages as in F.6, list 47/6, at 25/-; permanent magnets, F.6P.M., 7¾in. diameter, list 49/6, at 28/-; F.7P.M. (9in.), list £3, at 33/-; energised speakers, incorporate humbuckers, state if for power or pentode.—Degalliers, 4/21, Upper Marylebone St., London, W.1. [6130

VALVES.

ALL Types of Brand New American Valves in Stock; first-class makes, guaranteed.

247, 235, 551, 89, 18, 19, 46, 59, 6A7, 15, 42, 41, 38, 39, 78, 75, 57, 58, 224, 44, 36, 235, 83, 43, 12/-; 25Z5, 4/6; U.X.171A, U.X.199, U.X.280, U.X.245, U.X.226, U.Y.227, 7/6; U.X. 250, U.X.210, U.Z.281, 17/6; U.X.867 photocells, 25/-; various transmitting valves in stock; post paid; cash with order or c.o.d. WARD, 2nd Floor, 45, Farringdon St., London, E.C.4. 'Phone: Holborn 9703. [5722

FREE.—List of American and non-ring valves.—Epton, 93, New Rd., Chingford, E.4. [6086

SEE Our Advertisement in Last Week's Issue.—Premier Supply Stores, 20, High St., Clapham, S.W.4. Telephone: Macaulay 2188. Nearest Station, Clapham North Underground. [6219

METROPOLITAN RADIO SERVICE Co. for Guaranteed American Valves; any type at keenest prices; terms to trade.—1021, Finchley Rd., Golders Green, N.W.11. Speedwell 3000. [0436

Valves.—Contd.

SURPLUS Valves.—All brand new; battery types, 2-volt, H.F.2, L.F.2, L.P. 2, 1/9; super power, P.P.2, 2/6; screens and pentodes, 3/9; A.C. mains, 4-volt 1 amp., general purpose, 3/3; power, 4/-; screens and pentodes, 4/6; full wave rectifiers, 3/6; postage paid, cash with order, or c.o.d. over 10/-.—Clarion Radio Valve Co., 885, Tyburn Rd., Erdington, Birmingham. [6155

COMPONENTS, ETC., FOR SALE.

R.

RYALL'S RADIO, 33, Chancery Lane, London, W.C.2 (nearest Tube: Chancery Lane; 'bus 67 passes door, or tram to Savoy St.). Holborn 3529. Open Saturday afternoon. Close 7 p.m., Saturday 5 p.m., Thursday closed 1 o'clock.

SET Repairs, any commercial or amateur built set serviced, at "Trade" prices, British or American, satisfaction guaranteed.

BRITISH Radiophone Volume Controls, with mains on-off switch, new, 10,000, 15,000, 20,000, 35,000, 100,000, 2/6 each.

BRITISH Radiophone Radiopaks: B.P. superhet. 110 kc/s, 30/-, postage 1/3; sets British Radiophone 3-coil units on base, with terminals, wave change switch and knob; B.P. superhet. 110 kc/s, 8/9, postage 9d.; Ferrocart coils, G1-2-8, 25/-; all with mains switch.

SPECIAL Offer of New Garrard Double Spring Motors, No. 11B, 12in. turntable, fully automatic unit plate, etc.; 20/-.

T.C.C. 0-1 Non-inductive Tubular Condensers, 10d. each, 350v.; T.C.C. electrolytic 15 mfd., 50v., 1/4, new; T.C.C. 0.01 mica, type M, 1/-; T.C.C. 0.0001, type M, 5d.; H.M.V. condenser blocks, 250v. working, 4×4 mfd., 3/6; 4×4×1×1×½ mfd., 4/-; T.C.C. 0.1×0.1, 450v. working, 1/6.

HELSBY Non-inductive Condensers, bakelite cased, 4 m.f., 250v.w., 3/-; Ryall's 4 m.f., 250v.w., 2/-; 750 v.w., 6/6; Dubilier, 2 m.f., 250v.w., 1/6; Dubilier electrolytic, 450v. peak, 3/-, 8 m.f.; ditto, 4 m.f.

UNIKNOBS, Polar 2-gang, new, brown, 8/-, with cover, 9/6; Polar disc drive, complete with Polar No. 4 0.0005 condenser, listed 9/-; 4/- the two; R. and A. type output transformers, 18-23-32-1, new, 5/-; Paxolin formers, with guiders, 1in., 8d.; R.I. Hypermite transformers, 6/-, second-hand; R.I. Parafeed transformers, 5/-, second-hand.

RADIOPHONE Disc Drives, less escutcheon, fit ⅝in. spindle, read 0-100 from left to right; 1/6 post free.

R. [6196

24.

MILDMAY RADIO EXCHANGE Offers the Following, sound and perfect; cash with order or c.o.d.

METERS.—Pifco De Luxe radiometer, 42/- model, 22/6; Ferranti triple range m.-amp. 0-7, 0-15, 0-30, 25/-; 0-2 m.-amps., flush, 22/6; 0-1 amp., 12/6; 0-20 amps., 12/-, 15/-; 15 amps., 12/-; Weston, type 301, 0-3 m.-amps., 20/-; type 506, 0-150 volts, 12/-; 0-250 volts, A.C. type 517, 20/-; type 506, 0-150 m.-amps., 14/-.

FERRANTI Transformers.—A.F.4, 8/-; A.F.3, 12/-; A.F.5, 17/6; A.F.6, 18/-; A.F.5c.c., 19/-; outputs, O.P.1, 1-1, 7/6; O.P.2, 25-1, 7/6; O.P.3c., 10/-; O.P.4c., 10/-; O.P.M.16c., 14/-; O.P.M.4c., 14/-; O.P.M.15c., 14/-; A.F. 7, 18/6.

FOSTER Mains Transformer, 700-0-700 120 m.-amps., 4v. 3a., 4v. 2a., 4v. 1a., 200-250 input, 25/-; Parmeko 425-0-425 60 m.-amps., 4v. 2 amps., 4v. 3 amps., 200-250 input, 25/-; Parmeko 200-0-200 60 m.-amps., 4v. 3a., 4v. 1a., 200-250 input, 18/-; Heayberd heavy duty L.F. choke, type 755, 15/-; Heayberd filament transformer, 4 volt 10 amps., 7/6.

WEARITE "Wireless World" Everyman, 4 coils, 16/-; Polar Star Minor 3-gang, 10/6; Radiophone 3-gang condensers, 7/6 each; pair Ferrocart Colverdynes, 15/6.

RADIOPHONE Band Pass Superhet. Radiopaxes, 30/- each; RF superhet type, 32/6; Westinghouse H.T.7, 8/-; transformer for same, R.I., 7/-; H.T.5, 6/-.

MAGNAVOX Dual Matched Type "Magna," series 144 and 142, 2,500 ohms, £3 pair; Magnavox, type 152, 10in. 200 ohms field, 27/6; B.T.H. Senior R.K. P.M. moving coil speaker, 45/-; 1934 Baker's super type P.M., 50/-; Epoch type A.2, 17/6.

8-VALVE Battery Operated Chassis, 4-screen grid with push-pull output, less valves; £2/10.

FERRANTI Inductor Dynamic Loud Speaker, equal and, in fact, better than cheap moving coils; 20/-.

EKCO Mains Units.

TYPE A.C.25, output 150 volts 25 m.-amps., having 4 tappings, 2 variable; listed at £3/17/6, our net price 33/6.

TYPE K.25, output 150 volts 25 m.-amps., having 4 tappings, 2 variable, also trickle charger for 2-, 4- or 6-volt accumulator; listed at £5/7/6, our price 39/-.

TYPE K.12, output 150 volts 12 m.-amps., with charger for 2-, 4- or 6-volt accumulator; 35/- each, all brand new in sealed boxes.

THE Above Post or Carriage Paid.

'PHONE: Clissold 5001.

OPEN All Day Thursday, closed all day Saturday.

24, Mildmay Grove, London, N.1. [6166

PEARL and PEARL Bargain List A Free.—190, Bishopsgate, London, E.C.2. [0421

MAINS RADIO DEVELOPMENT COMPANY'S Guaranteed New Surplus:—

SONOCHORDE Standard P.M.M.C., 7in. cone, pentode output, new; list 35/-, 13/11.

RADIOPHONE 25,000 ohm Potentiometers, with switch, 1/11; Bulgin on-off toggles, 6d.; Plessey 5-pin valveholders, chassis, 1/- per 6.

SATOR 0.0001, 0.0003 mfd. Tubular Condensers, 2 meg. leaks, all wire ends, new; 1/- per 6.

READY RADIO Boxed Spaghetti Resistances, 10,000, 15,000, 20,000, 25,000 ohms; Mikado 0.0005, 0.002 mfd. condensers; 9d. per 12; your assortment.

STANDARD TELEPHONE'S Mains Transformers, brand new, fully tapped input, 200-250v., output 325-0-325 at 60 m.a., 4v. at 4 amp., 4v. at 2½ amp., all C.T.; 9/6.

1/6.—Cadmium plated chassis, 4-valve, pressed steel, 14×9; post 6d.

2/9.—Plew A.V.C. units for battery receivers, prevents fading, list 10/-, brand new.—Kay, 167, City Rd., London, E.C.1. [6159

Components, Etc., for Sale.—Contd.

SOUTHERN RADIO'S Bargains.—Set manufacturer's guaranteed surplus.

VARIABLE Condensers.—Lotus 3-gang 0.0005, 12/6; Lotus 2-gang, 0.0005, 8/6; Lotus Dyblock single, 0.0005, 4/9 (list 9/6); all these condensers are complete with dials, escutcheons, knobs, fully screened with trimmers, and boxed; Hydra block condensers 16 mfd. (2+2+8+2+1+1) 1,000v. D.C., 7/- each; Dubilier 4 mfd. (2+1+1), 1,000v. D.C., 2/9; 4.5 mfd. (2.25+2.25), 1,000v., for mains noise suppression, 3/-; fixed 4 mfd., 2/3; 2 mfd., 1/6; 1 mfd., 1/-; Utility Midget 2-gang variable condensers, 0.0005, with concentric trimmers, 3/5; T.C.C. 0.1+0.1, 1/3 each.

SPEAKERS.—Blue Spot permanent magnet, with universal transformer for power, super power, pentode and Class B; 23/- (list 39/6).

G.E.C. Stork Speaker in cabinet; 19/6 (list £3/15).

MICROPHONES.—"Wonder," ready for use on any set; 3/9 each.

BLUE Spot Genuine 100U Inductor Speaker on Chassis; 13/6 (list 39/6).

S.T.400 Kits, all specified proprietary components; £2/19/6 (list £4/17/6).

EKCO A.C. Eliminators, each new and boxed, in original sealed cartons, type K25, with trickle charger, 25 milliamps., 39/6 (list £5/7/6); type A.C. 25, 33/6 (list £3/17/6); type K.12, with trickle charger, 37/- (list £3/17/6); Ekco trickle chargers type T.C.1., for 2- 4- and 6-volt accumulators, 20/- (list 42/-).

IGRANIC Superhet Coils, set of 4 (1 Osc., 2 I.F., with pig tails, 1 L.F. plain); 12/6 (list 50/-).

LISSEN Superhet 3 Coils Kit, screened, ganged on base with wave change and filament switches; type L.N.5181, for battery or mains; 12/6 (list 30/-).

VARLEY Constant Square Peak Coils, complete with all accessories, new, boxed, B.P.5; 2/4.

VARLEY H.F. Inter-valve Coils B.P.6, 2/3.

FRAME Aerials.—Lewcos dual wave superhet., 9/- each (list 27/6).

PICK-UPS.—Marconi No. 19 (1934), 22/6 each (list 32/6); Celestion latest improved type W8 (1934), 16/9 (list 35/-); all new and boxed.

READY Radio Instamat Transformers, for matching any valve to speaker; Junior model, ratios 1:2, 1:1, 1½:1, 2:1, 3:1, 7/6 (list 27/6); Senior model, ratios 10:1, 12½:1, 14:1, 16:1, 20:1, 25:1, 12/6 (list 37/6).

RECEIVERS.—3-valve screen-grid Elector Super, complete with valves, Exide batteries and accumulator, Celestion moving coil speaker, contained in magnificent walnut cabinet; £3/10 (list £10).

OSRAM Thirty-Three Music Magnet, complete with G.E.C. speaker, two Osram screen-grid and Osram power valves in moulded bakelite walnut cabinet; £3/12/6 (list £9/9); in original sealed cases.

READY Radio Meteor Screen-grid 3-valve Kits, all specified components new in sealed cartons; 25/-, less valves; with 3 Mullard valves 42/6 (list £5/7/6).

"A" Kit as Above, complete with magnificent walnut cabinet and Celestion perm. mag. speaker; less valves, £3/5; with 3 Mullard valves, £4/2/6 (list £8/17/6).

MISCELLANEOUS.—Westinghouse metal rectifiers, H.T. 6, 7, 8, 9/3 each; Ferranti chokes, 20 henry 60 m.a., 6/9 each; Lewcos superhet, 8-way bases, complete with valve holders, grid leak, fixed condenser type "48," 2/- each; Lissen base turntables, 1/6 (list 5/-); Lewcos coils, B.P.F./R., 4/-; T.B.F./C., 3/3; O.S.C./126 (Extensor), 3/3; T.O.S./R., 3/3.

ALL Goods Guaranteed and Sent Carriage Paid.

BRANCHES at 271-275, High Rd., Willesden Green, N.W.10, and at 46, Lisle St., W.C.2. Please send all post orders to 323, Euston Rd., N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren St., Tube). 'Phone: Museum 6324. [6210

WEST END RADIO STORES' Genuine Summer Sale; a few of our many bargains:—

STANDARD Telephones, mains transformers, 300-0-300v. 60 m.a., 4v. 2a., 4v. 3a., C.T., 4/11; second-hand R.I. 250-0-250v., 4v. 2a., 4v. 2a., 4/6; Wearite 350-0-350 70 m.a., 4v. 2.5a., 4v. 4a., 7/6.

WESTINGHOUSE Rectifiers, 6v. 1 amp., 4/11; 6v. ½ amp., 4/6; B.R. full scale slow motion drives, 2/6.

PHILIPS 20h. 180 m.a. Chokes, 4/6, 650 ohms; 20h. 60 m.a., 2/6; Collaro A.C. gramophone motors, 31/6, new.

DUBILIER 4 mfd. Electrolytic Condensers, 450v. working, 3/3; 8 mfd. ditto, 2/6; Dubilier 6.55 tapped banks, 1,000v., 1/6.

SONOCHORDE 2,500 ohm Senior Energised Speakers, Universal transformers, new, 7/11; Ekco K25 eliminators, with trickle charger, new, £2.

TAPPED Output Transformers, 0.35-1R., 2/6; ex-G.P.O galvanometers, 2/6; Junit multi change switches, 1/-.

AMERICAN Midget Sets.—Halson 4-valve, £4/10; Crosley 4v. ditto, £5; Crosley 5-valve, £6/10; all for 100-250v. A.C. or D.C superhets. with M.C. speakers; hundreds of other sale bargains.

POSTAGE Extra on All Orders.

WEST END RADIO STORES, 14, Lisle St., Leicester Sq., W.C.2; also at 382, Coldharbour Lane, Brixton. [6201

MAINS RADIO DEVELOPMENT COMPANY, 4-6, Muswell Hill Rd., London, N.6. Tudor 4046. [6192

FREE.—No. 1 wireless list now ready, knockout prices, exchanges arranged.—Exchange Mart, 67, Porter St., Hull. [6182

Components, Etc., for Sale.—Contd.

THE Following Unused Set Manufacturers' Surplus, all goods guaranteed perfect; immediate delivery.

TRANSFORMERS, 350-0-350v., 75 m.a., 4v. 4a.-4v. 2a., 12/6; A.C. and D.C. eliminators, first class make, tappings S.G., detector, and power (150v., 25 m.a.), A.C. type, with Westinghouse rectifier, 25/-; D.C. type, 12/6.

DUBILIER Resistors, 1 watt type, 7d.; 2 watt type, 1/2; 3 watt type, 1/9; Dubilier or T.C.C. condensers, 8 mf. or 4 mf., 500v. working, 50v. 50 mf., 200 mf. 10v., 3/6; Mansbridge type, 4 mf. 400v., 4/-; 4 mf. 750 v., 6/6.

MARCONI K19 Pickups, 22/6; B.T.H. pickup tone arms, 3/-; B.T.H. needle armature pickups, 29/-.

COLVERDYNES, 7/6; Clix 5-pin valve holders, 5d.; Rotorohm volume controls, with switch, 2/6.

WESTINGHOUSE Rectifiers, H.T.8, 9/6; H.T.9, H.T.10, L.T.4, L.T.5, 10/9; transformers (Regentone) for H.T.8 or H.T.9, with 4v. 4a. L.T., 7/-; carriage paid, cash with order or c.o.d.; send for list.

WARD, 45, Farringdon St., London, E.C.4. 'Phone: Holborn 9703 [6165

BIRMINGHAM RADIOMART Revised List Now Ready; more components than advised in whole these columns; stamp essential.

RADIOMART.—Utility fully screened 3-gang, with trimmers, list 22/-, almost identical Radiophone; 6/6.

RADIOMART.—Igranic smoothing chokes, 20-10hy., 260 ohms, 100 m.a., Stalloy core impregnated interleaved windings; 2/9.

RADIOMART.—Single span formers, 1in.×2in., 7 for 10d.; 100 m-mfd. micros., 1/3.

RADIOMART.—Radiophone straight line dials, illuminated; ours have oxidised escutcheons, knob; 3/6.

RADIOMART.—Igranic boxed nickelcore 3-1, 5-1 transformers, list 10/6, 3/11; Igranic 8/6 parallel feed, 2/11.

RADIOMART.—Centralab 1-watt colour coded resistances, nearly all values; 6d.

RADIOMART.—Radiophone wire-wound logarithmic potentiometers, 5,000, 2/-; 15,000, with concentric independent main switch, 2/9.

RADIOMART.—New Metvick 110-volt "A" transformers, sold for laminations and clamps, 3/6.

RADIOMART.—Screened Caradio ignition cable, ideal screened downlead; list 4/6, 9d. yard.

RADIOMART.—3½in. flush £3 moving coil milliammeters, 10, 25, 50, 100 m.a.; 16/6.

RADIOMART.—Visual tuning meters, extremely neat, 5/9; 30 ohm potentiometer, for humdimming, 8d.

RADIOMART.—Sovereign 50,000 genuine wirewound potentiometers, 5-watt, 2/-; Electrad 50,000 potentiometers, 1/6.

RADIOMART.—Boxed Telsen, 500v. electrolytics, 6 mfd., 2/9; 4 mfd., 2/7; 275v. 6 mfd., 2/-; Dubilier 4 mfd. 200 v., 1/3; all dry.

RADIOMART.—T.C.C 250v. A.C., equivalent 400v. D.C. working, 4×4×4 (12 mfd.), 3/9; T.C.C. 8 mfd. electrolytics, 3/-.

RADIOMART.—Aerovox 8×8 mfd. dry, the world's best electrolytic; 3/6; cheapest smoothing possible.

RADIOMART.—Non-inductive wire-ended tubulars, 1,500v., 0.1, 0.01, 0.02, 6d.; Philips ditto, 0.0001, 0.001, 2d.

RADIOMART.—Utility 1934 Bakelite condensers, 0.0005, 10d.; 0.0003, 8d.; 0.0002 0.0001, 6d.; 0.0003 differentials, 1/6.

RADIOMART.—Cadmium 5-valve chassis, 1/6; 4-valve, 1/-; postage 6d. extra

RADIOMART.—Utility screened 2-gang 0.0005 Bakelite Uniknob disc drive; 2/11.

RADIOMART.—Telsen boxed differential condensers with knob, 0.0001, 0.00015, 1/-; 0.0003, 0.00035, 1/3.

RADIOMART.—Met-Vic boxed H.F. chokes, really efficient, 1/-; Utility snap switches, 9d.

RADIOMART.—Colvern 5-watt wirewound potentiometers, 2,500, 15,000, 1/6; Magnum, 25,000, 1/9.

RADIOMART.—(G5NI), shortwave specialists, actually stock Hammarlund "Comet Pros," McMurdo single signal, National F.B.7.

RADIOMART.—Igranic ironcore dualrange shortwave coils, 3/3; with switch, 4/9, Raymart shortwave H.F.C., 9d.

RADIOMART.—Famous 0.0001 all brass shortwave variables, 1/9; Ormond 0.00025 loloss pigtail, 1/9.

RADIOMART.—Western Electric solidback guinea microphones, 2/9; Beehive standoff insulators, 8d.

RADIOMART.—Frequentite valve holders, 9d.; R.I. special 300hy. chokes, 7/6; second-hand 400 ohm potentiometers, 6d.

RADIOMART.—Orders over 6/- post free.—The Square Dealers, 19, John Bright St., Birmingham. [6215

CLEARANCE Sale.—All lines fully guaranteed; carriage paid over £2; terms nett cash; trade enquiries invited; goods must be cleared to make way for new season's lines.

SERADEX V.R.367c. Charger, demonstration model, thoroughly overhauled; listed £9/10, price complete with new valve £7/7.

SERADEX V.R.7512 Charger, with 4 lines, 1-30 cells in series on each, total output 12 amps., full details on request; £18/18.

POWER Pack Kits, giving smoothed output of 300v. 75 m.a., with 4v. A.C. complete, dead silent under load; £1/17/6.

SUNDRIES.—Chassis valveholders, 4-pin, 3/- dozen; 5-pin, 3/6; 7-pin, 4/9; 4-pin baseboard ditto, 4½d. each; Telsen differentials, boxed, 1/3; transformer bobbins, for No. 30, 1in. core, 5d. each; ditto, No. 4, 8d.

LOUD-SPEAKERS, demonstration models, Goodman's Renown, 17/6; W.B. P.M.6, 19/6; Magnavox P.M.254, 19/6; ditto, P.M.252, £1/2/6.

VALVES (non-ring and imported).—Mains varimu-pentodes, similar V.P.4, 8/9; mains pentodes (3,000 M.W.), 8/9; mains detectors, similar 904v., 6/-; sundry 2-volts, H.F., L.F., etc., Barion, etc., 2/3; full wave rectifiers, with 4-volt heaters, 300v. 75 m.a., 5/3; 350v. 120 m.a., 6/6; 500v. 120 m.a., 8/9.

SEND Now for Lists of Many Others—48, Wakegreen Rd., Birmingham, 13. [6214

Components, Etc., for Sale.—Contd.

LOUD Speakers, L.F. transformers, etc., for sale cheap; stamp for list or state wants.—R. Thurley, 7, West St., Newbury, Berks. [6181

FERRANTI A.F.3, 11/-; A.F.4, 7/9; A.F.5, A.F.6, A.F.7, 17/6; A.F.5c, 18/6; O.P.M.1, O.P.M.1c, 13/-. —Bostock, 1, Westbourne Terrace, S.E.23. [6208

SEE Our Advertisement in Last Week's Issue.—Premier Supply Stores, 20, High St., Clapham, S.W.4. Telephone: Macaulay 2188. Nearest Station, Clapham North Underground. [6218

AMAZING Bargain!—Genuine 21/- Silvertown L.F. transformers, our price 2/3 post free, cash with order.—The Wireless Shop, Radio Buildings, 28-30, Pink Lane, Newcastle-on-Tyne. [6188

BURNDEPT Pick-up, filter, V.C., 20/-; Bulgin 0-5 m.a., 15/-; 0-250-volt, 25/-; Ferranti 0-15 m.a., 20/-; 0-7½-volt, 15/-; 0-500-volt, £2; Ferranti A.C. eliminator, £2/10; Philips, £3; American Senior Magnavox, 50/-.—Angel, Tanghill Lane, York. [6212

VAUXHALL.—Radiophone, Radiopaks, complete with volume control and Lucerne station named scale and escutcheon, state type, 32/6; intermediate transformers for above, with terminals, 6/-; coils set of 3 on base with switch and terminal, 16/6; 3-gang condensers, superhet., 14/6; ordinary type, 12/6; disc drives, complete, 4/9.

VAUXHALL.—Pick-ups from 8/- to £2; state make for quotation; volume control, all values, with switch and knob, 3/6; gramophone switches, 3/6.

VAUXHALL.—Benjamin, Class B, transformers, 1-1½ to 1, 6/6; Radiophone, Class B, 10/-; L.F. transformers, 3/-.

VAUXHALL.—Resisters: Dubilier, 1-watt, 7d.; tubular condensers, all values, from 4d.; Clix valveholders, 4.5 P.M. terminal, 7d., 7-pin chassis type, 7d.; W.B. ditto, 4-5-pin, 4½d.

FREE Service.—Home constructors' queries; write details fully; send postcard for lists.

VAUXHALL UTILITIES, 163a, Strand, W.C.2 (facing Bush House, S.E Wing). Temple Bar 9338. [6221

PIONEER RADIO Offers: Ericsson 3-1 L.F. transformers, list price 17/6, new and guaranteed, our price 2/3, post free U.K.; Varley constant square peak band-pass coils, type B.P.5, complete with switch, brand new, in maker's original carton, with full instructions and diagrams, list price 15/-, our price 2/4, post free U.K.; Polar 3-gang Star Minor condenser, with trimmer, brand new, list price 18/9, our price 7/- each, post free U.K.; Collaro electric gramo. motor, A.C., 200-250, with pick-up and volume control, auto start and stop, brand new, listed at £4, our price 47/6, carriage paid; Celestion energised M.C. speaker, 2,500 ohms, model D.C. 2054, with universal transformer, list price £2/5, our price 12/6; bankrupt set manufacturers' stock.

PIONEER RADIO, Coptic St., London, W.C.1. Museum 9606. [0425

MISCELLANEOUS.

EVERYTHING for Movies.—Cameras and Projectors from 20/-; screens from 5/-.

ILLUSTRA ENTERPRISES, 159, Wardour St., London, W.1 (facing Film House, Oxford St. end); not a shop, but a warehouse packed with motion-picture equipment; your inspection invited. 'Phone: 6889 Gerrard; free parking facilities. [5936

PRINTING Press, with type; 22/6, bargain.—Particulars, Webster, 291a, Normanton Rd., Derby. [6191

POSITIVE Bargain, Homesun sun-ray lamp complete, 230v. A.C., perfect, cost £15; accept £7/10.—Ogden, 4, High St., Shaw, Oldham. [6184

GUARANTEED Expert Repairs to Any Receiver, estimate free, highest quality workmanship, lowest prices; receivers taken in part exchange.—Zenith Radio Service, 17, Park St., Guildford. 'Phone: 1700. [0423

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A. MATHISEN, Chartered Patent Agent; patents, designs, and trade marks.—First Avenue House, High Holborn, London, W.C.1. Holborn 8950. [5284

GEE and Co. (H. T. P. Gee, Patent Agent for Great Britain, U.S.A., Canada, etc., Mem. R.S.G.B. A.M.I.R.E.), 51-52, Chancery Lane, London, W.C.2 (two doors from Government Patent Office). 'Phone: Holborn 1525. Handbook free. [0001

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YOUTHS Trained for all branches wireless profession. Britain's leading college. Training fee payable after appointment. Students boarded. London representative for interviews. Prospectus free.—Wireless College, Colwyn Bay. [0388

RADIO Engineering.—If you are finding difficulty in obtaining a position in the radio industry apply to British Radio Engineering College, 179, Clapham Rd., London, S.W.9. Recognised by the radio manufacturers. More than 100 situations obtained since July, 1933. [6200

REPAIRS AND SERVICE.

METROPOLITAN RADIO SERVICE Co. for Guaranteed Repairs to American (Midget and Standard) Receivers.

CLARION Service Depot; replacement parts; transformers rewound; terms to the trade.—1021, Finchley Rd., Golders Green, N.W.11. Speedwell 3000. [0435

MAINS Transformers Rewound; prompt service; satisfaction guaranteed; prices on request.—The Sturdy Electric Co., Wesley Terrace, Dipton, Newcastle-on-Tyne. [6156

HENRY FORD RADIO, leading service specialists for American receivers, also British, trade work particularly; estimates free.—56, Howland St., Tottenham Court Rd., W.1. Museum 5675. [0434

ALL Kinds of Transformers, chokes, speakers, etc., rewound with best quality British wire; results guaranteed; moderate charges.—John Bennett, Tuckton Rd., Southbourne, Bournemouth. [6202

OLD Sets Transformed to All Mains Universal A.C.-D.C. with New High Voltage Valves, powerful, clear, hum-free reception guaranteed; prices 10/- per socket, plus price of valves; no extra parts charged for.—Sablon's Radio, 69, Sister's Ave., London, S.W.11. [5837

REPAIRS to Moving Coil Speakers, cones and coils fitted or rewound. Eliminators and transformers quoted for. Loud-speakers, l.f. and speech transformers, 4/- each. Post free. Trade invited. Satisfaction guaranteed. Prompt service.—Loud-speaker Repair Works, 5, Balham Grove, London, S.W.12. Battersea 1321. [0394

EXTENDED PAYMENTS.

EASY PAYMENTS.—We supply you direct, by easy payments, components, accessories, and sets, any make; 10% down, balance spread over 11 months; any radio goods ordered c.o.d. despatched same day.—Send list of requirements to London Radio Supply Co. (established 1925), 11, Oat Lane, London, E.C.2. [0337

EXCHANGE.

WE Offer You a Very High Allowance on Your Present Radio Goods in Part Exchange for Other Goods; easy payments available, taking your goods as deposit.—Bostock and Stonnill, 1, Westbourne Terrace, S.E.23. [6207

DEAL With the Firm that Gives You the Highest Possible Allowance in Exchange, sets or components; prompt attention and deliveries.—Mildmay Radio Exchange. 'Phone: Clissold 5001. 24, Mildmay Grove, London, N.1. [5935

WANTED.

WANTED, A.C. short-wave converter.—Box 1140, c/o *The Wireless World.* [6204

WANTED, wireless receiver, Philips 2515, must be as new; 2534 or 2531 might answer.—Hoare, Combedene, Hindhead. [6190

WANTED, 100v. D.C. to 200-230v. A.C. converters, state condition and output wattage.—Lee, G. A., Attleborough, Norfolk. [6217

SELENIUM Metal Rectifiers Wanted, German or American make, all sizes, any condition; cash by return post.—Offers to Box 1134, c/o *The Wireless World.* [6193

HIGHEST Possible Allowance Made on Used Wireless Sets or Parts in Exchange for Any New Set, kit or parts; Peto-Scott kits supplied; goods bought for cash. —R. Wigfield, Furlong Rd., Goldthorpe, Yorks. [6206

WANTED, good modern second-hand wireless parts, sets, meters, eliminators, speakers; we pay higher prices than any other dealer; bring or send, spot cash. Open 9-8.—University Radio, 142, Drummond St., Euston, N.W.1. [6222

HIGH-CLASS Radio Parts and Sets Wanted for Cash, new or second-hand, any quantity, we pay up to one-third of the retail value for class goods; send yours, stating reasonable price; cash by return (no junk, please); dealers' obsolete stocks also purchased, any amount; van and representative will call for any reasonable lots.—Mildmay Radio Exchange, 24, Mildmay Grove, London, N.1. 'Phone: Clissold 5001. [5984

BUSINESSES AND PROPERTY FOR SALE, TO BE LET, OR WANTED.

WIRELESS and Charging Business, £70, including charging plant, amplifier for shop, all test gear and stock; rent 30/- for shop, parlour, workshop; main road.—68, Chalk Farm Rd., London. [6195

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VACANCY for Salesman with Extensive Knowledge of Gramophone Trade for Olympia Exhibition; state age and experience.—Box 1135, c/o *The Wireless World.* [6193

RADIO Designer Wanted, used to coils, and must have experience with superhet. receivers, both battery and all mains; state full experience and salary required.—C. F. and H. Burton, Progress Works, Bernard St., Walsall. [6194

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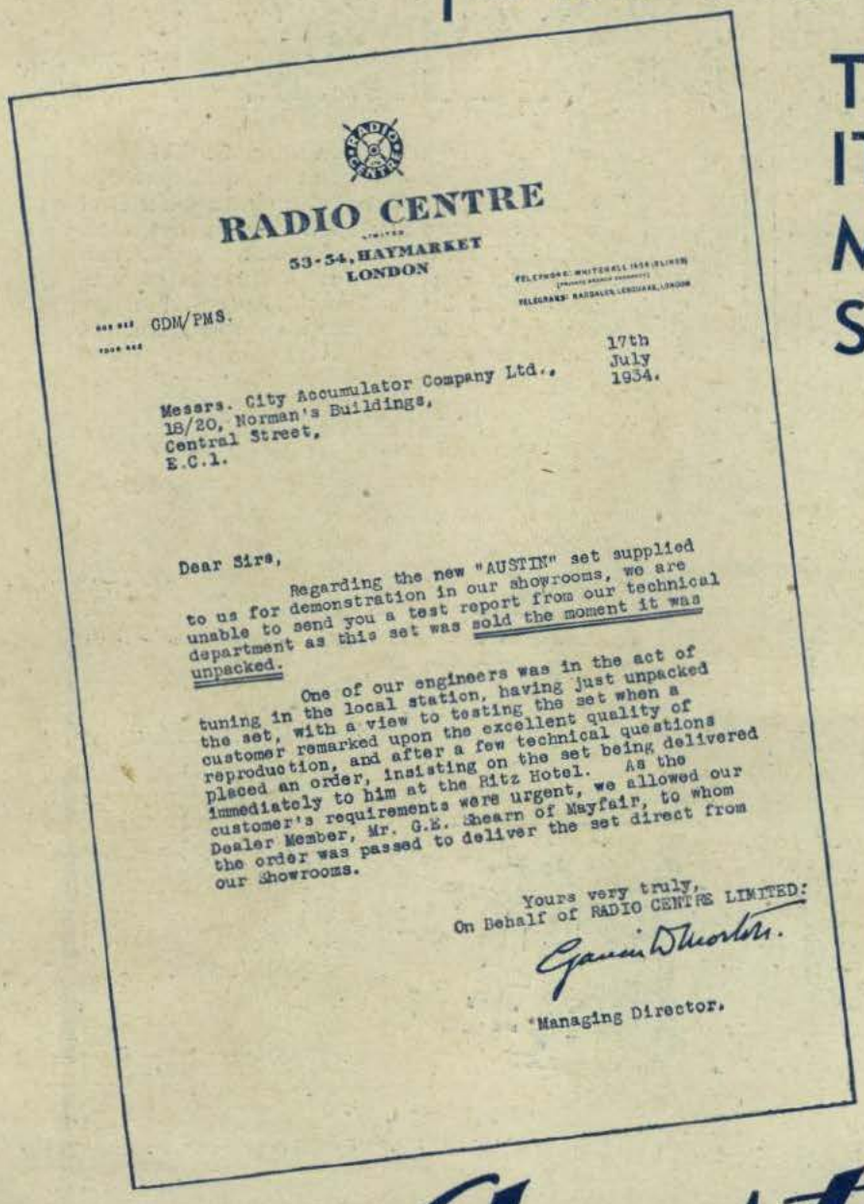
AT "RADIO CENTRE" EVERY SET OF REPUTE IS ON SHOW

COMPARATIVE TESTS CAN THEREFORE BE MADE UNDER EQUAL CONDITIONS.

THIS LETTER IS THUS VERY GRATIFYING TO US, BUT



RADIO CENTRE
53-54, HAYMARKET
LONDON

GDM/PMS.

17th July 1934.

Messrs. City Accumulator Company Ltd.,
18/20, Norman's Buildings,
Central Street,
E.C.1.

Dear Sirs,

Regarding the new "AUSTIN" set supplied to us for demonstration in our showrooms, we are unable to send you a test report from our technical department as this set was sold the moment it was unpacked.

One of our engineers was in the act of tuning in the local station, having just unpacked the set, with a view to testing the set when a customer remarked upon the excellent quality of reproduction, and after a few technical questions placed an order, insisting on the set being delivered immediately to him at the Ritz Hotel. As the customer's requirements were urgent, we allowed our Dealer Member, Mr. G.E. Shearn of Mayfair, to whom the order was passed to deliver the set direct from our showrooms.

Yours very truly,
On Behalf of RADIO CENTRE LIMITED:
Gamin Thornton.
Managing Director.

TO YOU—MR. READER IT IS SOMETHING MORE THAN SIGNIFICANT!

We are Exhibiting at the following:

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STAND No. 89.

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KELVIN HALL, GLASGOW,
August 31st to Sept. 8th,
STAND No. 82.

NORTHERN RADIO EXHIBITION
CITY HALL, MANCHESTER,
Sept. 14th to 22nd,
STAND No. 73.

Designed by Maj. W. I. G. Page, B.Sc.

Austin

As Modern as The Minute.

THE NEW & BETTER RADIO

"AUSTIN" A.C. SUPER.

Table Model Five-Valve (including Rectifier), Superhet for A.C. Mains, with Twin Matched 8 in. Energised "Rola" Speakers. Provision for Pick-up and External Speaker.

The Input Circuit consists of a Band-pass Filter, with an inductively coupled link. The first Valve is one of the new Osram MX40 Heptode frequency changers, having the high conversion conductance of 570 micromhos. The I.F. Transformers, of 8 k/c. fixed peak separation, have a dynamic resistance of approximately 200,000 ohms, so that the stage gain of the frequency changer is about 46.

The I.F. Valve is an Osram VMP4 Variable-mu H.F. Pentode, coupled to a Double Diode-Triode, the Osram MHD4, one Diode of which is used for Delayed A.V.C. and the other for Signal Rectification.

The output Valve is an Osram MPT4 Cathin Pentode, giving an output of 3 watts undistorted volume.

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The Wireless World

THE PRACTICAL RADIO JOURNAL *with* *Complete Foreign Programmes*

Friday, August 10th, 1934.

The Wireless World

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EDITORIAL COMMENT

Olympia 1934

Trend of Design

THURSDAY next, August 16th, will see the opening of the annual Radio Show at Olympia. As in previous years, we are making the Exhibition the occasion for three special show numbers of *The Wireless World*. The present issue is the first of these, and will be followed next week by a Guide to the Show, which, appearing at the opening, will tell our readers what items of special interest to look for and where to find them. The third show number will be a Stand-to-stand Report on Olympia, prepared on the spot by the technical staff of *The Wireless World*, and fully illustrated.

At this stage, before the Exhibition opens, it is not possible in the special articles in our first show number, to give more than a general idea of the trend of development, and improvements have been introduced since last year.

Amongst receivers the indications are that an outstanding characteristic this year is greater reliability, resulting from better mechanical and electrical design and more thorough methods of testing. It is gratifying to find that more attention is being paid by manufacturers of the better class receivers to quality, because this is a point which *The Wireless World* has long endeavoured to impress upon designers. It is interesting, too, to find that several models this year will be fitted with variable selectivity, so that high quality can be obtained under local receiving conditions and yet adequate selectivity when it is needed.

There is plenty of evidence that there is still a scramble amongst manufacturers to bring prices down as low as possible because of competition amongst themselves. This, of course, is of benefit to the buying public so long as it does not mean that the sets suffer in performance or workmanship.

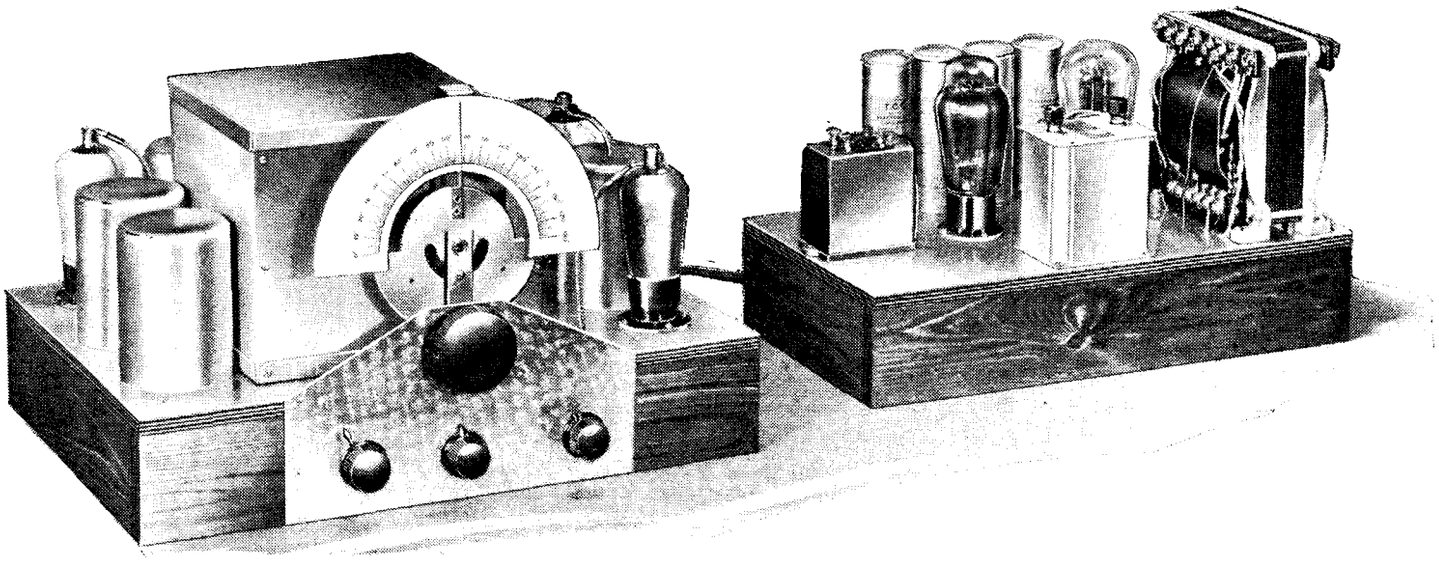
Some receivers have been simplified to the extent of eliminating H.F. amplification. Such sets are admirably suited for purely local reception work but should not be placed in the hands of the public as suitable for long-distance reception, because, sensitivity being dependent upon the use of reaction, such sets may bring about a return to the old conditions of reception when oscillation was so serious a cause of interference.

One feature of this year's show is that the purely D.C. mains set is fast disappearing in favour of universal A.C./D.C. receivers. This is a good trend because it will encourage D.C. users to enjoy the advantage of a mains set without feeling that a change-over of supply or a domestic move will render their sets useless.

Cabinets and Dials

In the matter of cabinet design one might have expected to see a more pronounced departure from former styles, but it would seem that the majority of manufacturers have settled down to the idea that the public has a fairly definite conception of what a wireless set should look like and that perhaps innovations would not be welcomed. There are, however, some interesting exceptions, notably in instances where commendable progress has been made towards producing a tuning dial of really serviceable dimensions enabling stations to be tuned in without the aid of a microscope.

In the matter of components and valves interesting developments have taken place; most of these, we are glad to say, have been directed towards improvement in reproduction quality and simplifying tuning and control.



Olympic S-S Six

A Selective High Quality Set for Distant Reception

By W. T. COCKING

THE single-span system of tuning is of particular interest to the constructor because it relieves him of all ganging difficulties while still permitting single-control tuning to be obtained. The receiver described in this article is both more sensitive and more selective than other designs, while the high standard of reproduction associated with single-span receivers is fully retained.

THE various methods by which increased selectivity can be obtained at the high intermediate frequency employed with single-span tuning were discussed in recent issues of *The Wireless World*,[1] and it was shown that an increase in the number of tuned circuits was the most satisfactory solution of the problem. Now, although it is readily possible to add tuned circuits to a receiver without increasing the number of valves employed, and it is also possible to add stages of amplification without using a greater number of tuned circuits, neither course is wholly satisfactory, and the best results are secured when tuned circuits and valves are added together. If the aim be to secure the maximum possible selectivity from a given number of tuned circuits, then ideally they should be separated from one another by valves. If many circuits be employed, this calls for a large number of valves, and in order to maintain stability and to keep the total amplification within reasonable limits, each stage need give only a small gain. Although ideal, a course of this nature is ruled out on the grounds of expense.

The other extreme is to obtain as high a degree of amplification as possible from each stage, and to include the tuned circuits in twos, threes, or even fours, coupled together in the intervalve couplings. Coupled circuits, however, are both less efficient and give lower selectivity than the same number of circuits separated by valves, so that to maintain reasonably high amplification the circuits must be coupled fairly tightly, and this leads to poor selectivity. Compromise between the conflicting factors of cost and technical requirements is thus called for, and in the New Single-Span Receiver an increase is made in both the number of tuned circuits embodied and in the number of effective stages of amplification.

Six tuned circuits are used and arranged as two coupled pairs and two single circuits, with three stages of amplification in addition to the buffer stage, which provides reaction and greatly increases the selectivity. There are thus four effective valves at the intermediate frequency, but only three are actually used, for the first two stages are combined in a single envelope. Advantage is taken of the triode-pentode valve, originally developed as a frequency changer, but used here to combine the functions of a buffer valve and a

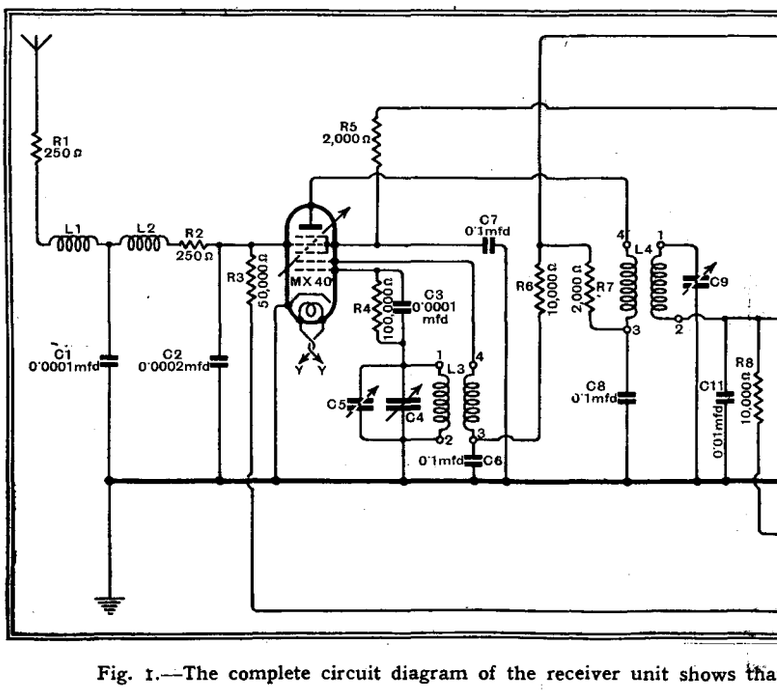


Fig. 1.—The complete circuit diagram of the receiver unit shows tha

[1] *The Wireless World*, July 20th and 27th, 1934.

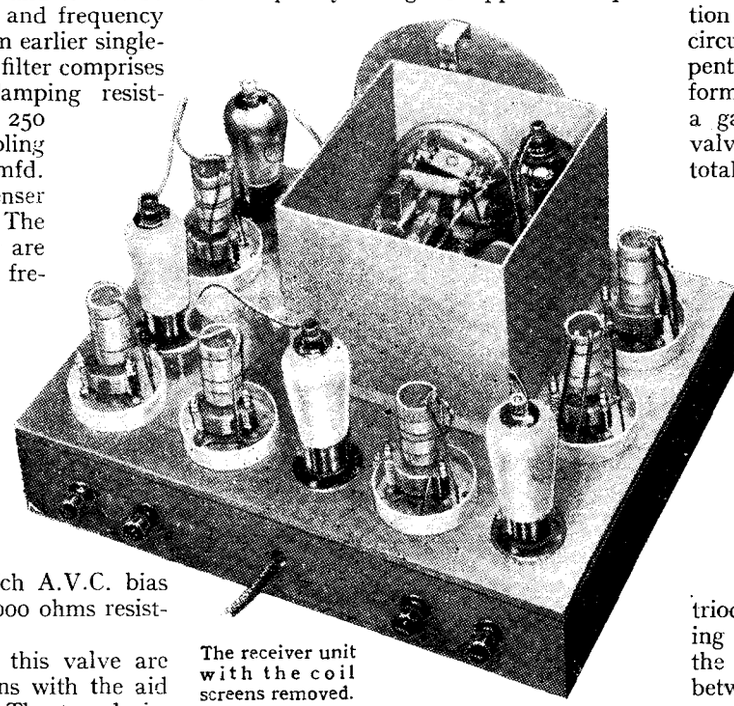
first stage I.F. amplifier—functions which it fulfils admirably.

The Frequency Changer

Fig. 1 shows the complete circuit diagram of the receiver unit, and it will be seen that the aerial circuit and frequency changer are unchanged from earlier single-span receivers. The aerial filter comprises L1 and L2, the two damping resistances R1 and R2, of 250 ohms each, with the coupling condenser C1 of 0.0001 mfd. and the terminating condenser C2 of 0.0002 mfd. The characteristics of the filter are such that it freely passes frequencies between 150 kc/s and 1,500 kc/s, but greatly attenuates frequencies outside this range, so preventing second channel interference. The frequencies passed by this filter are applied to the control grid of the tetrode section of the heptode frequency-changer, to which A.V.C. bias is applied through the 50,000 ohms resistance R3.

The inner electrodes of this valve are used to generate oscillations with the aid of the coil assembly L3. The tuned circuit is connected to the oscillator grid, which is maintained at its correct operating potential by the flow of grid current through the 100,000 ohms resistance R4. The reaction coil is joined to the oscillator anode which derives its H.T. supply through the 10,000 ohms resistance R6. The oscillator frequency is controlled by the variable condenser C4, having a maximum capacity of 0.00016 mfd. and tuning over a range of 1,750-3,100 kc/s to permit reception over the 150-1,500 kc/s band (2,000-200 metres). This condenser forms the sole tuning control, and the parallel padding condenser C5 is merely for the purpose of securing the requisite tuning range.

The intermediate frequency output of the frequency changer is applied to a pair of loosely coupled circuits. The first circuit consists of L4 and C9 tuned to 1,600 kc/s, the circuit being fed from a primary having the same number of turns as the secondary. The second circuit, L5C10, is also tuned to 1,600 kc/s, and is coupled to the first by the 0.01 mfd. condenser C11. The potentials developed across C10 are applied to the triode section of the triode-pentode, and reaction is applied from its anode circuit to the tuned circuit L5C10.

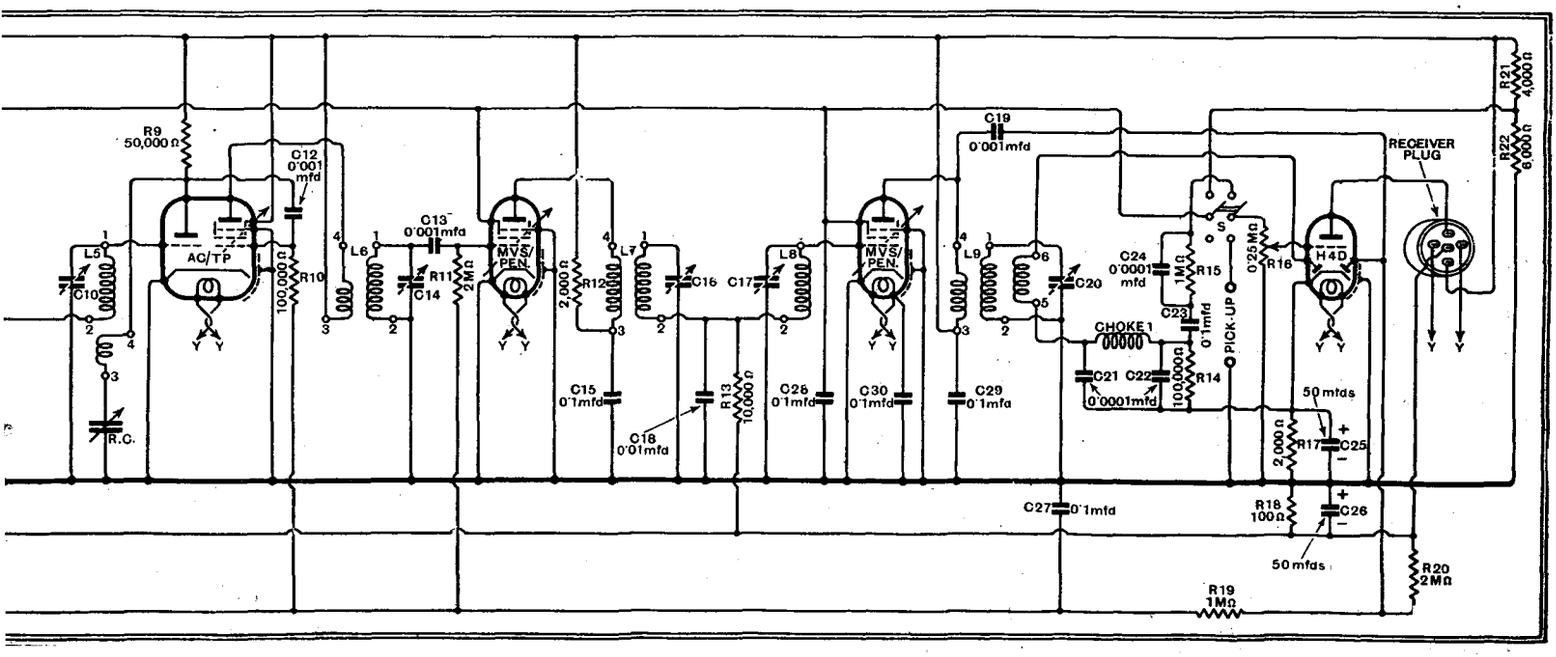


The receiver unit with the coil screens removed.

Resistance coupling is used between the triode and pentode sections of this valve, for the chief function of the buffer is to isolate as far as possible the tuned circuits which follow it from the one to which reaction is applied, and which precedes it. The coupling is formed by the combination of R9, R10 and C12, and the tuned circuit L6C14 is coupled to the coil in the pentode anode circuit, thus giving a transformer of 1-2 ratio. The buffer valve gives a gain of 1.5 times, and the first I.F. valve an amplification of 126.5 times; the total gain afforded by the triode-pentode is thus $1.5 \times 126.5 = 190$ times.

The Detector

The second I.F. stage is an H.F. pentode and is coupled to the third stage by a pair of coupled circuits, the primary being a transformer of 1-1 ratio. The gain obtained here is consequently less, for the coupled circuits give an efficiency of under 50 per cent.; in spite of this, however, an amplification of forty times is obtained. The last stage is coupled to the duo-diode-triode by means of a transformer L9 carrying three windings. The ratio between the primary and secondary is 1-1.5, and between the secondary and tertiary it is 1.5-1. The detector diode is fed from the tertiary, and the usual H.F. filter Ch1, C21 and C22 is included. The diode load resistance R14 is given a value of 100,000 ohms in order to maintain the upper register, and the L.F. potentials developed across this are applied through the 0.1 mfd. condenser C23 to the network R15, C24, R16. R16 is the manual volume control and functions on both radio and gramophone; it has a value of 250,000 ohms. R15 of 1 megohm and C24 of 0.0001 mfd. form a tone-corrector in



ndamental tuning system of single-span remains unchanged. Advantage is taken of the triode-pentode valve to obtain increased amplification and six I.F. tuned circuits are embodied.

Olympic S-S Six—

conjunction with R16. At low and medium frequencies C24 has little effect, and R15 and R16 form a potential divider, so that only about one-fifth of the detector output appears across R16. At high frequencies, however, C24 has a reactance moderate compared with the resistance of R16, and nearly the full detector output appears across R16.

Negative grid bias for the triode L.F. amplifier is derived from the voltage drop across R17. The initial bias for the early stages, however, is obtained by making the earth line of the set, to which the cathodes are returned, positive with respect to negative H.T. through the insertion of the 100 ohms resistance R18 between earth and negative H.T. The A.V.C. diode is fed from the primary of L9 through the 0.001 mfd. condenser C19, and the load resistance R20 is returned to negative H.T.; the delay voltage is thus equal to the sum of the voltage drops along R17 and R18. The A.V.C. bias developed across R20 is applied to the controlled grids through the usual filter R19C27.

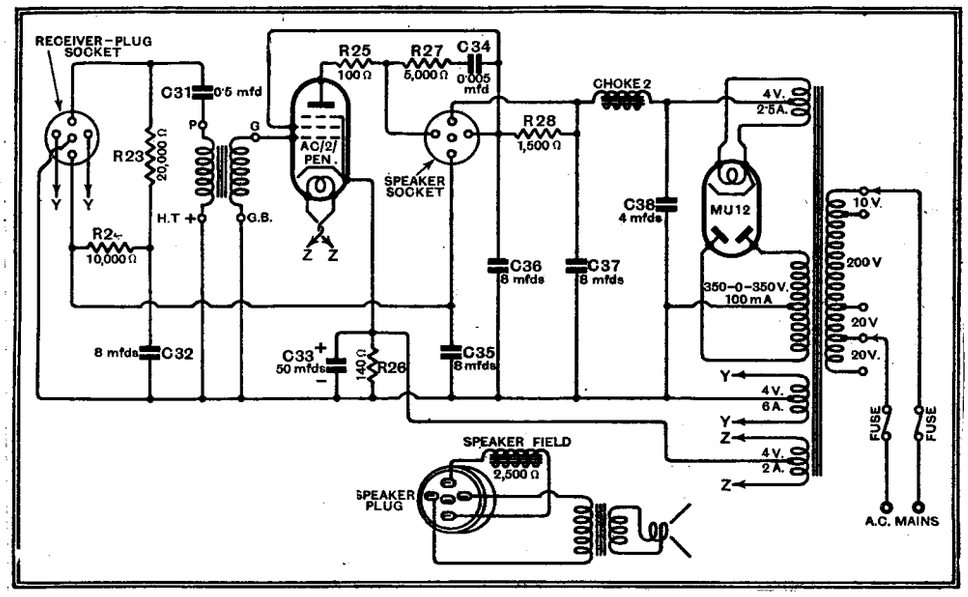
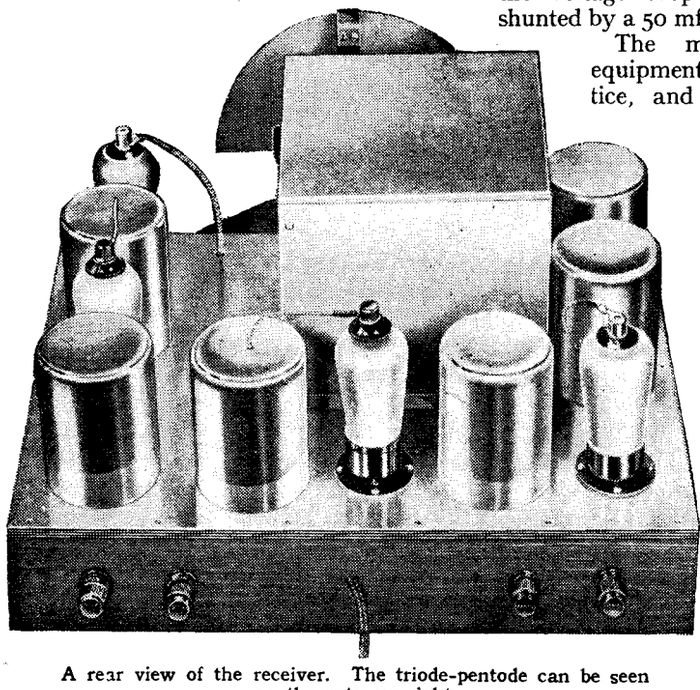


Fig. 2.—Provision is made in the power unit for energising the field of a loud speaker, the winding being so connected that it functions as a smoothing choke.

The coupling between the L.F. stage and the output valve is by means of a resistance-fed transformer of 1-3 ratio (Fig. 2). The coupling resistance R23 is given a value of 20,000 ohms, and decoupling is provided by the 10,000 ohms resistance R24 in conjunction with the 8 mfd. electrolytic condenser C32. The output pentode is one of high efficiency, rated for an output of about 3.5 watts, and it is biased by the voltage drop along R26, which is shunted by a 50 mfd. condenser C33.

The mains and smoothing equipment follow standard practice, and need no explanation. Provision is made for energising a speaker field of 2,500 ohms resistance, and it is, in fact, employed as a smoothing choke. Electrolytic condensers are used throughout for smoothing, and the rectifier is of the indirectly heated type.

Through the combination of six tuned circuits and reaction, variable selectivity of a high order is obtained, and exceptionally good quality of reproduction can be secured.



A rear view of the receiver. The triode-pentode can be seen on the extreme right.

The selectivity obtained with reaction at minimum is shown by curve A of Fig. 3. The curve was obtained with the aid of a standard-signal generator, the procedure being to tune the receiver to resonance with the locally generated signal, and to adjust the input to give a certain output across the loud speaker terminals. The frequency of the signal is then varied by a small known amount, and the input increased to give the same output as at resonance. The ratio of input off-resonance to input at-resonance is plotted for a number of different frequencies, and the curves of Fig. 3 are obtained.

Broadcasting stations are usually spaced by 9 kc/s, and we see from curve A that a station 9 kc/s off-resonance would have to be 3.2 times as strong as one at-resonance to give the same output. This is not a high order of selectivity, but it is intended that the receiver be operated in this condition only for local reception when the wanted station is itself much stronger than any transmission on a nearby wavelength. The sideband cutting with this degree of selectivity is not high, and a 10,000 cycles note is reduced only to about 27 per cent. of its original value. This loss is easily corrected, and the overall frequency response curve of Fig. 4 shows the results obtained; from 40 cycles to 10,000 cycles the response is even within ±3 db. It is possible to obtain, therefore, an exceptionally high standard of reproduction in local reception.

Variable Selectivity

When reaction is applied, the selectivity is very greatly increased. It is difficult to give definite figures for selectivity obtained in this way, for the amount of reaction which can be used with stability depends in some degree upon the A.V.C. bias applied to the controlled valves, and hence upon signal strength. Curve B of Fig. 3 represents the case of critical reaction with a weak signal, so that the A.V.C. bias is zero. Somewhat greater selectivity is possible on a stronger signal. The great improvement in selectivity obtainable as a

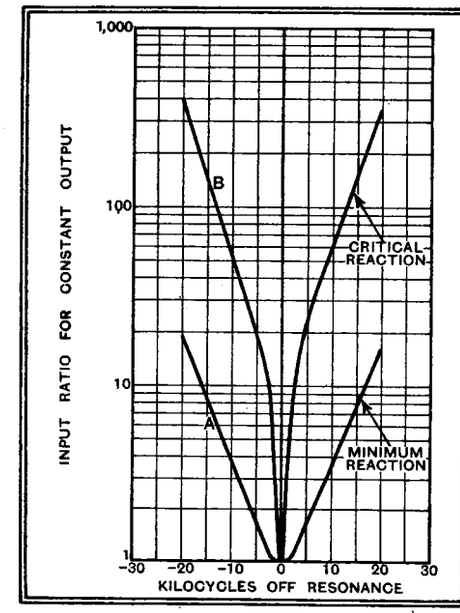


Fig. 3.—These curves show the selectivity obtainable with the new receiver both with minimum and with critical reaction. With other degrees of reaction, the curves obtained would be between these extremes.

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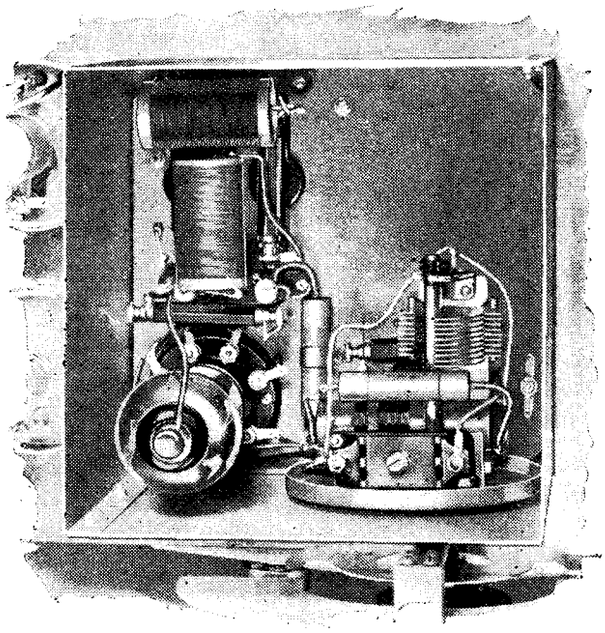
result of the use of reaction is readily apparent, for a signal 9 kc/s off-resonance must be over forty-five times as strong as one at-resonance to give the same output.



The frequency-changer and aerial filter are included in a large screening box and the arrangement of parts is clearly shown here. The oscillator screen has been removed.

Even then the curves do not tell the whole story, for they represent only the selectivity afforded by the tuned circuits, and do not show the gain in freedom from interference afforded by the demodulation of a weak signal by a stronger which occurs with a linear detector. Whatever the degree of selectivity, this effect comes into play to reduce interference, but it increases with any growth in selectivity, and so accentuates the difference between the curves of Fig. 3.

When much reaction is used, there is naturally a good deal of sideband cutting, with the result that the high-frequency response falls off. This is actually advantageous rather than otherwise, for on the weak signals for which high selectivity is needed it is essential to reduce the high-frequency response if heterodyne interference and sideband splash are not to prove prohibitive. In addition to increasing the selectivity, the application of reaction increases the sensitivity by some 21 times. Unless the set be tuned to a weak signal, however, it will be found that an increase in reaction has little or no audible effect on the volume, for the greater sensitivity is offset by the higher bias applied by the A.V.C. system to the controlled valves.

It may be remarked at this point that the apparent selectivity of the receiver depends not only on the true selectivity but also on the sensitivity. At first, therefore, the spread of the local station may seem rather great, particularly if the set be tried in the daytime or at some other time when the signals on nearby channels are weak. If the set be operated at night, however, when distant stations increase greatly in strength, it will be found readily possible to receive stations free from interference which are working with quite a small frequency separation from the local. This is more easily seen from Fig. 5, which shows the selectivity curves replotted to illustrate the actual aerial input required to maintain constant output for a particular setting of the manual volume control. With critical reaction, an input of 71 microvolts will give the same output as an input of 1,500 microvolts without reaction, when the circuits are tuned to the same frequency as the signal. At frequencies different from resonance, however, reaction in itself makes little difference.

Suppose we wish to receive a station giving 1,500 microvolts in the aerial, and that there is an interfering transmission giving the same aerial voltage on a frequency 20 kc/s lower than that of the wanted signal. Now we can obtain adequate volume without reaction, but the output from the interfering station will be 1/19.35 times that of the wanted signal. It may still be audible, therefore. If we increase reaction to the limit, the output from the unwanted station is unchanged, but the input required from the wanted station is only 71 microvolts. This station can thus be 1/21 times its former strength with the same interference. The station will, however, remain at 1,500 microvolts, so that the increased detector input will result in A.V.C. reducing the sensitivity. This reduction will not be to quite 1/21 times, but it applies to all signals equally, so that instead of the interfering transmission giving an output of 1/19.35 times that of the wanted station, it gives an output of $1/19.35 \times 21 = 1/406$ times, and the interference becomes inaudible.

It is particularly to be noted that if the set is not tuned to a station the application of reaction will not reduce interference from a station to which the set is not tuned. Increasing reaction certainly increases the sensitivity and sharpens the resonance curve, but this does not affect the output from a neighbouring station until a carrier is tuned in which will operate the automatic volume control system and so reduce the sensitivity.

(To be concluded.)

THE LIST OF PARTS

A full list of component parts required to build this receiver, together in some instances with suitable alternatives, will be found on page 110.

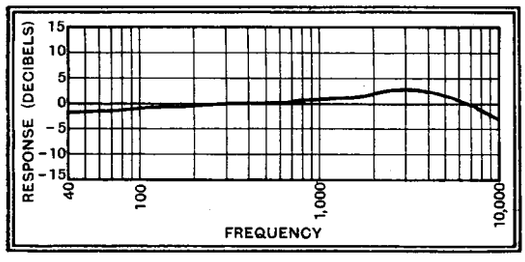


Fig. 4.—The overall frequency response of the receiver shows that at 40 cycles the loss is under 2 db, while at as high a frequency as 10,000 cycles it is only 3 db. There is a slight rise at 3,000 cycles, but this does not exceed 2.5 db. The curve was taken with reaction at minimum.

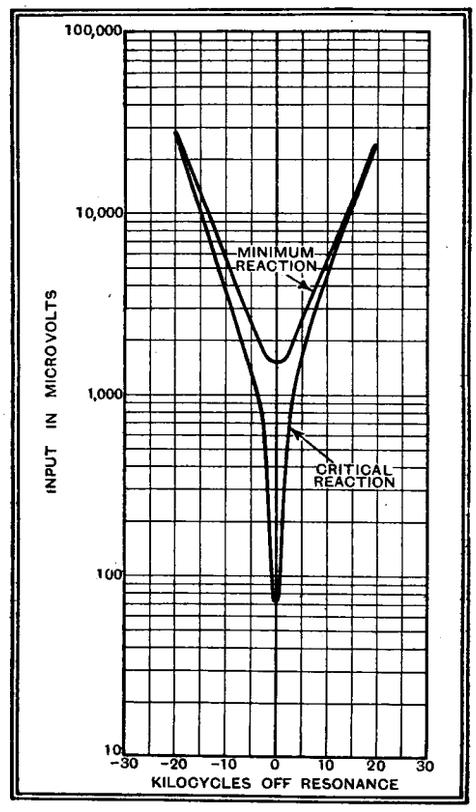


Fig. 5.—These curves show the input necessary for constant output at various frequencies on either side of resonance. It should be noted that the use of reaction has little effect except at resonance.

NEW RECEIVER DESIGNS

What the Show Will Reveal

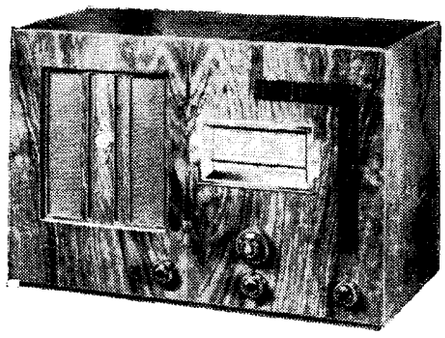
ALTHOUGH the Olympia Show does not open until August 16th, it is already possible to form a useful opinion on the general trend of design of the new receivers. Many of the technical developments which have been discussed in these pages during the past year have now been embodied in commercially-built sets.

AS a preliminary to a description of the outstanding technical features of the new sets to be shown at Olympia, it will avoid needless repetition to say that most of the receivers discussed—at any rate, those of the more ambitious type—are available as ordinary table models and as radio-gramophones; in addition, a number of them may be housed in upright console cabinets. Descriptions will therefore be confined mainly to the chassis.

Similarly, the rectifier in mains sets will not be counted in the total number of valves, in spite of the fact that to do so has become almost universal among manufacturers. It has been found, however, to cause a certain amount of confusion in comparing various sets, one of the reasons being that metal rectifiers are not usually included as valves.

It is already quite clear that the "standard" set for the 1934-1935 season is to be of the type generally referred to as a small superheterodyne, having as a rule a total of four valves. This tendency was evident last year, and now practically every manufacturer who caters for the more popular market has produced a model.

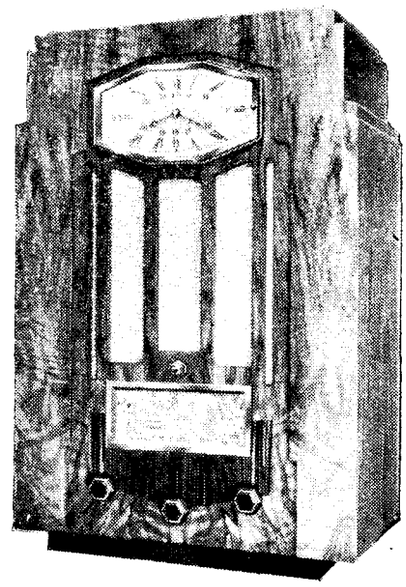
The typical small mains superheterodyne now costs roughly 12 guineas for the table model, and rather more ambitious variations of the same circuit arrangement, with refinements in the matter of general equipment and cabinet work, are sold at prices varying from 14 guineas upwards.



Cossor straight battery receiver with iron-cored coils.

The general design of these popular sets will be discussed under the appropriate heading.

It is natural that technical interest should centre mainly round the larger superheterodynes, of which the more important features will be critically discussed later. Probably the most beneficial development is the provision of true variable selectivity, which will be found, for example, in the R.G.D. radio-gramophones. We all know by now that under modern broadcasting conditions it is not



The Ferranti Gloria superheterodyne.

always that one can avail oneself of a really wide frequency response in a receiver; the logical thing to do therefore, is to make provision for widening the frequency band (and thus attaining natural reproduction) when conditions are good, and narrowing it down when interference from adjacent-channel stations is present, and poorer quality must be tolerated.

Automatic volume control is now included almost as a matter of course in all superheterodynes, even in those of the smallest type, but "quiet" A.V.C., whereby background noises, usually present when the desensitising effect of an incoming carrier wave is not applied, may be avoided, is naturally confined to the more expensive multi-valve sets. At any rate, this applies to true Q.A.V.C., of which the functioning is entirely automatic. A number of the smaller sets have manually-operated noise suppressors, or "sensitivity limiters." Little, if any, attempt has been made to include A.V.C. in the cheaper type of "straight" set.

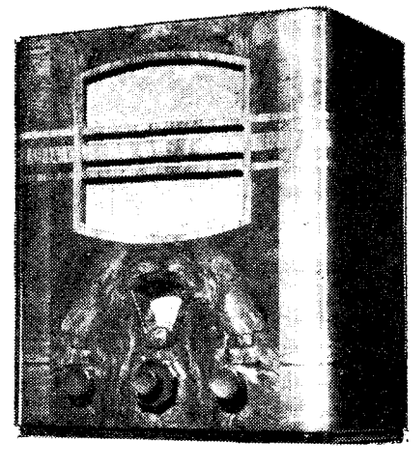
In view of the general adoption of A.V.C., it is natural that diode detectors —or H.F. metal rectifiers—are almost always fitted in superheterodynes or in multi-stage "straight" sets. It is rather surprising to find that triode detectors are practically universal in the cheaper type of H.F.-det.-L.F. or det.-L.F. set. In a few cases, however, H.F. pentodes are used for grid detection.

Pentode output valves are clearly favoured in all but the more ambitious receivers, and in the smallest battery-operated sets.

It is certain that iron-cored coils will be widely used in receivers of every type, for I.F. as well as for H.F. circuits. They will be included in Cossor, Drummer, Dynatron, Haynes and G.E.C. sets, the core material employed in the products of the last-mentioned firm being the newly developed Gecalloy. It is interesting to see that moving-coil loud speakers will be fitted in almost every set costing more than some five or six pounds.

Multi-stage Receivers

The majority of receivers of the larger type fall into the superheterodyne class, although there are naturally exceptions. Nowadays the owner of an expensive receiver demands not only high quality reproduction but a high degree of sensitivity, coupled with the ability to select the desired programme free from interference. He asks also for the refinements of radio



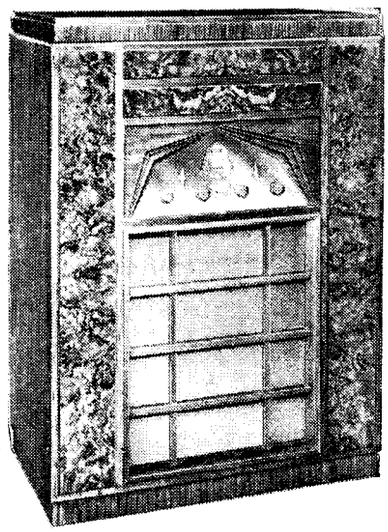
The Philips Model 588-A receiver.

technique, and expects his set to be equipped with visual tuning, delayed quiet automatic volume control, and tone control, while single control tuning, station calibration, and waveband switching—the "special features" of a few years ago—are taken as a matter of course.

New Receiver Design—

The keynote of most of the receivers which will be on show this year is sound design, and there is no doubt that it is of far greater importance than many more spectacular developments. Almost invariably a steel chassis is employed in the construction, not so much because it provides a convenient earth line to which connections may be made, as for its rigidity and for the increased screening which it makes cheaply available. The largest chassis are usually supplied in radio-gramophone form, and wide use is made of automatic record changers.

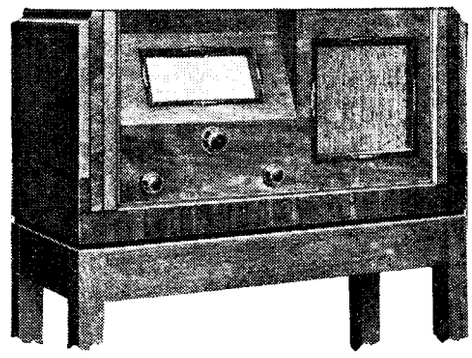
Among the electrical developments which will be found at Olympia, variable selectivity is probably the most important, and will contribute most to the attainment of a high standard of reproduction. The necessity for such a control will be realised



The R.G.D. All-wave Radio-Gramophone.

when it is remembered that first-class quality of reproduction cannot be secured unless frequencies up to some 10,000 cycles are present in the receiver output. No matter how selective the receiver may be, a response of this order cannot be maintained on distant stations if all forms of interference are to be avoided. It is necessary, therefore, to reduce the frequency response for distant reception, and this is best arranged by so varying the selectivity that it is only moderate for local reception, but reaches a high order when distant stations are required.

One of the best examples of this modern trend in design will be found in the Model 1202 of the Radio Gramophone Development Co. This set has no less than twelve valves, and it is, of course, a superheterodyne. A signal-frequency H.F. stage is embodied, with three tuned circuits, in order to obtain freedom from second-channel interference, even under poor conditions. The frequency-changer is of the two-valve type, and there is a single I.F. valve with four tuned circuits. Amplified A.V.C. is included, and a diode detector is used to provide distortionless rectification. The L.F. amplifier is resistance-coupled throughout, and the paraphrase system of push-pull connection is embodied in it. The tuned circuits can have their constants modified by means of a switch, so that the upper limit to the overall frequency response can be set at 10,000 cycles, 4,000 cycles, or 3,000 cycles, to

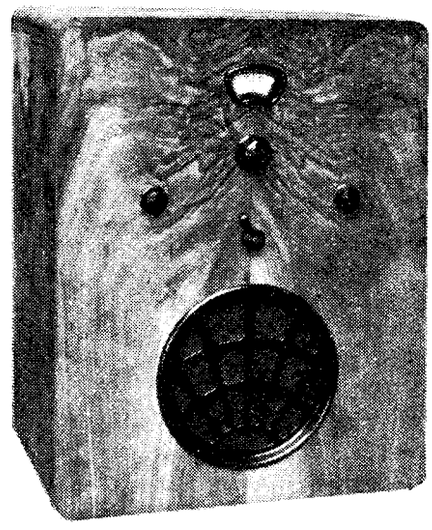


Telsen superheterodyne with A.V.C.

suit the interference conditions prevailing on any given station. In addition, a 9 kc/s whistle filter is included in order to eliminate the heterodyne note between adjacent transmitters, but this may be switched out of circuit when not required.

A separate triode valve provides quiet A.V.C., and the gramophone equipment includes an automatic record changer and a piezo-electric pick-up. Three loud speakers are used—two of the cone type to cover the lower range of frequencies, and one small horn speaker for the extreme upper register—and it is claimed that the combination affords a flat response over the range of 70-7,000 cycles.

A receiver of this nature, of course, represents one of the few cases where technical merit is the ultimate aim in the design in contradistinction to the more usual aim of obtaining a high performance for the lowest possible cost. Incidentally, of course, the one may present to the designer just as great problems as the other, but there is no doubt as to which is the more interesting scientifically.

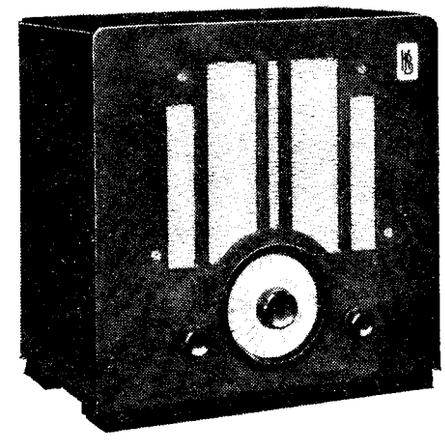


A frame-aerial A.C. Mains superhet : the McMichael Transportable.

A very general tendency is to make use of the special frequency-changer valves in superheterodynes, and the Birmingham Sound Reproducers' seven-valve receiver includes an octode for this purpose. It is preceded by a stage of signal-frequency amplification, and the single I.F. valve feeds a duo-diode-triode. Resistance-capacity coupling is used throughout the L.F. amplifier, and the triode output valve is rated to deliver 5.9 watts to the loud speaker. There are seven tuned circuits using iron-cored coils, and a visual tuning indicator is included.

A smaller receiver by the same firm is unusual in not being a superheterodyne. It is fitted with two H.F. stages, and four iron-cored coils are used for tuning. The detector is a duo-diode-pentode, and feeds the output triode through a resistance coupling. A.V.C., visual tuning, and a tone control are included.

Quiet automatic volume control will still be found only in a minority of receivers —one is the R.G.D. set already mentioned, another is the Kolster-Brandes KB.383. This set includes an H.F. pentode solely to provide the "quiet" part of A.V.C., for normal delayed A.V.C. is obtained with



The Kolster-Brandes Model 381.

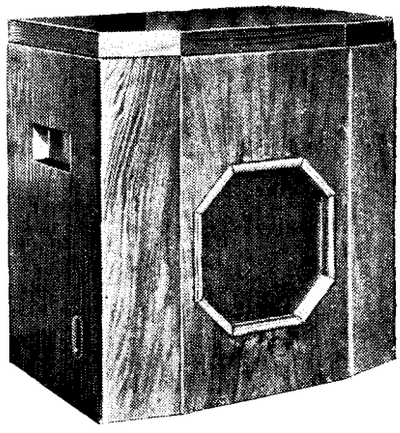
the aid of a duo-diode-triode. A heptode frequency-changer is used with a single I.F. stage, but the output stage consists of two pentodes in parallel. The set is designed for universal operation from A.C. or D.C. mains, and it is provided with a neon tuning indicator and, last but not least, variable selectivity.

Another set of the same make, the KB.366, embodies a somewhat different Q.A.V.C. system, and it involves a single-diode-tetrode in addition to the normal duo-diode-triode. In this set a signal-frequency H.F. stage is included, and an H.F. pentode is used for frequency changing, while the output pentodes are connected in push-pull.

In this larger class of receiver there appears to be no definite trend in circuit design as far as can be judged at the time of writing. The conventional arrangements of valves and circuits so common in small receivers are here conspicuous by their absence. This is all to the good and is evidence of individual thinking on the part of the designers. In part, of course, it is no doubt due to extra importance being placed upon different attributes of the receiver by different manufacturers. Thus a firm which considers quality of reproduction to be of primary importance is more likely to provide variable selec-

New Receiver Design—

tivity than one which gives sensitivity and selectivity pride of place. Such a firm is also likely to prefer low-gain resistance-coupled L.F. amplifiers to the use of few valves and high-ratio transformers.

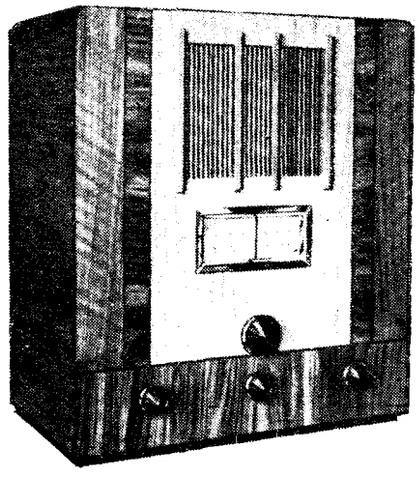


The Pye SP/AC superheterodyne.

Although automatic volume control is a fitting of value chiefly in distant listening, it must not be thought that its presence necessarily places a receiver in the category of the second rate from the quality viewpoint. This is by no means the case, for it is a convenience, but not a necessity, in local reception, and most high-quality receivers include some form of A.V.C. It will, in fact, be hard to find any receiver this year which contains more than four valves and which does not include A.V.C.

Many sets will include some form of noise suppressor, and this usually takes the form of an extra bias resistance to an early stage, which can be thrown in circuit by a switch while tuning. The sensitivity of the set is thus reduced, and background avoided. Although not as perfect as true Q.A.V.C., it is cheaper and very effective.

Universal A.C.-D.C. operation has spread to only few of the large receivers and is chiefly confined to smaller sets, for which it is rather more suitable. Visual tuning indicators will be widespread, however, and of varied types. A simple milliammeter is still the most popular, but shadow tuning and neon indicators are increasingly to be found.

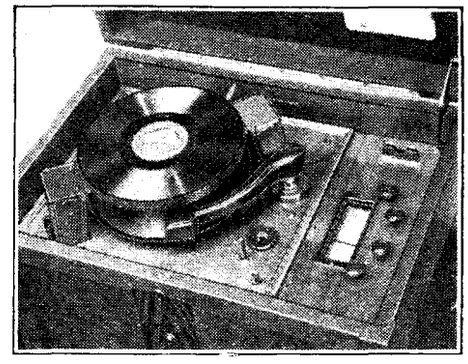


Edge Radio superheterodyne, Model M 55M.

Battery-operated receivers with many valves are likely to be widespread, due largely to the great advances which have been made in battery-valve design of recent years. Five- and six-valve sets will not be uncommon. The Pye SP/B affords a good example of this class of receiver. It is a portable, and includes a signal-frequency H.F. stage with a triode-pentode frequency-changer feeding a single I.F. valve. A duo-diode-triode provides detection and A.V.C. and also acts as the driver to the Class "B" output stage.

Although it has an output of the same order, however, the Gramophone Company has chosen Q.P.P. in preference to Class "B" for its model 462 receiver. This is also a portable with a signal-frequency H.F. stage, but metal rectifiers are used for detection and A.V.C. The frequency-changer is a screen-grid valve.

In the Consolidated Radio Ranger De Luxe Battery Superheterodyne a heptode is used for frequency-changing, and both H.F. and I.F. amplification are included.



The HMV Autoradiogram, Model 542.

The duo-diode-triode provides A.V.C., but there is an additional triode for the driver to the Class "B" stage.

It will be thus apparent that uniformity has by no means been reached either in the type of frequency-changer or in the output stage. Where a frame aerial is used, it seems to be generally accepted that both signal and intermediate frequency amplification are necessary, but while some designers favour a detector-oscillator for the frequency-changer, others prefer the heptode, and still others employ the triode-pentode. This would appear to show that no one system is outstandingly better than the others.

Opinions are probably evenly divided regarding the relative advantages of the Class "B" and Q.P.P. output systems. When correctly designed, there is little to choose between them from the quality viewpoint, but Class "B" requires an additional valve, and Q.P.P. is somewhat easier to design, so that, in spite of the smaller output usually obtained, it is finding wide favour. A.V.C. is now included in battery receivers just as much as in mains types, and at least one model has variable selectivity. Tuning indicators are not so widespread, however.

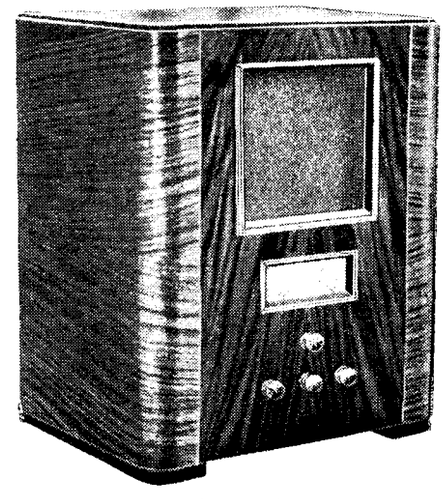
Although many examples of D.C. mains receivers will be found, there is undoubtedly a tendency for them to be displaced by the Universal set. There can be no doubt that this is due to the fear of the purchaser lest his D.C. supply be changed to A.C. within a short period and his receiver rendered useless. Unless he is certain that his supply will be continued unchanged for many years, therefore, he naturally prefers a Universal receiver which will continue to function regardless of the nature of the mains supply. Where A.C. is available the purely A.C. receiver is to be preferred, of course, for the Universal set usually suffers from the same voltage limitations as a D.C. model.

Full information with regard to every manufacturer's programme has not yet been received, but sufficient is available to indicate that, in spite of many fears to the contrary, standardisation has not yet been reached. Receivers of widely differing types for A.C., D.C., Universal, and battery operation are available at prices to suit all purses, and it is only among the cheapest class of set that the variations between different receivers become of a minor order.

Small Superheterodynes

It has already been stated that the so-called small superheterodyne is certain to be the most popular set of the season. Although there are fairly important differences between the various productions, it is fairly easy to determine what constitutes the typical circuit arrangement. In almost every case a two-circuit input tuner is provided; this is followed by a heptode frequency changer, or by the newer octode valve, which is also electron coupled, and is very similar in operation. It is claimed to offer the advantage of a quieter background. Next comes a single intermediate frequency stage, with band-pass coupling, the valve being more often than not a variable-mu H.F. pentode. A double diode triode performs the function of second detection and also provides voltages for operation of the A.V.C. system, while the output valve is almost invariably a pentode.

Sets to this general specification are produced by almost every firm. The Marconi-



The Orr Radio Universal A.C.-D.C. superheterodyne.

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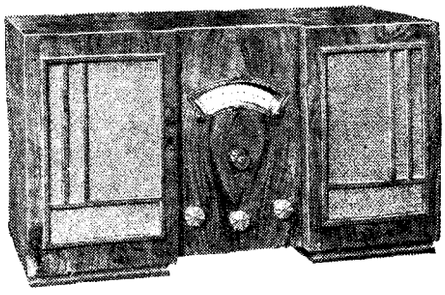
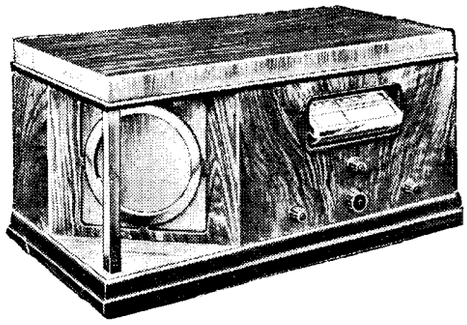
phone version, for example, includes a manually operated static suppressor, while the Ekco A.C. model has variable tone control in addition to a sensitivity limiter. An interesting feature of this latter set is the exceptionally large station-calibrated



Twin loud speakers are fitted in the C.A.C. "Austin" Model.

tuning scale. Incidentally, a well-designed variable tone control acts very much in the same way as variable selectivity (which naturally is not to be expected in these small sets) and is to be found in a number of sets, including the C.A.C., Drummer, and G.E.C. productions. In passing, it should be noted that the C.A.C. set is one of the few to include the refinement of twin loud speakers.

Although visual tuning indicators, whereby the operation of tuning may be carried out much more accurately than by aural means, are fitted to many of the larger sets, considerations of cost debar their use from many of the smaller ones.



The tuning scale of the Clarke's Atlas superhet may be tilted for easy reading.

Tuning indicators are to be found, however, in the H.M.V. and Cossor four-valve superhets., and also in the Ferranti Lancastria model, in which, incidentally, all the normal functions of a small superhet are carried out with a total of only three valves.

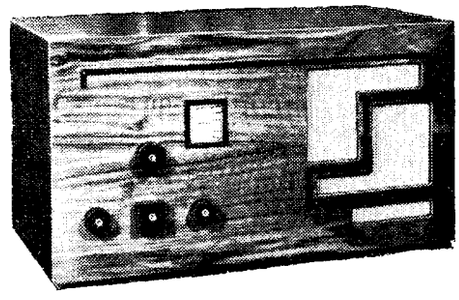
In the matter of external appearance, no very sweeping changes are to be noticed, although convenience of operation, which has been consistently urged in this journal, has clearly had the attention of many designers. In the new Clarke's Atlas set, for instance, the tuning scale may be tilted to the most convenient position for reading. This set, incidentally, is one of the few of its type to embody a triode output valve.

Straight Sets

Except for a few outstanding examples, the use of straight circuits is now confined to the less ambitious type of receiver, and largely to battery and universal mains receivers. It would almost appear, indeed, that so far as selectivity is concerned, the designers of this class of receiver have ceased to compete with the superheterodyne, in which relatively high selectivity is so easily and cheaply obtained. This statement is prompted by the fact that there is a distinct tendency to simplify straight sets by the omission of band-pass tuning; most of the cheaper sets include only two tuned circuits. In this matter, as in most others, one gets what one pays for, and the higher selectivity conferred by an extra circuit involves, in all cases, a slightly greater outlay.

The average price of typical three-valve mains sets works out at about 9 guineas, and interesting examples have been produced by Aerodyne, Telsen, and Cossor, the latter being fitted with iron-cored tuning coils.

It is noted that the ordinary screen grid H.F. valve has virtually disappeared;



Climax superheterodyne, Model S 5W.

even the ordinary variable-mu valve is comparatively rare, its place having been taken by an H.F. pentode. Triode detectors and pentode output valves are fitted in the majority of sets.

We are here dealing with mains receivers, and it would seem that those without H.F. amplification are becoming extremely rare; this in spite of the fact that a simple det.-L.F. circuit is still capable of satisfying the less exacting sort of requirements and offers the advantage of extreme simplicity and freedom from breakdown. One of the few new detector-L.F. sets is the Kolster-Brandes A.C. model, with pentode output and an energised moving-coil loud speaker, costing £6 17s. 6d.

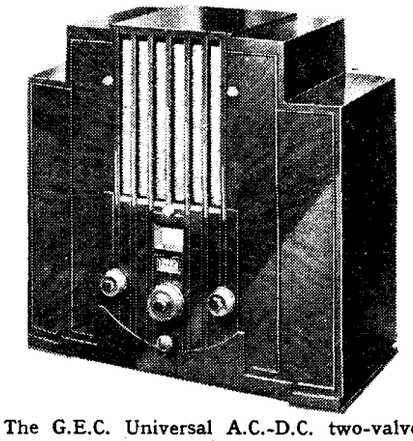
The more ambitious types of straight receiver are discussed under the appropriate headings.

Universal A.C.-D.C. Receivers

As was to be expected, the D.C. mains set tends to disappear, its place being taken by the universal receiver, which may be operated interchangeably on either A.C. or D.C. supplies. As a general rule it may be said that these receivers work just as well on D.C. as a set designed specifically for that form of supply, but there is a slight falling off as compared with a set built to operate solely on A.C.

This general adoption of the "universal" principle is a matter of some importance, and it is likely that the sets will prove popular, particularly among those with D.C. supplies, most of whom are anticipating a change to A.C. in the near future.

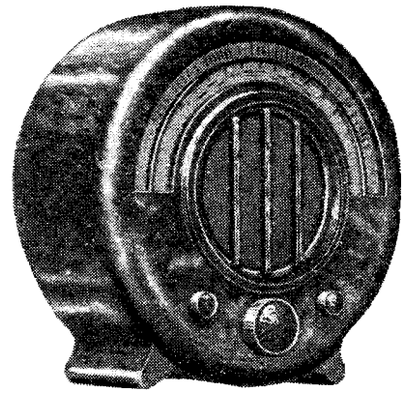
Most of the universal sets have either three-valve H.F.-det.-L.F. or four-valve superheterodyne circuits, but one at least is of the detector-L.F. type. This is the



The G.E.C. Universal A.C.-D.C. two-valve receiver.

G.E.C. Universal Mains Three, embodying two valves and a rectifier with pentode output. The loud speaker field coil is used for smoothing purposes.

With regard to circuit details, the A.C.-D.C. sets do not differ greatly from their A.C. counterparts, except, of course, in the fact that special valves, with their heating elements connected in series, are used. The Halcyon Model 4501 is an interesting example of the universal four-valve superheterodyne in which Westinghouse rectifiers are used for detection and A.V.C. Among the many other firms making "straight" or superheterodyne receivers are Aerodyne, Ace, Climax, and Ekco. The Ekco receiver is unusual in that it employs a total of three valves, including an octode frequency changer and a double diode pentode, which combines the functions of second detection, A.V.C., and output. Externally this receiver in its circular bakelite container is probably



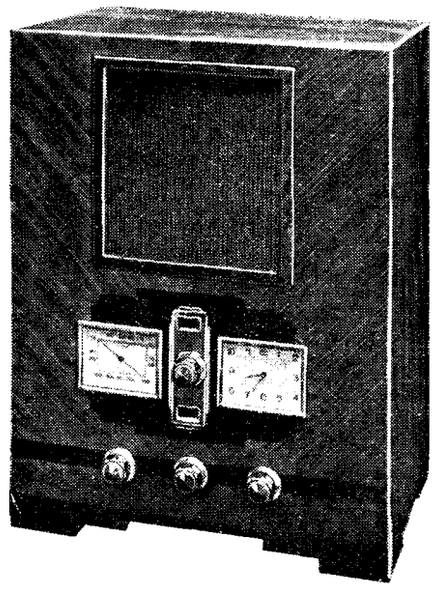
Unconventional externally and internally; the Ekco A.C.-D.C. three-valve superheterodyne.

the most truly unconventional of the new season's productions: this method of construction certainly makes it possible to fit an exceptionally large and legible tuning scale.

New Receiver Design—

The New Battery Sets

A rather unexpected, but, nevertheless, quite definite, trend of design is exemplified in the introduction by a number of manufacturers of det.-2 L.F. battery receivers with single-circuit tuning. It might be thought that under modern conditions

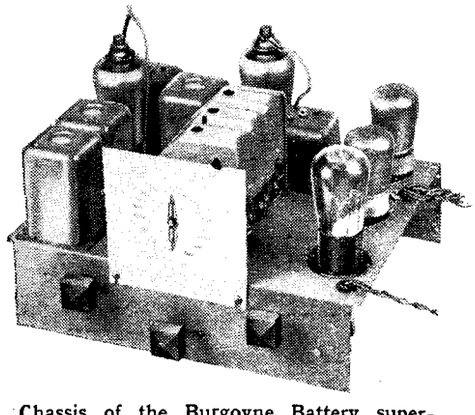


Aerodyne "Merlin" battery receiver.

these receivers would be insufficiently selective, but in certain circumstances they are actually capable of giving satisfactory service, and are both cheap and trouble-free. One of the first examples illustrating this tendency was the G.E.C. "Compact Three," which was recently reviewed in these pages; other sets of the same general type are made by Aerodyne, Burgoyne, Kolster-Brandes, Lampex, and Orr Radio, etc.

But the favourite circuit among designers of battery sets is clearly still our old friend the H.F.-det.-L.F. three-valve arrangement—which sometimes grows into a four-valve set when Class "B" amplification is included.

Remarks already made concerning the tendency to abandon three-circuit tuning in "straight" mains sets also apply to battery receivers, and it is found that the cheaper ones have almost invariably only two tuned circuits.



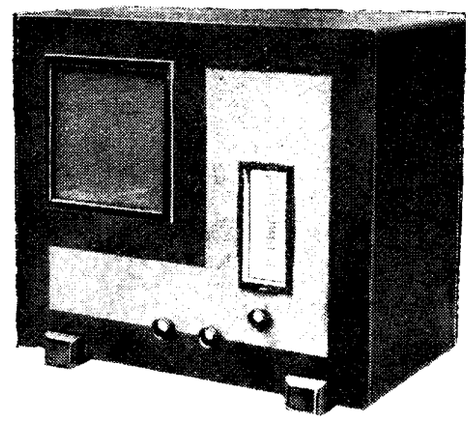
Chassis of the Burgoyne Battery superheterodyne.

With regard to the output stage of the battery set, it would seem that honours are fairly evenly divided between triodes, pentodes and battery-economy systems. Class "B" amplification is still popular, although several manufacturers, including Ekco, have adopted Q.P.P.; this firm employs a double pentode arrangement.

Among those manufacturers who have produced typical modern battery sets may be mentioned Aerodyne, Ace, Alba, Consolidated Radio, Cossor, Drummer, and Halcyon. In addition to the "straight" sets there are a number of battery superheterodynes in which "mains" technique is generally followed.

Short-wave Sets

Apparatus designed specially for short-wave reception seems likely to be more widespread than formerly, although it cannot be said that a very wide choice is yet available. The sets show evidence of more careful design, however, and a better realisation of the particular problems of the short wavelengths. The mechanical design, moreover, is receiving greater attention, and constructions suitable for tropical climates will be available. The superheterodyne principle is used without exception in the highly sensitive receivers necessary for these wavelengths, and in most cases coil changing is effected by means of switching. Even in the short-wave set the days of the plug-in coil are numbered.

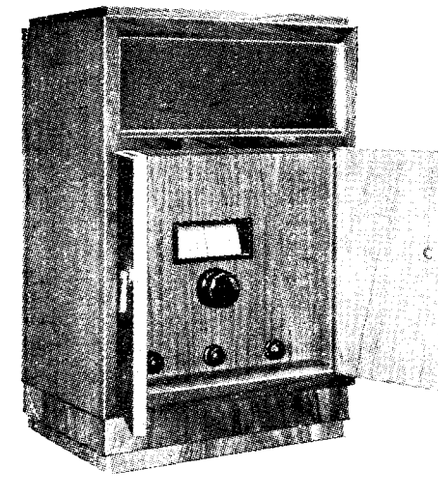


Lampex "Phantom Minx de Luxe."

An All-Wave International Radio and Television, Ltd. receiver affords an excellent example of the tendency in this respect. An octode frequency-changer is employed and followed by two I.F. stages using an intermediate frequency of 465 kc/s. A duo-diode provides detection and A.V.C., while the L.F. stage is a variable-mu pentode, the grid bias of which is variable for the manual volume control. Resistance coupling is used to the output pentode, and tone control is included, and provision is made for a pick-up.

The wide tuning range of 15-2,000 metres is secured in four bands, with internal switching. The tuning control is provided with two ratios so that rapid searching can be carried out and yet accurate tuning obtained, while, in order to secure maximum efficiency, Litz-wound coils are fitted. The receiver is designed for Universal operation from A.C. or D.C. mains, and employs the new Universal valves. In order to keep mains interference at a minimum, H.F. chokes are included in the supply leads.

The Continental model of British Radiophone has three bands covering 15-55, 195-560, and 800-2,000 metres, and is particularly interesting in that three tuned circuits with ganged control are provided.



All-Wave International Radio and Television receiver.

A signal-frequency H.F. valve is followed by an octode frequency-changer, and there is a single I.F. valve feeding the duo-diode detector and A.V.C. valve. The output valve is a pentode, and another pentode is included to give a form of Q.A.V.C. In order to withstand tropical conditions, a teak cabinet is used and all metal parts are anodised. It is claimed that the apparatus will withstand 100 per cent. humidity and a temperature of 100 degrees.

In electrical design there appears to be a tendency not to produce purely short-wave receivers, but sets designed for operation on both short, medium, and long wavebands. This is no doubt due to the notorious unreliability of short-wave reception, for the listener on these bands is always at the mercy of atmospheric conditions. The time constant of the A.V.C. system is usually kept at a smaller value than in purely broadcast sets in an endeavour to minimise the effects of high-speed fading, and both high sensitivity and high selectivity are considered of great importance. Apart from a tendency to employ a higher intermediate frequency, the circuits after the frequency-changer usually follow closely the lines adopted in superheterodynes for the normal wavebands, and, indeed, much in the way of change is unnecessary.

Apart from apparatus of this nature, short-wave converters will be well in evidence. These are designed to permit short-wave reception to be obtained with any sensitive broadcast receiver of conventional design. They invariably function on the superheterodyne principle and convert a straight set into a short-wave superheterodyne, or a superheterodyne into one fitted with double frequency-changing.

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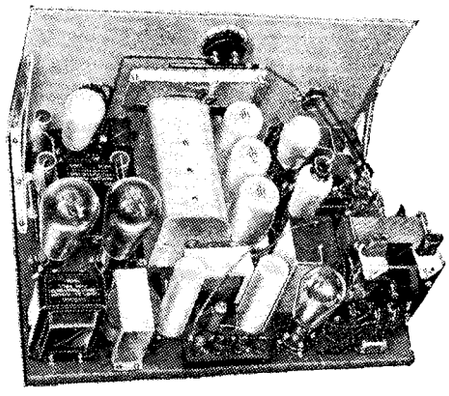
The Kolster-Brandes receivers are specially arranged for use with a converter, and a suitable unit is manufactured by the same firm and covers a range of 14 metres to 80 metres. Eastick and Sons have several different types of converter, including an A.C. model in which a detector-oscillator frequency-changer is preceded by an H.F. stage. Two tuning ranges are included and are obtained by an ingenious method. A single plug-in coil assembly is used, but there are two different ways of inserting it in its socket. To change the range, therefore, it is only necessary to remove the coil, turn it round, and to replace it.

The City Accumulator Company have a two-valve converter with a similar arrangement of the valves. Here, however, a set of plug-in coils is provided for the different wave ranges. This converter is for A.C. operation and includes its own mains equipment, so that it may be employed with any receiver without alteration.

When used with a suitable receiver, converters of this nature can give an entirely satisfactory performance and do not suffer in a comparison with a short-wave set. The converter, however, cannot turn a poor receiver into a good one.

Special-Purpose Apparatus

It is encouraging to see a growing tendency to cater for requirements that are not completely met by standardised broadcast receivers. In addition to the

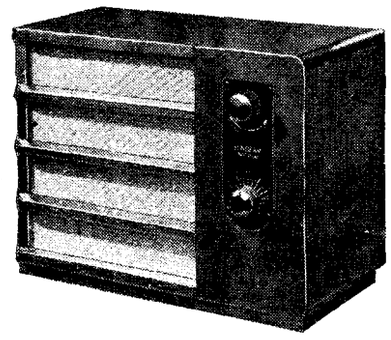


The Hartley-Turner 12-watt medium-range receiver.

short-wave and all-wave equipment that has already been described, a number of specialised sets have been produced to meet abnormal requirements or conditions.

An interesting example of this tendency is provided by the Hartley-Turner medium-distance set, which is specifically designed to give superlative reproduction within the "service" area of a broadcasting station. The circuit arrangement comprises a single H.F. stage, with band-pass tuning embracing an exceptionally wide range of frequencies. The succeeding grid detector is resistance-coupled to an intermediate L.F. amplifier, which is in turn linked to the output stage by a special transformer. Definite data with regard to frequency coverage is available, and the sets, which are produced with either 7-watt or 12-watt outputs, are available either ready-made or as kits of parts.

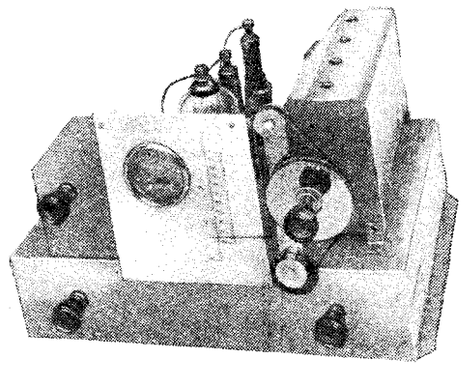
Although there are not so many car radio receivers as might be anticipated, at least two British-made specimens are to be available. The Baker, which was recently described in this journal, is rather more versatile than the American type, as it can be readily removed from the car or operated with an extension loud speaker. A Sunbeam car set is also announced, but full details are not yet available. The Sunbeam Universal A.C.-D.C. midget receiver may also be included in the



The Sunbeam Midget A.C.-D.C. superheterodyne.

category of special apparatus, as it would appear to be the smallest British superheterodyne.

To meet the demands of those who need flexibility and adaptability, tuner units for connection to external amplifiers have been evolved by B.S.R. and Haynes Radio. The B.S.R. radio chassis includes two H.F. stages, and derives its working current from any of the standard amplifiers made by the same firm. Haynes sets consist of tuner units of both the "straight" and superheterodyne type, fitted throughout with Ferrocart coils; the corresponding amplifier-eliminator units are designed with outputs of 2½, 6, and 14 watts, including a paraphase resistance coupled amplifier.

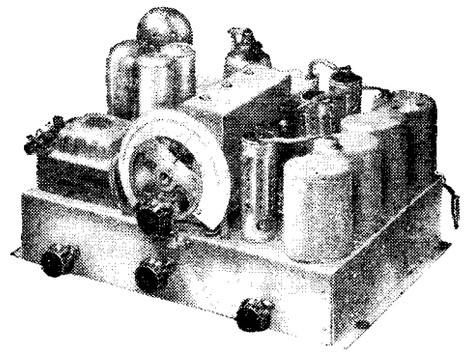


Haynes Radio tuner unit, fitted with Ferrocart coils.

Inexpensive television apparatus, both complete and for connection to existing sets, has been produced by Plew Television.

A limited amount of tone-correction is included in most sets nowadays, but the principle of deliberate sideband attenuation with subsequent correction is carried to extreme lengths in the interesting range of Stenode receivers produced by Eldeco.

Technical interest in portable sets centres round the superheterodynes, which have



The Eldeco Stenode for A.C. operation.

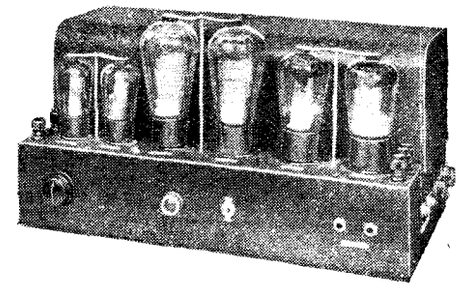
already been described. But, for this special purpose, many designers still pin their faith to the straight circuit, and a good deal of development work has been done. New or modified portables have been produced by Beethoven, Burgoyne, McMichael, Pye, etc. It is worth noting that the McMichael Transportable Superhet is one of the very few A.C. sets which operate with a frame aerial.

Amplifiers

There would appear to be no sweeping changes in the technique of L.F. amplification, although resistance coupling is certainly more widely used. Probably the most important development is the commercial adoption of resistance-coupled push-pull, as exemplified in the Quality Amplifier recently described in this journal; C.A.C. have now introduced a model of this amplifier in completed form. The R.G.D. amplifier is another interesting piece of apparatus embodying the paraphase principle.

Screen grid valves are used in a special circuit arrangement in the B.S.R. amplifiers rated at 25 and 50 watts. The same firm have designed a battery-operated portable amplifier with Class "B" amplification, which is stated to give an output of 4 watts. Portable public-address equipment is also made by Film Industries; the moving-coil horn loud speaker is included, and the audible range is stated to be 500 yards.

Amplifiers for many special purposes, including aids for the deaf, are made by



An Ardente high-power amplifier.

Ossicaide and Ardente; as was to be anticipated, the new midget battery valves have been found useful for deaf-aid appliances.

HINTS and TIPS

Practical Aids to Better Reception

IT has been found that Single-Span receivers are particularly susceptible to the good effects of an efficient earth system. In a number of cases the presence of modulation hum (which should normally never occur) has been traced definitely to a defective earth.

Hints for "Single-Span" Users

Poor reaction control in this receiver is almost always due to misalignment of the circuit immediately preceding the buffer valve. It is essential that this circuit should be trimmed to the correct frequency.

It is worth while remembering that the reaction condenser of the Single-Span set acts as a very effective tone control; with full reaction, reproduction of high frequencies is definitely attenuated, and vice versa.

IN some of the more remote parts of the country, listeners have a choice of several "local" stations, or at least several are audible at sensibly equal strength, even if they are not equidistant.

In such circumstances it is rather difficult to decide which station shall be favoured as a source of regular entertainment. Occasionally, of course, there is not very much choice in the matter, as one may soon learn by experience which stations are most subject to interference, particularly after dark.

The Best Local Station

But when interference is not troublesome it is worth while going to the trouble of ascertaining which of the stations is least subject to night-time fading. With modern A.V.C. sets the effect of fading, so far as a station at a distance of some 100 or 200 miles is concerned, is almost entirely masked; at any rate, the phenomenon does not manifest itself by variation of signal strength, but by a peculiar form of distortion which is none too easy to recognise.

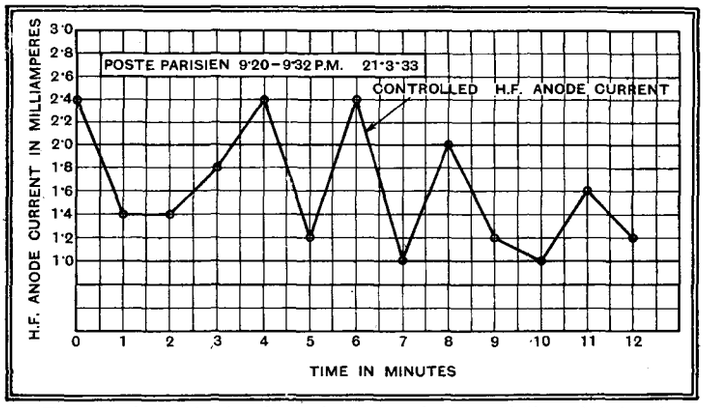


Fig. 1.—A graph showing minute-to-minute variations in signal strength, which correspond to changes in automatically controlled anode current.

It is a good plan in the circumstances we are considering to make a careful investigation of the tendency towards fading of the various stations that may be considered to have programme value. This is most easily done in the case of an A.V.C. receiver by connecting a milliammeter in the common anode circuit of the controlled valves, and then noting the variations in the meter reading over a fairly extended period. This test must, of course, be carried out during the hours of darkness.

It is interesting to prepare a "fading graph" of the stations concerned on the lines shown in Fig. 1; this diagram is reproduced from one that was published some time ago in these pages.

It will often be found that the stations which are normally received at best strength are by no means the least subject to fading and consequent night-time distortion.

WHEN a superheterodyne receiver becomes dumb, either completely or at certain positions of the tuning scale, the first thing to suspect is that the oscillator valve is failing to perform its normal function. Those who were familiar with superheterodynes in the days of two-valve frequency changers probably know the best test to apply for defects of this nature, but may not be aware that identically the same system of procedure is applicable to the modern type of heptode combined detector-oscillator.

Checking Heptode Oscillators

For a definite and easy test it is almost essential to use a milliammeter; this should be inserted in series with the oscillator anode of the valve in the manner indicated in Fig. 2. The next step is to stop self-oscillation without altering the operating conditions of the valve with regard to applied voltages; in practice the most convenient way of doing this is to short-circuit either the grid or anode coils to the oscillator tuning assembly. As to which coil is short-circuited is a matter of indifference so far as the test is concerned, and one's choice may be guided by convenience.

If all is well, there will be a definite change in anode current as a result of applying a short-circuit, but if no change is perceptible it may be assumed quite definitely that the valve is not oscillating, at any rate at the particular wavelength to which the circuits happen to be tuned. The test will be all the more conclusive if the short-circuit is applied while the receiver is tuned through a number of different wavelengths.

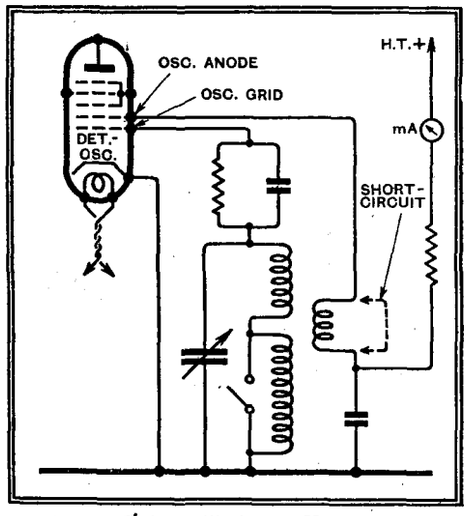


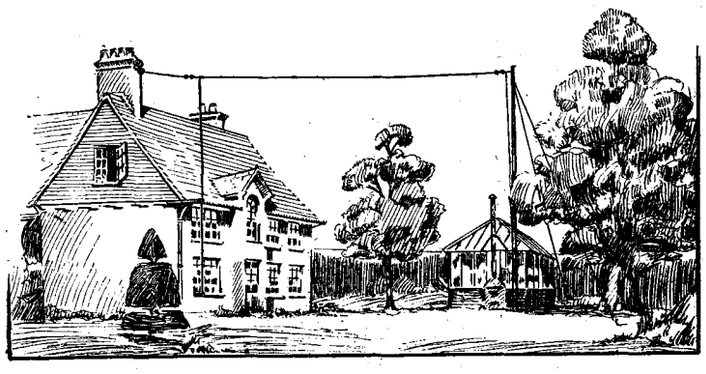
Fig. 2.—Is it oscillating? How to test a modern frequency changer.

With the help of a reasonably sensitive meter it is often possible to make a fairly satisfactory test without applying a short-circuit. If the reading of anode current changes slightly but steadily with variations in tuning of the oscillator circuit we have fairly conclusive proof that the valve is in a state of self-oscillation.

WHEN operating a superheterodyne receiver in the immediate vicinity of a powerful station, it will sometimes be observed that the local medium-wave transmitter is audible—but only weakly—while the receiver is tuned to the long waveband. This effect is quite easily explained, and is due to the interaction of harmonics of the fundamental frequency produced by the oscillator valve with the local signals, which in unfavourable circumstances may reach the grid of the frequency changer even when a fair amount of "pre-selection" is included in the set. It is worth while knowing that a simple type of wave-trap, such as that described in *The Wireless World* of January 26th, is effective in preventing this form of interference. The wave-trap must, of course, be tuned to the wavelength of the local station (or twin local stations).

On the Wrong Waveband

Are Good Aerials Worth While?



Results of Tests Under Practical Conditions

By H. F. SMITH

ALTHOUGH a highly efficient aerial is no longer necessary to compensate for lack of sensitivity in the receiver it is still a valuable aid towards minimising the effects of mains-borne interference. This article deals with the effect of aerial alterations from both points of view

THE opinion has been expressed that the outside aerial, so far as wireless reception is concerned, is an anachronism, and one that must eventually disappear. This attitude is understandable enough, but it is quite certain that so far no generally satisfactory alternative has appeared, although there are a few more or less passable substitutes, which may be briefly considered.

The so-called "mains aerial" is extremely erratic and uncertain and, worst of all, its use tends to accentuate background noises of every kind. Indoor aerials are usually rather inefficient collectors of energy, and as they must be erected in the field of re-radiation from the household electrical system, are likely to pick up everything that is going in the way of disturbances.

Probably the only form of competing aerial that need be seriously considered is the frame, although it is no longer in common use. But a good frame is of necessity bulky, and even so, is a relatively poor collector as compared with a modest outside aerial. In consequence, more magnification is needed for the reception of a given incoming signal, and thus valve noises will be increased. In addition, it is hardly practicable to mount a domestic frame aerial well clear of the field of re-radiated interference, and so the short-comings of mains and inside aerials are still evident.

Directional Reception

In spite of this, the directional properties of a frame, when proper use is made of them (it seldom is) are extremely valuable. The writer has handled ambitious directional broadcast receivers which cut out certain interfering signals which could not possibly be eliminated by any other means, but they are rather too elaborate for general use.

Taking these facts into account—and their truth is generally admitted—it will be realised that most of us still need an outside aerial. True, modern sets are so sensitive that they will work after a fashion with the most ludicrously inefficient collector of incoming signals, but results are always better with a good aerial.

But just how much better is a good aerial than an indifferent one? The effective height (and so the receptive power) of an aerial at a "professional" wireless station can be estimated with fair accuracy, but under ordinary domestic conditions there are so many unknown factors that the efficiency of the usual aerial system is generally a matter of chance. The writer therefore decided that it would be a matter of some interest to make a comparative test under strictly practical conditions be-

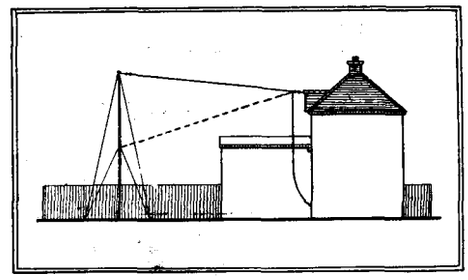


Fig. 1.—The higher aerial was found to be 60 per cent. more effective than the lower (dotted lines).

tween a reasonably, but by no means exceptionally, good aerial and an inefficient one, which is more closely representative of the specimens to be seen all over the country.

The arrangement of the two aerials used is roughly shown in Fig. 1. The higher and better aerial was approximately 85 feet in length, and its maximum height above ground was 30 feet. The lower and less efficient aerial consisted of the same length of wire, the only difference being that its free end was lowered to a height of 15 feet.

As laboratory apparatus was not available when the tests were made comparisons were effected with a more or less standard four-valve battery superheterodyne, the procedure being to note the reduction of anode current of the valves controlled by the A.V.C. system under various conditions. With the help of suitable apparatus these readings were afterwards translated into actual aerial input in microvolts, care being taken to see that the operating conditions of the receiver were unchanged.

The measurements were made on a number of different transmissions on the medium waveband, and after translation into actual input voltage, an average was struck, with the result that the input from the 30-ft. aerial was found to be almost exactly 60 per cent. greater than that from the lower one.

Effect on Signal Strength

Now, an increase of 60 per cent. (which incidentally was less than was expected) may seem to be well worth while having. Indeed, it is not to be scoffed at; but considered on a proper basis it does not amount to very much—rather under 5 decibels. Translated into practical reception, it means that the difference in signal strength between a moderately strong station received on either aerial would be only just appreciable. When dealing with a very weak signal the result of using the better aerial might make all the difference between intelligibility and lack of it, but in neither case would the signals have a real entertainment value. These conclusions

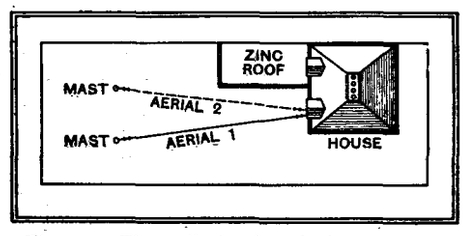


Fig. 2.—The effect of reducing spacing between the aerial and the metal roof was investigated.

were subsequently borne out by a careful listening test.

It may reasonably be asked, therefore, what is the advantage of trying to improve

Are Good Aerials Worth While?

an aerial if the result of doubling its height is so disappointing? The answer is that in some cases a greater improvement is to be expected, but more important still, the better aerial is almost certain to provide a quieter background for reception. This problem was the next to be dealt with.

Although the reception conditions under which the tests were made were almost perfect, without any local interference, the result of using the higher aerial was, so far

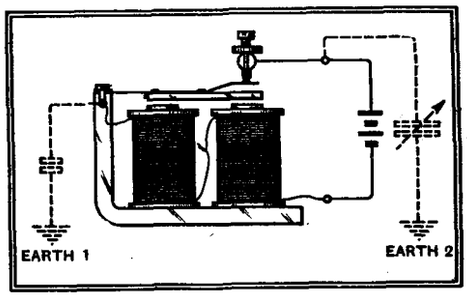


Fig. 3.—A sparking buzzer connected to the water pipes acts as a generator of artificial interference.

as the reception of distant stations was concerned, to reduce valve noises and other background noises. The gain in this direction was admittedly slight, but just perceptible.

The house was not connected to the mains, and as there was no local interference it was necessary to make some artificially. This was done quite easily by connecting a buzzer to separate points on the water supply system as shown in Fig. 3; rough preliminary tests with a portable receiver proved that the interference had most of the characteristics of the real thing (although, of course, it sounded quite different when reproduced through the loudspeaker), and that it was re-radiated quite strongly from the various water pipes. Of course, under more natural conditions the interference would be re-radiated instead from the electrical wiring. A very small semi-variable condenser inserted in one of the earthing leads provided a ready means of regulating the strength of interference.

Re-radiated Interference

With this artificial interference-maker at work the advantages of using the higher aerial were clearly apparent. As a result of lowering the aerial to the 15ft. position it obviously came within such a strong field of interference that signals that were originally quite intelligible were almost completely blotted out. Two factors account for this: first, the actual strength of signals was reduced, and secondly, the amount of interference injected into the aerial was increased; the signal-to-interference ratio had become less favourable.

It is not always that one would obtain such a convincing proof of the need for keeping an aerial as clear as possible of the building, water pipes, electric light wiring, etc., but the general principle would hold good in every case. However, it is worth while observing that as a rule it is the down-lead that is most affected by re-radiated interference, and not the horizontal span, as in the present case. If one cannot arrange a clear down-lead, the right thing to do is to screen it. A somewhat unconventional screened aerial system, where the down-lead is taken off the far end of the aerial and led into the building through a horizontal "transmission line" with matching transformers at each end, is shown in Fig. 4. This plan, which seems to work very satisfactorily, avoids the need of mounting one of the transformers in an elevated position on the aerial.

It should not be assumed that the aerial used for these tests is in any way ideal, even in its normal position with the free end thirty feet above the ground. Its worst feature is probably the small amount of spacing with respect to the zinc roof covering the wing of the house, which runs more or less parallel to the horizontal span. This has the effect of reducing appreciably the effective height of the aerial; also, as the zinc is presumably but indifferently earthed it is likely to provoke interference troubles. As a final test the effect of roughly halving the spacing between aerial and roof was tried; the result was a diminution of almost exactly 50 per cent. in signal strength. Here we have proof of the soundness of the axiom that aerials should be kept clear of the building, and particularly of such earthed objects as guttering, waterpipes, etc.

The conclusions to be drawn from a series of tests are often indefinite, but in the present case they are clear enough. Nowadays one should use a good aerial, not so much from the point of view of signal strength, but to attain immunity from background noises and electrical interference.

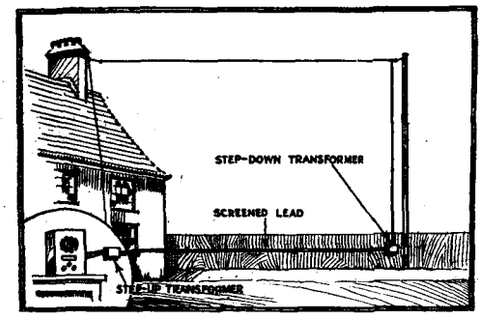


Fig. 4.—Screened horizontal aerial lead-in wire.

The Diary of an Ordinary Listener

ONE of the most interesting concerts to which I have been able to listen in recent weeks was that given on Wednesday, July 25th, by the National Orchestra of France, conducted by Roger Desormire, and broadcast by Radio-Paris. The playing of the National Orchestra is extraordinarily good; they seem able to combine all the precision and unanimity of a first-class string quartet with the volume and tone-colour of a full orchestra. It is a real delight to listen to them playing any music, but when the programme consists of seventeenth- and eighteenth-century compositions it is difficult to imagine anything better or more satisfying—at all events, to an enthusiast for old music. Earlier in the programme we were given a selection of thirteenth- and sixteenth-century songs compiled by M. Fendler from various ancient manuscripts and sung for the first time in public by Mme. Marcelle Gérar.

Modern Melodies

As a pleasing contrast to the ancient music I turned to Hilversum, where the V.A.R.A. orchestra was playing lighter and more modern melodies, and was fortunate to be in time for Meyer Lutz' well-remembered "Pas de Quatre" and Johann Strauss's waltz, "Wiener blut."

The following evening gave me rather a "mixed bag," beginning with a concert by the Radio-Suisse Romande orchestra, conducted by Robert Echenard, which, of course, was transmitted from Sottens. This station was rather faint, but I heard some of Mozart's music played by violin and pianoforte.

Juan-les-Pins was broadcasting a pleasing programme of light music by the Société Mandoliniste Le Palladienne, relayed from Monaco, which, in addition to mandoline music, included a "Chanson Andalouse," sung by G. Borghiri, whose attractive and somewhat Spanish-sounding voice came through clearly, and contrasted well with the full-voiced chorus which followed soon after in the popular "Blue Danube" waltz. Milan gave us a musical treat in Mascagni's opera, "Iris," conducted by the composer himself. The orchestra was evidently inspired by his enthusiasm, and appeared thoroughly to enjoy playing the tuneful music.

The evening's entertainment closed with a selection of records from Stuttgart, with some pleasantly sentimental ditties by a fine contralto and a good collection of dance tunes.

On Friday the K.R.O. orchestra gave an interesting concert of operatic overtures, among others, Beethoven's "Fidelio" and Offenbach's "Orpheus in the Underworld." This programme was also relayed by Brussels No. 2. Radio-Paris transmitted an excellent performance of Humperdinck's operetta "Hansel and Gretel," which I always find most attractive.

Unfortunately, I was away from home for the week-end, and so missed the performance of "Tristan and Isolda," from Salzburg, but on Tuesday evening I tuned at once to Hilversum as I saw that the latter was to relay a concert by the Vienna Philharmonic Orchestra, and wondered whether the exciting events of the preceding few days had affected the Austrian programmes, and, indeed, if the Vienna station could transmit after the siege it had been called upon to sustain. My fears proved quite groundless, and I was able to enjoy the excellent concert relayed from Salzburg under the conductorship of Mengelberg. It included Bach's Symphony in B Flat, Beethoven's "Pastoral," and Tchaikowsky's Fifth Symphony. Hilversum, unfortunately, did not relay the whole of this concert, and as Vienna was at times rather faint, I contented myself by listening to Alfredo Campoli and his orchestra, in which the leader extracted the maximum of luscious juice from each note of the rather succulently tuneful melodies.

CALIBAN.

News of the Week

Current Events in Brief Review

Radiolympia

RADIOLYMPIA, 1934, which opens on Thursday next, August 16th, has already been described by the prophets as a fairy-land of colour, and one of the novelties will be variable flood-lighting effects to suit the vagaries of the weather.

The Show runs until August 25th and will be open each day from 11 a.m. to 10 p.m., admission 1s. 6d.

Record attendances are expected, and it is believed that there will be many visitors from abroad.

Beauty at Addison Road

IF the arrangements of the City Accumulator Co. are typical, Radiolympia will not lack the feminine touch. Among a number of famous mannequins and professional beauties on the C.A.C. stand will be nineteen-year-old Angela Ward, who last year was selected by an international committee in Madrid as "Miss England 1933." Miss Ward is to demonstrate the firm's new "Divan" model—a complete divan bed containing, built into the head, a specially designed wireless set and loud speaker, an electric clock, a bookcase and a cupboard.

Next, Please ?

THE other day we reported that an American had built a wireless set on a pin-head. Now the same feat has been accomplished by an English youth, Mr. Eric Oliver, of Sowerby Bridge, Yorks.

To the pin-head he has soldered his tuning coil, crystal detector, aerial and earth terminals, and a pair of 'phone terminals. To put the set into action Mr. Oliver pushes the pin into the lapel of his coat.

Now we are looking for a set built on the business end of a needle.

Third Time Lucky

RADIO-AGEN, which has been described as Europe's unluckiest broadcasting station, having been first destroyed by flood and then burnt to the ground within two years, may be rebuilt.

At first it was considered that as the Lot-et-Garonne district came within the service area of the new Toulouse station under the Ferrié scheme, Radio-Agen would be unnecessary. Such is the local affection for the station, however, that the directors are considering opening a fund to give the station yet a new lease of life.

Now We Know

LISTENERS must have noticed with regret that concerts from the Ostend Kursaal and the Knocke Casino are not being broadcast this year. We understand that the absence of these popular programmes is due to lack of agreement between the proprietors and the Belgian National Broadcasting Institute on the question of finance.

High Power from Normandy

PENDING the establishment of the high-power station at Rennes, Normandy, under the Ferrié scheme, we understand a temporary 40-kilowatt station is to start operations on October 15th.

"Better Quality" Brigade

"THERE is evidence that the campaign which has been waged by the purists in radio—with *The Wireless World* as general of the forces of the 'better quality' brigade—is beginning to bring results.

"Last season we saw the passing of the 'tom-tom' drum-like loud speaker. Now the demand for 'natural' reproduction is being accentuated."—J. Granville Stephens in the *Nottingham Evening News*.

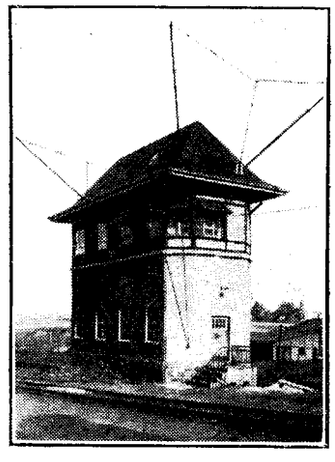
At Buckingham Palace

MICROPHONES and loud speakers are now used at Buckingham Palace to summon guests' motor cars from the car park in the middle of the Mall.

On the Radio Farm

A SPECTACULAR novelty at the Chicago World's Fair is a farm tractor controlled by wireless. The farmer sits at a small control desk in the farmyard and from there drives the tractor to and fro hauling a plough over a field.

This suggests the rejuvenation of the radio "dog" which was so popular some years ago. With



RAILWAY RADIO. A peculiar roof aerial on a German State Railways signal box at Herford. Train shunting instructions are transmitted on ultra-short waves.

such a dog, fitted with a loud speaker, the farmer could round up sheep and cattle without stirring from the inglenook.

Institute of Patentees

THE Institute of Patentees now offers improved facilities, including writing and reading rooms, having taken on new quarters at 10, Victoria Street, Westminster, S.W.1.

Radio Advertising in India

STRONG protests have been made at Calcutta against the decision of the Government of India to sanction sponsored programmes.

Valve Price Reductions

THE principal valve manufacturers have announced reductions in the prices of many types of battery valves. Small triodes are now listed at 5s. 6d. and small power valves at 7s., while screen-grid types are 12s. 6d. Pentodes of both the output and H.F. types are priced at 13s. 6d.

The Anti-interference Mark

EVERY type of electrical "parasite," and the anti-interference devices to cope with each, are listed in a new catalogue issued by the French "Chambre Syndicale des Industries Radio-Electriques." This organisation will award a special mark to all anti-interference devices submitted for examination which are found to conform to the requirements.

Mosquitoes and Radio

WIRELESS, blamed times out of number for bad weather and drought, is now accused by a French professor of attracting mosquitoes. Mosquitoes, according to the professor, are extremely susceptible to music, especially when it issues from a loud speaker.

We suspect that the professor's attitude is merely a clever ruse to make listeners keep their windows shut when the wireless is switched on.

Noisy Loud Speaker By-law

THE facilities now available to Borough Councils to make by-laws against the inconsiderate use of private loud speakers may soon lead to the widespread adoption of measures to check the nuisance. The Hornsey and Ealing Councils have already adopted by-laws, and we learn that Hampstead Borough Council is now considering the question.

The by-law provides that on representation of three householders who complain, the owner of a wireless loud speaker or gramophone who causes "any noise which shall be so loud and so continuous or repeated as to cause a nuisance to occupants or inmates of any premises in the neighbourhood" shall be given a fortnight in which to abate the nuisance.

If court proceedings are taken, the by-law makes provision for a fine not exceeding £5.

English from Warsaw

TO-MORROW (Saturday), at 8.30 p.m., Mr. Thad Ordon will broadcast in English from the Warsaw station, answering correspondence from British listeners.

The Radio Nurse

THE French listener likes a tilt at the English programmes from stations in France. Under the heading "The Radio Nurse," our contemporary *Haut Parleur* writes: "The English announcer at Radio Normandy winds up his

MUSIC ON THE ROAD. The latest from Hollywood—a radio-equipped cycle, complete with midget set, batteries and non-directional aerial.

programme with all kinds of good wishes and advice. He bids his British listeners a fond good-night and wishes them pleasant dreams. Only the rudimentary state of radio prevents him from sending his listeners cups of tea and plates of porridge."

Marconi Anti-fog Device

ULTRA-SHORT WAVES are used in Marchese Marconi's latest development in maritime navigation. On July 30th the yacht "Elettra" effectively demonstrated at Sestri Levante, near Genoa, how a ship can be navigated on a straight line into the most difficult harbour entrance under the worst conditions of visibility. For the demonstration voyage to the harbour the blinds of the chart room were drawn.

At the harbour was a beacon station working on a wave length of about 60 centimetres, with two small aerials and reflectors mounted at right angles to each other on a platform forming the top of a cylindrical base.

The basic characteristic of the transmission in the new system is the creation in space of a narrow zone of silence at the centre of a wide beam. The fact that reception would be nil when on that line would be too uncertain a condition to give the necessary confidence to ships' masters, so it is arranged that the zone of silence swings from left to right of the centre line. The amplitude of the swing is small, being only 6 degrees.

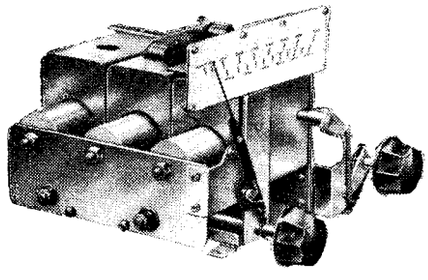
NEW COMPONENTS

Latest Designs to Look For at Olympia

WHENEVER a new component is introduced it will usually be found to have some bearing on a recently described development in receiving technique, unless the said new part is the outcome of improvements to an earlier model of the same general form.

New devices unheralded by technical articles are the exception rather than the rule to-day, since it is usually necessary for the demand to be created before production is commenced. Yet, occasionally, the tables are turned, which is as it should be in a live industry, and a new component appears with the expectation that interest will be directed into the new channels.

Recent developments in the use of movable iron cores in H.F. coils as a method of tuning has opened up an entirely new line of research, and although the system is not without its difficulties, when perfected there is good reason to believe that it will offer a satisfactory alternative to the orthodox method.

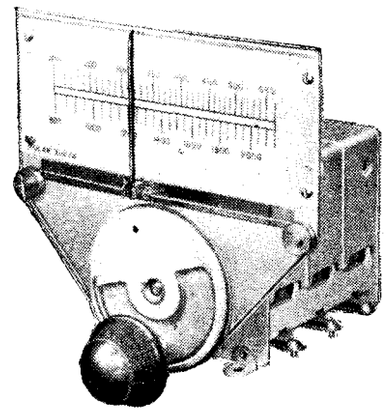


Varley Permeability Tuner, complete with wave-band switching.

At last year's Show Varley had an experimental model of a Permeability Tuner, but during the intervening twelve months many improvements have been made, and the new model should serve to foster further interest in this system. Three- and four-gang coil units are now available. The coils are completely screened, and tuning is carried out by a movable sleeve made of high permeability iron dust material. Waveband switching is employed, and the coil units cover the medium- and the long-broadcast wavebands. There will be models for use in straight as well as in superheterodyne sets, so adequate provision is made to meet all circuit requirements.

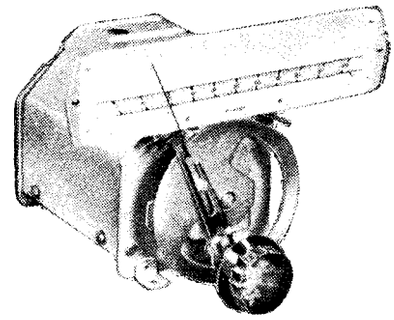
It is too soon yet to predict the effect of permeability tuning on set design, but it is not improbable that more will be heard of this system in the near future. In the meantime the established arrangement continues to maintain its popularity, and, in addition to the usual seasonal improvements, many new condensers and coils will be shown this year by all the firms specialising in components of this kind.

When the gang condenser was first introduced in unit form it proved such a convenience that the space required was willingly conceded. Year by year its size has been reduced and its electrical qualities



Polar new midget gang condenser, fitted with V.P. horizontal drive.

improved out of all recognition. In present-day models the matching is probably as close as modern production methods will allow, but still further reduction in dimensions has been achieved. A three-gang condenser with each section of 0.0005 mfd. and all matched to within one-half of one per cent. is compressed into an astonishingly small compass, and examples of these miniature models will be a feature of the exhibits of Wingrove and Rogers, British Radiophone and Jackson Bros. The Polar Midget in three-gang form measures only $3\frac{5}{8}$in. deep × $2\frac{7}{8}$in. × $3\frac{3}{8}$in. high, and the corresponding type in the British Radiophone range is as near as no matter the same size. In the first-mentioned make the rotor spindle is supported in ball bearings at the front and by a plain bearing at the back.

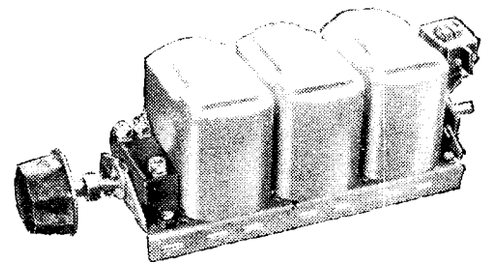


British Radiophone miniature three-gang condenser and new drive.

The reduction in size is obtained mainly by the adoption of closer spacing between the vanes, and, although this might have been regarded with disfavour some years or so ago, the manufacturing methods now in vogue justify the course taken, since an accuracy is being attained quite as high as hitherto with the wider spacing, and, owing to the very rigid construction, condensers will maintain their electrical characteristics under all but the most brutal conditions of treatment.

Closely allied with condensers is the devices adopted to operate them. Full-vision scales mounted on a reduction driving mechanism will predominate this year. All the well-known condenser makers will show them in various different styles. Horizontal, vertical, and semi-circular scales will be the most popular, yet the older pattern with a moving scale and a fixed indicator are to be retained for the coming season, though in fewer numbers than hitherto. But still there will be no paucity of this kind for those who prefer them.

The design of coils has progressed along the lines obtaining last year. The iron dust cored pattern has now definitely established itself, for, with the compact style of assembly now generally adopted, a coil of good all-round efficiency is relatively easy of attainment if fitted with a high-permeability core. This applies to



Colvern Ferrocart coil unit, type G.

the medium and long broadcast wavelengths and also to superheterodyne I.F. transformers, but so far there is no evidence that the air-cored pattern can be bettered for short-wave work.

Examples of some new coils with iron cores will be shown by Varley, Wright and Weaire Telsen, and Colvern, though as regards the last mentioned the improvements in their Ferrocart coils are mainly constructional, as the electrical properties remain much the same.

In order to avoid unwanted coupling, the waveband switching is generally embodied in the coil assembly, and, while this practice is still adhered to by most makers, there will be many more coils available this year without built-in switches. Provided adequate care is taken to keep the external leads short and the switch mounted close to the coil, no undesirable effects are likely to follow, and this omission certainly makes for a cheaper, and in many cases a more compact, coil. Some of the new iron-cored coils that Varley and Wright and Weaire

New Components

will show take this form, while the new Bulgin air-cored type are also without switches.

In the new superheterodyne I.F. transformers it will be seen that the fixed coupling is falling into disfavour and that the majority now have provision for varying the coupling between the primary and the

Varley Duo-Nicore I.F. transformer.

secondary. This facilitates the initial lining up of the I.F. circuits, as it can be done with the coupling sufficiently loose to give a single response curve, and, furthermore, permits of greater latitude in adjusting the band width of these circuits. Examples of this pattern are the Varley Duo-Nicore and the new Wearite I.F. transformers. Iron cores are employed in both models.

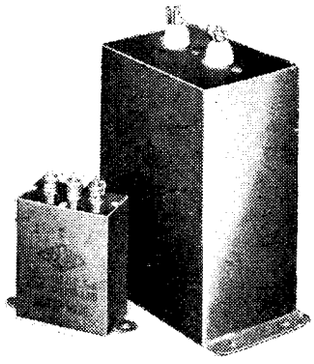
Those manufacturers catering for the requirements of the battery-set user continue to concentrate on the all-important question of economy in H.T. current. Class "B" amplifier components will be as much in evidence as last year, though, so far as one can judge from the information at present available, there will not be any appreciable additions to the total number of special transformers already available. Quiescent Push-Pull amplification has shown a revival, due, no doubt, to the initiative of the valve makers in introducing during the past year special valves with the electrodes of two pentodes

Siemens 300-volt dry battery for cathode-ray tube operation.

in the one bulb, which obviates the need for careful matching in the first instance.

Class "B" and Q.P.P. Components will be shown by Benjamin Electric, Bulgin, Ferranti, Sound Sales, Telsen, Varley, and Wright and Weaire, among others, in addition to which the complete unit for converting an existing single-valve output stage to Class "B" with the minimum of alteration on the lines of that introduced last year will be continued.

Economy in H.T. current can, however, be achieved in another way and without any structural change in the output stage. With the aid of a rectifier, such as the Westector, it is possible to arrange for the grid bias applied to the output valve, whether it be a triode or a pentode, to be controlled by the signal. At low volume the valve is biased well back and so passes a small anode current, while on strong passages the grid bias is set to its normal working value. Some examples of complete units to enable this economy scheme to be incorporated in a set will be shown by Benjamin Electric and Varley.



Sound Sales high-voltage paper-type smoothing condensers.

Small rotary converters driven by a 6-volt accumulator have been further developed and are now being employed for supplying short-wave sets, particularly for overseas use, with H.T. Several models of this type will be shown on the C.A.V. stand.

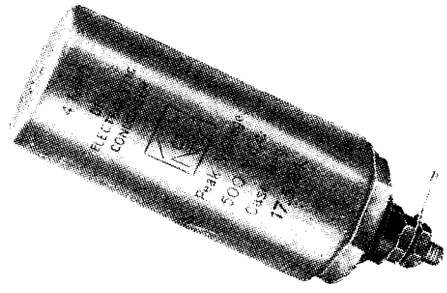
So far as H.T. batteries are concerned, we must not expect to find any revolutionary changes. The portable-type primary cell has been in existence for so long, and used for so many purposes other than wireless, that it has reached a very high standard of perfection, yet minor improvements still continue to be made from time to time. All the well-known battery makers will be exhibiting their products, particular attention being given to assembling the batteries in cartons of suitable size and voltage for the majority of the present-day battery sets.

One notable development is the introduction by Siemens of a special high-voltage dry battery for use with cathode-ray tubes, which are now finding a new application in television reception. This battery gives 300 volts, and as only a fraction of a milliamp. of current is needed, cells of small capacity can be employed in its assembly. As a consequence, the dimensions of the battery are only 11¾in. × 2¾in. × 9in. Three of these, giving a total of 900 volts, will, as a rule, be needed.

There is some justification for the belief that television apparatus will be more to the fore this year, if the greater interest shown by some component manufacturers in this class of article is any criterion. High-voltage mains-operated supply units, time-base apparatus, and the many other items associated with television reception will be featured by Sound Sales. This firm has now reintroduced paper-type smoothing condensers, but of a new pattern and for working voltages of from 250 to 1,500 D.C., the higher potential types being suitable for use in this class of apparatus.

New Ferranti resistance shown in baseboard form.

The composition type of resistor is so admirably suited and in every respect satisfactory for present-day needs that it is now almost universally used in the construction of receivers. The wire-wound variety are found only where very heavy currents have to be handled. Hitherto the one-watt type was the smallest rating readily obtainable by the home constructor. But in a superheterodyne receiver embodying the latest features it is not unusual to find twenty or more resistances, and in many cases a lower rating than one watt would suffice. Furthermore, the resistor would be smaller, which has its advantages, since they can then be worked into the wiring more easily. The new Ferranti resistances might be cited as an example of the smaller type, for the half-watt size measures ⅛in. only in diameter and a shade under 1¼in. long. The British Radiophone resistor, which is also a new product, is about the



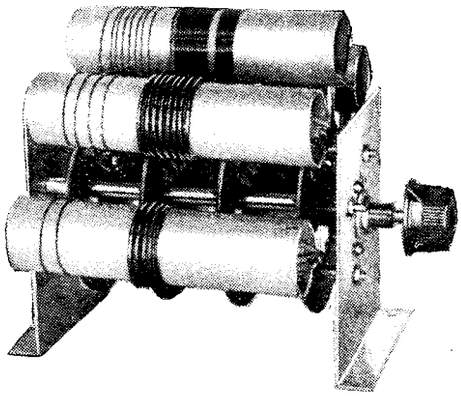
Polar-N.S.F. high-voltage dry-electrolytic condenser.

same length, only larger in diameter. Another new make is the Polar-N.S.F., which is included in the range of components bearing this description that will be shown by Wingrove and Rogers this year.

Resistance values in each of the above makes are indicated by the adoption of the now standardised colour code, and wire ends are fitted so that the resistor can be suspended in the wiring. The same method of fixing is becoming increasingly popular for small fixed condensers, as in many of the new models introduced this year no provision is made for baseboard

New Components

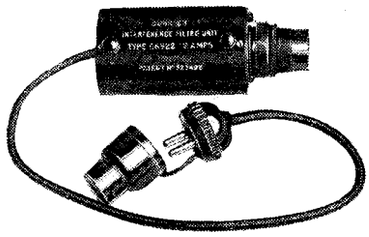
mounting. In addition to the T.C.C., Dubilier, Telsen, and British Radiophone makes, there will be some tubular condensers with wire ends shown by Ferranti and by Wingrove and Rogers. Considering that some thirty odd condensers, many of small value, are often included in one receiver, the saving in baseboard space and also in time during construction is considerable, since one process, namely, screwing to the baseboard, is eliminated.



Bulgin short-wave coil unit.

There has always been an undercurrent of interest in short-wave listening at all radio shows, though Stratton and Co. and the Radio Society of Great Britain formed the main attraction for the enthusiast. Eddystone components will be quite as much in evidence as hitherto, and many new parts for short- and ultra-short-wave use will be available for inspection.

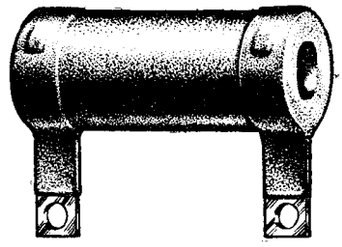
Interest in this particular sphere is this year being taken by several other firms, though some, such as Bulgin, for example, have always catered for the short-wave listener. Bulgin will be showing several new components, one particular item being a short-wave coil chassis holding five coils and fitted with a waveband selector switch. There are seven coils made to fit this unit, covering wavebands of from 10 to 2,000 metres. Another addition is a series of short- and ultra-wave coils, the latter being self-supporting and mounted on a low-loss base. These cover a waveband of 5 to 25 metres with three coils.



Dubilier interference filter unit.

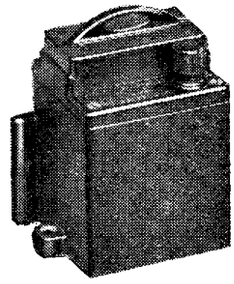
Then Wright and Weaire have introduced a new range of short-wave coils wound on skeleton formers made of an insulating material described as Mycalex. A valve holder and an H.F. choke complete their range. Some new short-wave condensers will be shown also by Wingrove and Rogers.

The suppression of electrical interference has become a matter for serious attention, especially now that so much is being done to achieve a really high standard of reproduction. A prevalent source of such disturbance is the supply mains, not that the electric supply is itself responsible for the trouble, but the mains act as a conductor for the interfering electrical disturbances.



Erie heavy duty wire wound resistance.

All offending electrical machinery should, of course, be fitted with suitable filters, but much can be done to mitigate the trouble at the receiving end. Belling and Lee have been devoting much time to this subject, and they have developed an extensive range of interference suppressors, some for installation at the source of the trouble and some for use at the receiving end. Suppressor units for motor car engines, when wireless is fitted to these vehicles, forms another aspect of the interference question in which the above-mentioned firm is interested, so also are Dubilier and Erie, both firms having a kit of suppressor units for this purpose.



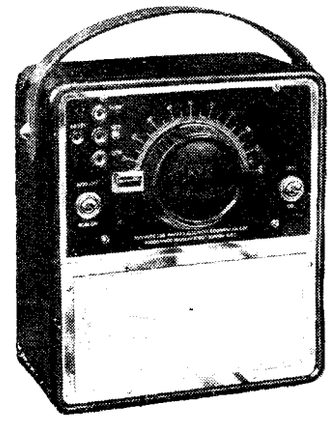
New T.C.C. anti-interference unit.

A slightly modified version of the T.C.C. anti-interference unit will be seen this year, while other examples will be shown by Wright and Weaire, Dubilier, and Hartley-Turner.

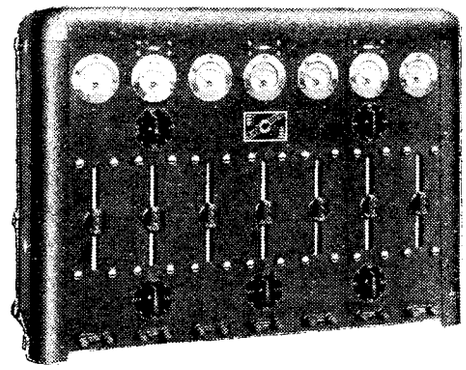
The servicing side of the radio industry increases in importance as time goes on, for more and more sets are now sold under a guarantee. This work can be carried out expeditiously only if the servicing departments are adequately equipped. In order to meet this need, several firms are now supplying inexpensive set-testing apparatus designed primarily for the service engineer. One such is the modulated oscillator made by Wm. F. Brown, which will be shown in several different forms, together with the sundry other units associated with this subject. Battery- and mains-operated test sets will be available. The Birmingham Sound Reproducers is another firm now producing test apparatus, and they also will have battery- and mains-operated sets in their range. The battery version are intended for portable use, while the mains type would generally be permanently installed in the test shop.

Brown portable modulated oscillator.

Ferranti will show a small pocket-type test set in addition to a range of separate meters, while the Automatic Coil Winder and Electrical Equipment Co. has now introduced a small portable oscillator. This year Everett and Edgecumbe will be showing radio meters, also the Radiolab portable test set, the manufacture of which they have now taken over.



The Avo-oscillator of the Automatic Coil Winder and Electrical Equipment Co.



Newton seven-circuit battery charger to be on C.A.V. stand.

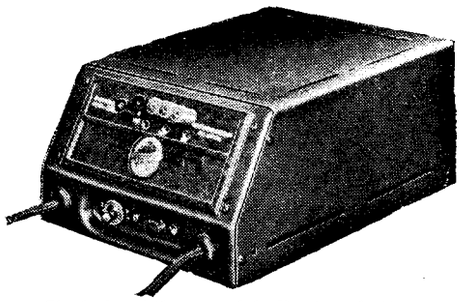
Further examples of servicing apparatus will be shown by the Weston Instrument Co.

When a change is made from a district supplied with direct current to one having A.C., the question of converting the radio set, if mains operated, for the different form of supply naturally comes to the fore. The difficulties attendant on this matter need not now be regarded with any disquietude, since one of the new developments of the past year has resulted in the appearance of easily installed A.C. con-

New Components

version units for D.C. sets, the G.E.C. and the Harmer and Simmons units being two notable examples.

The battery-set user who wishes to invest in a mains H.T. supply unit will still find several firms ready to satisfy his



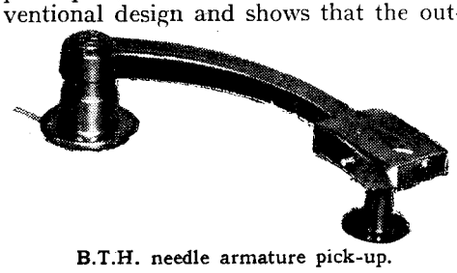
Clarke's Atlas model T10/30 battery eliminator.

needs. Improvements in current models have been effected and some new types developed for the coming season. One new model has been added to Clarke's Atlas range, while Ekco, Dyson, Ferranti, Heayberd, and Harmer and Simmons will be showing units of this kind. Dry batteries and L.T. accumulators will be as numerous as ever, and, although few new models are promised, not one of the legion of battery manufacturers has failed, as in the past, to find some little modification calculated to add to the attractiveness of their products.

Gramophone Equipment

As a result of the increased popularity of universal A.C.-D.C. mains receivers and radio gramophones, manufacturers of electric gramophone motors, who have until recently been concentrating on A.C. motors of the induction or hysteresis type, have experienced a demand for compact universal motors at a somewhat lower price than has been ruling for this class in the past. The new Garrard U5 motor is representative of this trend. In other respects, gramophone motors and record changers appear to have reached a state of equilibrium in relation to present requirements, though there is a possibility that a new record changer designed to play both sides of a series of 25 records may make its debut at the Show.

At the moment there is little to indicate any startling development in pick-up design, and most firms are continuing their last year's models with minor modifications. The B.T.H. needle armature pick-up is, however, a break from conventional design and shows that the out-



B.T.H. needle armature pick-up.

put from this type of pick-up, which is undoubtedly superior in "top" reproduction, need not necessarily be inconveniently small.

BROADCAST BREVITIES

By Our Special Correspondent

At Radiolympia

FIVE excerpts from the variety performances at Radiolympia will be broadcast. Those on August 16th, 20th and 25th will be relayed in the National programme and those on August 18th and 22nd in the Regional.

Three Shows a Day

Three variety performances will be given daily and the bill will be changed three times in the course of the exhibition, each programme running for three consecutive days.

The artists appearing will include Claude Dampier and Billie Carlyle, Ann Penn, Collinson and Dean, Phyllis Robins, Bertha Willmott, Clapham and Dwyer, Jass and Jessie, Arthur Prince and "Jim," Lily Morris and the Carlyle Cousins.

In addition there will be Stanelli and his Hornchestra, Stainless Stephen, Alec McGill and Gwen Vaughan, Anona Winn, and Hermione Gingold. Last but not least, of course, comes the B.B.C. Dance Orchestra, directed by Henry Hall, with Les Allen and Kitty Masters as vocalists.

The New Empire Music Director

THE new post of Empire music director, to which I was able to make exclusive reference last week, is to be filled by Mr. Eric Fogg, the well-known composer.

Mr. Fogg has been associated with Northern broadcasting since 1924. He was station accompanist at Manchester before being appointed Assistant Musical Director early this year. He has conducted his own works in the Queen's Hall; in the Free Trade Hall, Manchester; at the Leeds Triennial Festival, and elsewhere.

"All-Night" Orchestra

Mr. Fogg will supervise all musical activities connected with Empire broadcasting and will frequently conduct the new Empire Orchestra in the early hours.

Just at the moment there are no real "all-night" performances, there being a gap between 1 a.m. and 10 a.m., but as the seasons change so do transmitting conditions. In the course of a year's work the orchestra will have played at all times during the night and can therefore be truly regarded as the B.B.C.'s first "all-night" musical combination.

Sad but True

QUITE the most pathetic story that the B.B.C. has given us in recent years concerns a well-known official's fruitless search last week for cycle bells. The idea was to provide a cycle-bell obbligato to a tune in "Wild Violets," and the official in question spent a whole lunch-time with his violin, visiting shop after shop in search of bells tuned to D♯, E, G, A and B. Not one did he find.

A Pity

Cycle dealers may lack the necessary knowledge, but one would imagine that a B.B.C. official would know how easily a cycle bell can be tuned to any note. Even a piece of putty will do the trick.

When Droitwich Opens

OCTOBER 7th is the date on which Droitwich will take over the National programme in its entirety. Immediately afterwards, work will begin on the new Midland Regional transmitter, which, I understand, will occupy a new building on the Droitwich site. Already most of the new apparatus is ready, and this will be installed with a minimum of delay. It is likely that we shall hear the new Midland Regional before Christmas.

End of 24-Hour Time

NEXT week will be a sad one for the upholder of 24-hour time, whoever he may be, for it will be the last innings of 24-hour timing. By midnight on Saturday, August 18th, the 24-hour clock, so far as broadcasting is concerned, will be as dead as the dodo.

MAN-HANDLING THE MIKE. Weiss Ferdl, comedian, in full cry at the Munich microphone. What the engineers said afterwards is unrecorded.

Theirs Not to Reason Why

Although the Corporation has been criticised ever since the inception of the experiment, it has stuck to its guns with the stolid courage for which it has always been noted. If the Government had decreed a period of 168-hour time, the B.B.C. would have gone ahead with it, and not even rifle fire would have deflected it from its purpose.

No More "Experiments"

However, it is hoped that the listener will be given a rest from such "experiments." "Try it on the dog" is a good rule, but there is no reason why the listener should fill the canine role.

The "D.G." for South Africa

SIR JOHN REITH sails for South Africa on September 7th. As the guest of the Union Government Sir John will advise on the possible reorganisation of the broadcasting system, though it is not correct to say that he will actually carry out administrative work.

The trip is essentially a holiday one and will last two or three months.

Tuning Indicators

A Review of the Various Visual Tuning Devices Available and Some Suggestions as to Their Use

A RECEIVER fitted with A.V.C., and few modern sets are now without this feature if the design permits, requires a little more care in tuning than one in which the volume is controlled manually, as the optimum tuning point is not quite so easily determined, especially when the received signals are very strong. The inherent selectivity of the set may be quite high, yet it seems that the station occupies more than its fair share of the scale. The action of the A.V.C. is generally responsible for this illusion, for there is no apparent optimum tuning point, as judged by the strength of signals within this area, but if attention is concentrated on the reproduction a decided change in the quality will be noticed. On first entering the tuning area the reproduction is thin and high pitched, then deepens to a good, round tone with everything nicely balanced, and, as the knob is further rotated, once again becomes thin and unnatural.

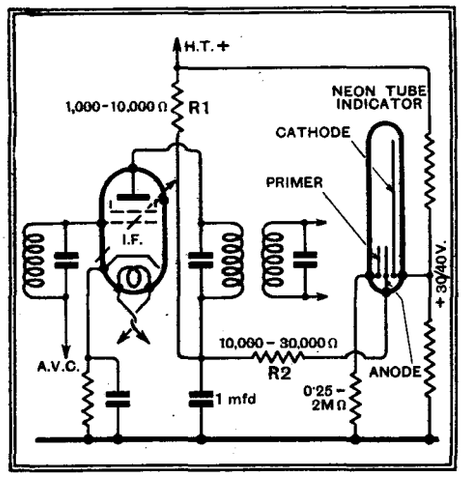


Fig. 1.—Circuit connections required for the Cossor neon tube tuning indicator.

Available Types

Accompanying this will be observed a marked difference in the background level, which will first decrease then rise again in relation to the signal strength. Only at one part of the scale is the tone quality at its best, and this, fortunately, is when the background is lowest, so it serves as an aural indication of the optimum tuning point.

While many listeners may find its determination less difficult than others, a visual indicator which works in conjunction with the A.V.C. system, and gives a sharply defined maximum, would undoubtedly be of assistance to all. That this method of tuning is receiving some support is evident from the number of commercial receivers so equipped.

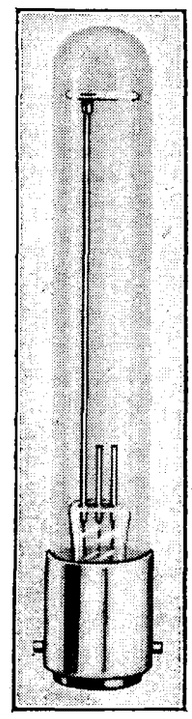
THE inclusion of A.V.C. requires that the receiver be brought into exact resonance with the transmitter for best quality of reproduction, and this has led to the development of a number of visual tuning indicators. The manner in which they function and how they can be embodied in existing circuits is discussed in this article.

There are several types of visual tuning units on the market, but quite a satisfactory indicator can be arranged by fitting an ordinary milliammeter in the anode circuit of one or more of the valves linked up with the A.V.C. system.

Of the special devices there is one taking the form of a small neon tube, another is a miniature cathode-ray oscillograph, while some are merely milliammeters modified for the purpose and omitting the customary calibrated scale, which, of course, is not necessary, though an arbitrary scale is sometimes included.

Although the special units differ widely in design and operation, they all function by virtue of a change in current, but in some types this has to be converted into a difference in potential to operate the device, which is a relatively simple matter, since it only requires the inclusion of a resistance in the circuit.

One example of the voltage-operated type is the Three-electrode Neon Tuning Indicator developed by A. C. Cossor, for showing visually the correct tuning point of any station. This takes the form of a narrow glass bulb, some 3in. long, mounted on a miniature bayonet cap with two base contacts that fit the standard motor car two-point lamp holder. There are three electrodes in the tube, two quite short and one extending nearly the full length of the bulb. The short ones serve as anode and priming electrode respectively and join to the two base contacts, while the longest of all is the cathode, and is connected to the metal base cap. With the correct operating voltages a faint glow appears at the base of tube when no signals are received. On tuning in a station the column of light rises in the tube and reaches a maximum at the correct tuning point. The height of the glow depends on the potential applied to its anode, and, in practice, this is derived from the anode circuit of the valve, or valves, in the receiver which are linked up with the A.V.C. circuit.



Cossor Three-electrode Neon Tuning Indicator.

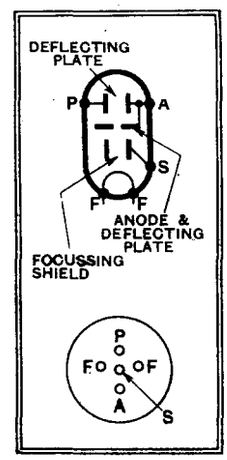


Fig. 2. — Arrangement of the electrodes in the Micro-mesh Tunograph and the connection to the base pins.

Since the action of A.V.C. is to bias back these valves, they consequently pass less anode current, and to convert this change into a potential difference it is necessary only to connect a resistance in the H.T. supply line. It should be adjusted to give the longest column of light when receiving that broadcast station providing the strongest signals. It is shown at R1 in Fig. 1, and in general will be somewhere between 1,000 and 10,000 ohms. The best value can be found only by experiment, since it depends on the magnitude of the change in the current in this part of the circuit. This resistance, in conjunction with the one-mfd. condenser, serves also for decoupling the H.F. stages, which is very desirable when extra leads are added to, or additional connection made to, circuits in which H.F. currents flow.

Neon Tube Operation

Resistance R2 may or may not be needed; it depends on the total H.T. voltage available. Its function is to fix the initial striking voltage of the tube and to maintain the glow when no signals are received. Between 160 and 180 volts are required for this purpose, under which condition some 3 mA. flow through the tube. Then a small potential—from 30 to 40 volts positive—must be applied to the cathode, and this is most conveniently derived from a fixed potentiometer joined across the H.T. supply, as shown. Finally, the priming electrode is joined to the H.T. negative through a resistor of from 0.25 to 2 megohms.

The tuning indicator functioning on the

Tuning Indicators—

cathode-ray oscillograph principle is the Micromesh Tunograph, made by Standard Telephones and Cables, the form of assembly of which is given in Fig. 2. A stream of electrons is emitted from a hot cathode, concentrated into a beam by a focusing shield, and then through a hole in the anode. Then the beam passes between a pair of deflecting plates, and finally strikes a fluorescent screen inclined at an angle and mounted in the upper part of the bulb.

Cathode-ray Indicator

Here the beam of electrons becomes visible and is seen as a green spot. The beam can be moved laterally by applying a negative bias to one of the focusing plates, and about 40 volts are required to bring the spot over to the extreme left of the screen. Since the electron stream is free from inertia, and will, therefore, follow high-frequency alternating potentials, it is possible to so arrange the connections to the tube that visual indication of tuning is obtained by causing the spot of light to vibrate at the frequency of the received carrier wave. So far as the eye is concerned this would appear as a green line on the fluorescent screen and the length of the line can be made to vary with the strength of the incoming signals. The line method of indication, however, necessitates a very strong signal to give good definition, and it may be preferable in practice to utilise

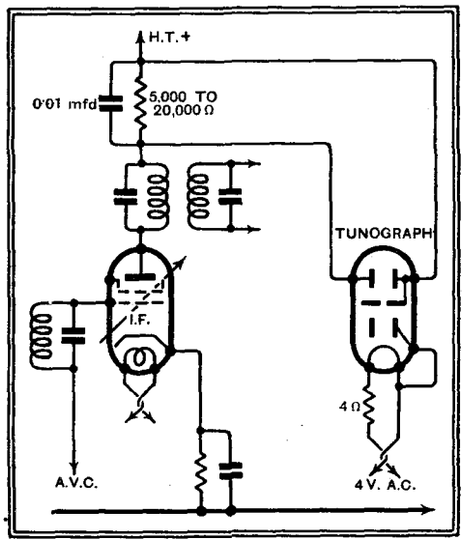


Fig. 3.—With this circuit arrangement the position of the light spot in the Tunograph varies with the anode current, and the optimum tuning point is determined by maximum deflection.

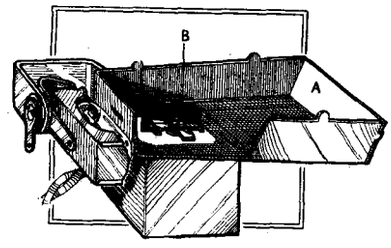
the arrangement in which the light spot is deflected from its quiescent position when a signal is received, and as the amount of deflection is then proportional to the strength of the signal the set is tuned to give maximum deflection.

The circuit arrangement that produces this effect is given in Fig. 3, where the Tunograph is shown connected to the last I.F. stage in the receiver. The resistance in the anode circuit of the I.F. valve is chosen to give a potential of minus 40 volts on the free focusing plate, the spot then being normally at rest at the extreme left of the fluorescent screen. When a signal is tuned in the A.V.C. circuit biases back the controlled valves, the current through the anode resistance falls, so a smaller potential is developed across its ends and the spot moves over to the right. At the optimum tuning point the A.V.C. bias is greatest and maximum deflection of the spot is obtained.

The potential on the anode of the Tunograph must be not less than 180 volts, while its filament requires slightly less than one ampere at from 0.5 to 0.6 volt. This can be taken from the L.T. filament winding by inserting a four-ohm resistor in one of the filament leads as shown.

The current-operated devices will usually have a moving member of some kind, such as a pointer, or it may even take the form of a moving vane throwing a shadow on to a translucent screen as in the Shadow Tuning Meter made by Philco Radio and Television Corporation of Great Britain. This type is the simplest of all to install, and entails the least alteration to the set. The H.T. supply lead to the anode or anodes of the H.F. or I.F. valves controlled by the A.V.C. is broken at a convenient point and the meter, or special unit, joined in the circuit. With the Philco model a pair of leads must also be taken from the L.T. supply to illuminate the lamp, or if a dial light is used the tuning indicator lamp can be joined in parallel with it. The small bulb fitted is obtainable for mains, battery or car radio receivers, and is of the low-consumption type. When no signals are being received a broad shadow is thrown on the screen, and this contracts whenever a station is tuned in, the narrowest shadow indicating the correct adjustment.

Micromesh Tunograph, a visual tuning indicator functioning on the principle of the cathode-ray oscillograph.



Sketch showing the principal features of the Philco Shadow Tuning Meter; A is the screen and B the vane which intercepts the beam of light projected by the lamp.

The Sifam Electrical Instrument Co. has developed a meter-type tuning indicator which is employed in much the same way as the Philco model, but in this case the optimum tuning point is given by the greatest deflection of the pointer in the direction of the arrow engraved on its dial. An arbitrary scale is provided, but it has no relation to the current flowing, though it might be useful as a means of keeping a check on the state of the H.F. valves, if the position of the pointer is noted with the set detuned or with the aerial disconnected, when the meter is first fitted.

Milliammeter as Indicator

The standard model requires 7 mA. for a full-scale deflection, but instruments taking more current can be supplied if required. It has a moving-iron movement which is sufficiently well damped for the purpose.

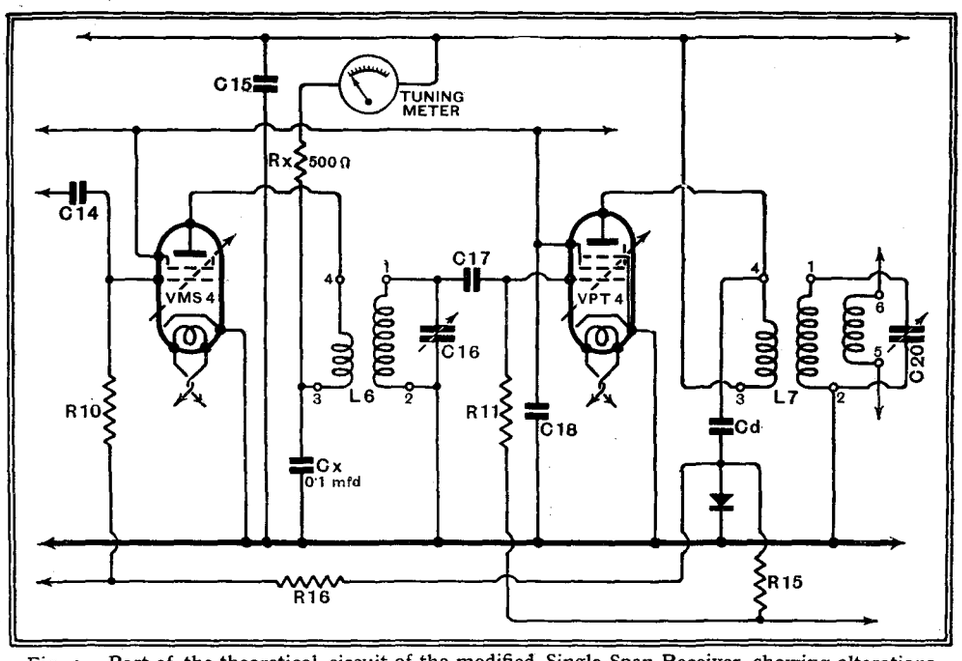
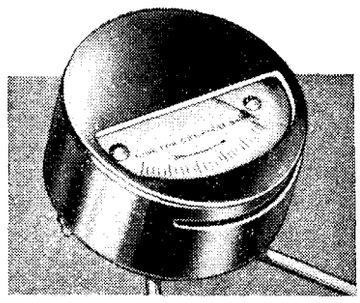


Fig. 4.—Part of the theoretical circuit of the modified Single-Span Receiver, showing alterations necessary to include a visual tuning meter or similar device.

Tuning Indicators—

An ordinary milliammeter can quite well be used as a tuning indicator. It need not have an accurately calibrated scale, but should be reasonably dead beat, one with a freely swinging pointer being more of a hindrance than a help. The best position for it is in the anode circuit of one or more of the controlled valves.

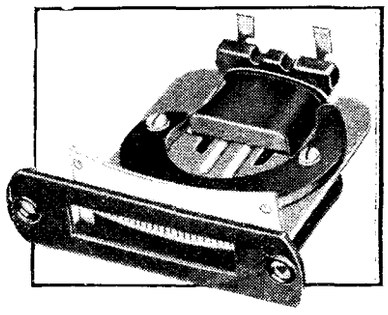


Sifam meter-type tuning meter ; the dial can be illuminated by a lamp mounted close to a window in the side of the case.

There is only one precaution that need be observed when making an addition to the H.T. circuit, and that is to see that the meter is inserted between the anode decoupling components and the main H.T. supply, for should it be connected on the valves' side of the decoupling there is a likelihood of the additional wiring causing H.F. instability. As an illustration of the practical installation of a meter-type tuning indicator a portion of the circuit diagram of the modified Single-Span Receiver[1] is given in Fig. 4. This shows the second and third I.F. stages, and it is suggested that if the meter is of the sensitive kind and requires less than 10 mA. to give a full-scale deflection of the pointer it would be advisable to connect it in the anode circuit of one only of the valves controlled by the A.V.C.

Position in Circuit

The VMS4 stage would seem the most suitable in this particular case, and the only alterations needed consist of disconnecting the lead joining C15 to terminal 3



Howard Butler edgewise-type tuning indicator.

on the primary of the I.F. transformer L6 and interposing a decoupling resistance, the tuning indicator and an extra by-pass condenser. The position of C15 in this theoretical diagram may seem slightly different from that of the original, but reference to the wiring plan will reveal that in practice it serves as an H.T. junction point for several of the valves.

The additional decoupling resistance is shown at Rx, and one of 500 ohms would seem a suitable value, for some of the special tuning indicators have a considerable D.C. resistance. As for the extra condenser, one of 0.1 mfd. will suffice, and it should be of the same working voltage as the other condensers in this part of the circuit.

These changes will meet the requirements of such devices as the Philco Shadow Tuning Meter, the Sifam model, and the visual tuning indicator of Howard Butler, Ltd. Each of these functions satisfactorily with a standing current of about 6 mA.

There is a series of Electradix meters, designed by Leslie Dixon and Co. especially to meet the requirements of visual tuning. Three styles are available, one a moving-coil pattern, another fitted with a magnetic movement, while the third is a miniature moving-iron type instrument.

Two types of Electradix visual tuning meters ; the larger has a moving-coil movement and provision for illuminating the dial from the side.

Each has a full-scale range of 10 mA., but only an arbitrary scale is fitted. Provision is made in the two larger models for illuminating the scale.

Since preparing this article, details of a Ferranti tuning indicator have come to hand. It takes the form of a skeleton moving-iron instrument of the type incorporated in this firm's receivers, and, being a current-operated device, it can be fitted in the manner already discussed.

[1] *Wireless World*, June 22nd, 1934, pp. 420-421.

OLYMPIC S-S SIX

(*Continued from page* 93)

THE LIST OF PARTS

After the particular make of component used in the original model, suitable alternative products are given in some instances.

RECEIVER UNIT

1 Variable condenser, 0.00016 mfd. **C4** — **Polar Type "E"**
1 Dial, Slow-motion type — **Eddystone 973**
1 Slow-motion condenser, 0.0002 mfd., **R.C.** — **Polar "Q.J."**
1 H.F. Choke, Ch1 — **Wearite H.F.S.**
(Eddystone)
1 Potentiometer, 250,000 ohms, **R16** — **Claude Lyons S.T.250**
(Ferranti, Magnum, Rothermel)
1 Rotary D.P.D.T. switch. S — **Claude Lyons 2163**
1 Valve holder, 7-pin — **W.B. Baseboard Type**
3 Valve holders, 7-pin — **Clix Chassis Mounting Type**
1 Valve holder, 9-pin — **Clix Chassis Mounting Type**
1 Compression condenser, 100 mmfds., **C5** — **Colvern**
6 Microdensers, 100 mmfds., **C9, C10, C14, C16, C17, C20** — **Eddystone 900**
4 Fixed condensers, 0.0001 mfd., **C3, C21, C22, C24** — **T.C.C. Type "M"**
1 Fixed condenser, 0.0001 mfd., **C1** — **T.C.C.34**
1 Fixed condenser, 0.0002 mfd., **C2** — **T.C.C.34**
3 Fixed condensers, 0.001 mfd., **C12, C13, C19** — **T.C.C. Type "M"**
2 Fixed condensers, 0.01 mfd., **C11, C18** — **T.C.C. Type "M"**
9 Fixed condensers, 0.1 mfd. Tubular, 350 volts D.C. working **C6, C7, C8, C15, C23, C27, C28, C29, C30** — **T.C.C.250**
(Dubilier, Graham-Farish, Peak, T.M.C. Hydra, Telsen)
2 Electrolytic condensers, 50 mfds. 12 v. working, **C25, C26** — **T.C.C.501**
(Dubilier, Telsen)
1 Resistance, 100 ohms, **R18** — **Graham-Farish "Ohmite"**
2 Resistances, 250 ohms, **R1, R2** — **Graham-Farish "Ohmite"**
4 Resistances, 2,000 ohms, **R5, R7, R12, R17** — **Graham-Farish "Ohmite"**
3 Resistances, 10,000 ohms, **R6, R8, R13** — **Graham-Farish "Ohmite"**
2 Resistances, 50,000 ohms, **R3, R9** — **Graham-Farish "Ohmite"**
3 Resistances 100,000 ohms, **R4, R10, R14** — **Graham-Farish "Ohmite"**
2 Resistances, 1 megohm, **R15, R19** — **Graham-Farish "Ohmite"**
2 Resistances, 2 megohms, **R11, R20** — **Graham-Farish "Ohmite"**
1 Resistance, 4,000 ohms, **R21** — **Graham-Farish "Ohmite" Heavy Duty Type**
1 Resistance, 6,000 ohms, **R22** — **Graham-Farish "Ohmite" Heavy Duty Type**
(Dubilier, Erie, Ferranti, Claude Lyons, Seradex, Watmel)
4 Resistance holders, horizontal type — **Graham-Farish**
1 6-way Connector — **Bryce**
1 5-pin Plug — **Bulgin P.3**
(British Radio Gramophone Co., Goltone)
1 5-way Cable, with twin 70/36 leads — **Harbros**
(Goltone)
6 Knobs — **Bulgin K.6**
4 Ebonite shrouded terminals, A., E., Pick-up (2) — **Belling-Lee Type "B"**
2 Valve cap connectors, thimble type — **Clix**
6 Coil screens, 3¾ x 2½in. diam. — **Mains Power Radio Co. C.S.1.**
1 Coil screen, 4 x 3½in. diam. — **Colvern**
(Goltone)
1 Screening box, 6½ x 6½ x 6in. — **Magnum**
Materials for Coils:
16in. Paxolin tube, 1in. diam. **Wright & Weaire**
2½in. Paxolin tube, ¾in. diam. **Wright & Weaire**
Quantity No. 32, 36 and 38 D.S.C. wire, **or 1 Set of Coils.**
2 Lengths screened sleeving — **Harbros**
(Goltone)
4 ozs. No. 20 tinned copper wire, 10 lengths Systoflex, wood, etc.
Plymax baseboard, 12 x 16 x ⅜in. — **Peto-Scott**
Aluminium front plate — **Peto-Scott**
Screws:—
20 ¼in. No. 4 R/hd.; 8 ⅜in. No. 2 R/hd.; 18 ⅜in. No. 4 R/hd.; 16 ½in. No. 4 R/hd.; 6 ¾in. No. 4 R/hd., all with washers.
2 ⅜in. No. 6 B.A. with nuts and washers.
Valves:—1 Ferranti H4D; 1 Mazda AC/TP; 2 Cossor MVS/Pen.; 1 Osram or Marconi MX40.

POWER UNIT

1 Mains transformer, primary 200 to 250 volts 50 cycles; secondaries, 350-0-350 volts, 100 mA., 4 volts, 2.5 amps. centre-tapped; 4 volts, 2 amps. centre-tapped; 4 volts, 6 amps. centre-tapped — **Rich & Bundy Type 239**
(Davenset, Parmeko, Sound Sales, Vortexion, Wearite)
1 L.F. transformer, 1: 3 — **Telsen DR3**
1 Smoothing choke, 15 henrys, 100 mA., **Ch2** — **Bulgin L.F.21**
(Davenset, Parmeko, Sound Sales, Varley, Wearite)
1 Fixed condenser, 0.5 mfd. Tubular, 350 volts D.C. working, **C31** — **T.C.C.250**
1 Fixed condenser, 0.005 mfd., **C34** — **T.C.C. Type "M"**
1 Electrolytic condenser, 4 mfds. 440 volts working, **C38** — **T.C.C.802**
4 Electrolytic condensers, 8 mfds. 440 volts working, **C32, C35, C36, C37** — **T.C.C.802**
1 Electrolytic condenser, 50 mfds. 50 volts working, **C33** — **T.C.C.521**
(Dubilier, Graham-Farish, Peak)
1 Resistance, 100 ohms, **R25** — **Graham-Farish "Ohmite"**
1 Resistance, 140 ohms, **R26** — **Graham-Farish "Ohmite"**
1 Resistance, 5,000 ohms, **R27** — **Graham-Farish "Ohmite"**
1 Resistance, 10,000 ohms, **R24** — **Graham-Farish "Ohmite"**
1 Resistance, 20,000 ohms, **R23** — **Graham-Farish "Ohmite"**
1 Resistance, 1,500 ohms, **R28** — **Graham-Farish "Ohmite" Heavy Duty Type**
(Dubilier, Erie, Ferranti, Claude Lyons, Seradex, Watmel)
3 Valve holders, 5-pin — **Clix Chassis Mounting Standard Type**
1 Valve holder, 7-pin — **Clix Chassis Mounting Type**
1 Twin safety fuseholder with 1 amp. fuses — **Belling-Lee 1033**
(Bulgin)
1 5-pin Plug — **Bulgin P.3**
(British Radio Gramophone Co., Goltone)
Loud speaker: 2,500 ohm field — **W.B. "E.M.2"**
Quantity No. 20 tinned copper wire, 4 lengths Systoflex, wood, etc.
Plymax baseboard, 8 x 15 x ⅜in. — **Peto-Scott**
Screws:—
24 ⅜in. No. 4 R/hd.; 6 ½in. No. 4 R/hd., all with washers.
Valves:—1 Osram or Marconi MU12, 1 Mazda AC/2/Pen.

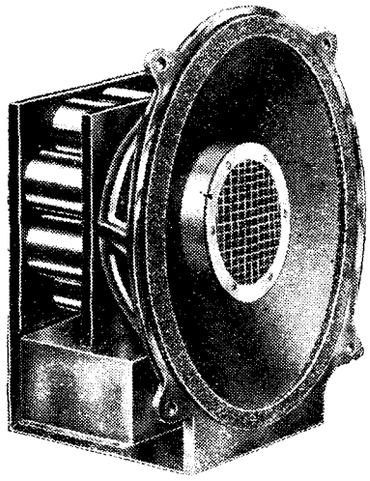
THE LOUD SPEAKER

New Season's Improvements

FOR the past two or three years the medium- or low-priced permanent-magnet unit has held the floor at the Radio Exhibition, and it seemed at one time that the energies of manufacturers were completely absorbed in producing this type of loud speaker at a price a few shillings lower than their competitors. This year, however, many of the leading firms have found time to produce some really first-class loud speakers in which quality of reproduction, rather than price, has been the primary consideration. There can be no doubt that the standard of taste in quality of reproduction has greatly improved during the last two or three years and up to present the range of choice in quality reproducers has fallen lamentably short of the demand.

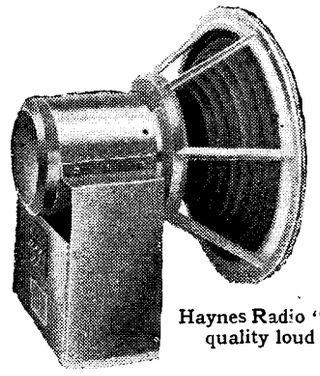
Quality Reproducers

From the technical standpoint one of the most interesting of the new quality reproducers is the "Super Dual" model which will be exhibited on the Blue Spot stand. A large-diameter main cone is used to cover the bass and middle frequencies, and an entirely separate high-frequency unit is mounted on the centre pole-piece concentrically with the main cone. The high-frequency unit has its own permanent-magnet system and employs an extremely light paper cone with an aluminium coil drive. A cylindrical baffle is inserted between the two diaphragms to prevent modulation of the high frequencies due to air movements originating from the main cone. Each unit has its own output transformer, and a filter is incorporated to keep low-frequency currents out of the smaller unit.



Blue Spot "Super Dual" loud speaker incorporating separate units for high and low frequencies.

Another important addition to the range of better-class loud speakers is the Magnavox "Double Six." A special form of rear suspension and a high flux density contribute to uniform bass response and good transient attack, while a careful arrangement of the group of corrugations in the centre of the 11-inch moulded diaphragm ensures good high-frequency response and the minimum of resonance due to the secondary modes of vibration of the diaphragm.

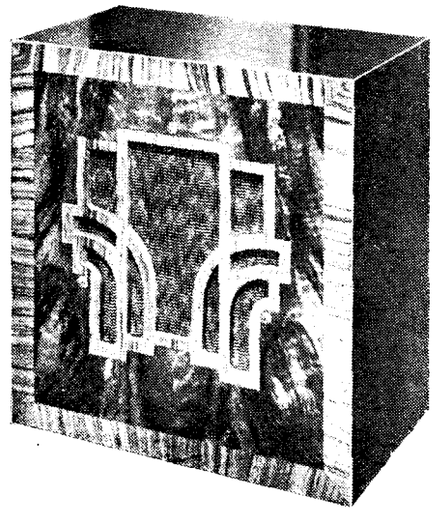


Haynes Radio "Standard" quality loud speaker.

Other notable newcomers to the ranks of quality reproducers are the Haynes Radio "Standard" and "Senior" loud speakers. These also employ the corrugated type of diaphragm and are of the energised type with field magnets of special high-permeability steel.

Detail Improvements

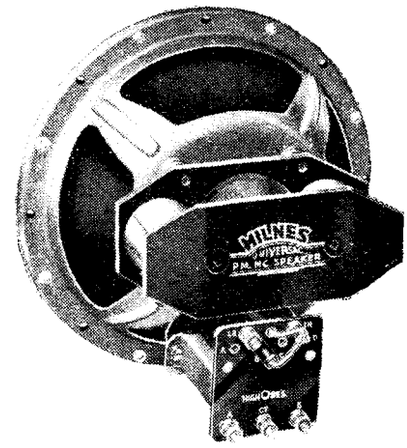
Several well-established high-grade loud speakers have undergone modifications in design since last year's show. The Ferranti M1, for instance, is now fitted with an aluminium alloy magnet having an air gap ½in. deep and the diaphragm suspension has been made considerably more free. The B.T.H. "R.K." also has a new type of cone suspension and is now supplied with an output transformer built into the chassis. In addition to the standard reflector type of baffle designed for domestic use, Voigt Patents, Ltd., will be exhibiting a new type of exponential horn for use in conjunction with their well-known moving-coil unit, and specially designed to fit into a corner of the room. A modified form of this unit incorporating a diaphragm of slightly larger diameter for the better reproduction of the extreme bass, will also be shown.



G.E.C. "Junior" extension loud speaker.

Nickel-Aluminium Alloys

A development which is likely to provoke considerable interest and discussion is the release of the new nickel-aluminium alloy of which rumours have been current for some considerable time. It seems incredible that this material, consisting as it does of two such comparatively feeble paramagnetic elements, should exhibit such strong magnetic properties; but there can be no doubt that bulk for bulk a much higher flux is obtainable than with the cobalt steel alloys generally used for loud speaker permanent magnets. The melting of the alloy presents special metallurgical problems and, generally speaking, an electric furnace is required; but, even so, the cost of production for a given flux is lower than that at present obtainable with ferrous alloys. The majority of magnets of this type are of the built-up type using cylindrical elements of the magnetic material, but the alloy is equally adaptable to the making of special castings and it can be given a high finish not unlike chromium plating.



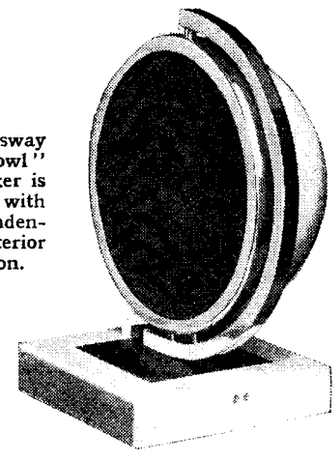
An example of the application of the new aluminium magnetic alloy—the Milnes P.M. speaker.

The Blue Spot "Star," Milnes "De Luxe," and Whiteley Electrical "Stentorian" models are examples of units employing this type of magnet. The latter loud speaker, incidentally, is notable for the very complete protection of the air gap from contamination with filings and

The Loud Speaker—

dust, and judging from the results of a brief test which we have been privileged to make, the introduction of the new type of alloy is likely to result in a considerable increase in the efficiency of medium-priced moving-coil loud speakers.

There is evidence this year that the Show will reveal closer attention to the requirements of purchasers of extension loud speakers, which last year were generally of the miniature type. It now seems to be realised that the demand is for quality of reproduction comparable with the receiver itself and for a standard of cabinet design which does not look out of place in a well-furnished room. That the modern style of furnishing has not been overlooked in this connection is evident from the strikingly original "Bowl" loud speaker, which will be shown by Kingsway Radio.



The Kingsway Radio "Bowl" loud speaker is in keeping with modern tendencies in interior decoration.

Letters to the Editor

The Editor does not hold himself responsible for the opinions of his correspondents

The Question of Quality

I HAVE followed with great interest the discussion on "The Question of Quality."

It is my belief that a great number of people have become so used to distortion as to be almost, or absolutely, oblivious to its presence. But I have also found that if these people are confronted by really high quality reproduction they do appreciate it, and say so in no uncertain voice.

Then we have the listener whose sole object is distance and quantity of sound, quality being of little or no importance at all. This type of listener is beyond recovery and desires nothing more than a distant station with a heavy grid current flow from a grossly overloaded output valve.

So far as I am concerned, quality is the first consideration, and the A.C. receiver I have at present in use is purely a local station set with a fairly large undistorted output. Many comments have been passed about its natural reproduction by both keen and not so keen listeners, and in most cases they have been amazed at being able to obtain such a high degree of quality and realism from a mere radio receiver.

Glasgow. PENTODE.

I THINK that the opinion of some radio manufacturers that the public likes a good mellow tone is to a large extent erroneous; it is seldom realised that the people who are now buying new radio sets are those who have never possessed a set before or those who have had one with a moving iron speaker. This becomes obvious when one realises that the vast majority of people buy a set to last not less than three or four years. These people are naturally impressed by the performance of almost any moving coil speaker that has its quota of "thump," for they have never listened to the bass before. It is this latter reason that makes them favour a set with boosted bass, though I believe they soon tire of its booming.

I possess a comparatively simple set that was designed and constructed by myself. In brief, it consists of an o-v-2 circuit originally designed for two PEN 220A's in Q.P.P. These are now run from an eliminator as a straight push-pull circuit, giving about 2.5 watts output. My speaker is an Epoch 99X, which has a very satisfactory high note response, and a Multitone tone control transformer is fitted. The set is not particularly easy to control, at any rate to get the best out of it, but when properly adjusted the results are very satisfying, and nearly everyone who hears it prefers its full high note response (the cut off is above 5,000 cycles) to the thump of the average commercial set.

You have recently intimated that we are following the practice in America, and I believe that in this case also this is the trouble. The Americans have for a long while had a very low cut off in their sets, and so the speaker manufacturers designed their products accordingly. Many of the best known British firms of loud speaker manufacturers are of American origin, and have in many cases clung to the American frequency range.

Many set manufacturers of to-day could improve their products enormously by fitting a speaker costing a few shillings more than the one they fit.

The public have to like a mellow set because there is nothing else for them to buy.

Ipswich. R. B. RANSOME.

Transients

IN the Correspondence Columns on July 20th, Mr. Farrell refers to an article in *The Wireless World* and states that "I remember it was shown that the failure of a receiver to reproduce transients with realism was principally due to a loud speaker defect, i.e., a loud speaker will not reproduce one separate cycle 'naturally' and hence fails to achieve life-like reproduction of the beginning of a sudden—though sustained—note, so that the 'attack' is lost. This is because the first, or few first, cycles are attenuated until the diaphragm 'gets into it's stride.'"

This has long been a pet theory of mine and I was not aware of it having been supported by any other writers. I have therefore examined the article to which he attributes this statement, but found no mention of it. It seems to me, therefore, that he has mixed it with my own article on loud speaker calibrations, towards the conclusion of which I stated the following:—

> "I even have doubts whether two speakers having practically identical curves will sound alike—at any rate, on transients—if their construction is such that one is aperiodic, so that it radiates sound instantly on receiving the corresponding currents, while the other is resonant and has to get its vibrating surfaces going properly before the sound is thrown off."

The mathematicians will no doubt be able to prove that the idea is a fallacy. It is based, however, on the experience which I have repeated more than once. Putting a horn in front of a good moving-coil loud speaker produces two effects (a) an apparently audible restriction in the frequency scale accompanied by (b) an increase in naturalness.

With solo instruments of simple wave form the effect may be negligible, but in full orchestral passages or with a choir the addition of the horn seems to separate the medley of sounds coming through the loud speaker into their proper constituents.

An increase in field strength (which applies magnetic damping to the speech coil) tends to have a similar effect.

The experiences of other readers on this question would be of interest.

P. G. A. H. VOIGT.

London, S.E.19.

Unnecessary Interference

IN the course of fitting up many country house radio installations we have been greatly struck by the amount of unnecessary interference with radio reception which people put up with, and apparently look upon as inevitable.

In most cases country residences are situated remote from factories, trams and other sources of trouble and should enjoy interference-free reception, but in all too many cases this is far from the case, owing to motor driven refrigerators. We have found a surprising number of houses where reception from even the local station was completely spoilt when the refrigerators "cut-in," and in every case the trouble has been completely removed by the simple expedient of earthing the actual motor.

These motors are usually completely, or almost completely, enclosed in thick cast-iron cases which form an excellent screen, but it is standard practice to mount them flexibly on rubber and no earth connection is made between the motor itself and the refrigerator casing, so that even if the latter is properly earthed when the machine is installed, the motor is not. We have found that earthing the actual motor with a flexible lead is almost always an absolute cure, no condensers being needed.

In the year 1934 it does seem to us that such an elementary precaution as earthing the motor should be taken by the refrigerator makers.

A. SMURTHWAITE, Director,
F. W. Smurthwaite, Ltd.

Wallington, Surrey.

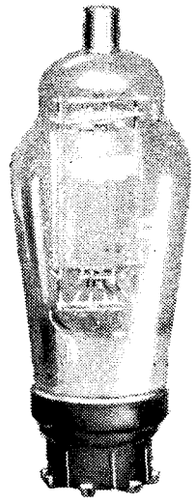
Correspondence, which should be as brief as possible, should be addressed to the Editor, "The Wireless World," Dorset House, Stamford Street, S.E.1, and must be accompanied by the writer's name and address.

MODERN VALVES

Recent Progress in Design

IN the past, valve and circuit design bore little relation to one another and were carried out independently. For many years, however, this practice has been disappearing, and we now find that valves exercise a very important influence indeed upon the types of receiver which make their appearance. Indeed, many receivers would be an impossibility were it not for the recent advance in valve technique. It must not be thought, however, that receivers are developed as a result of the production of new valves; although this may sometimes happen, in many cases, a valve is designed to meet some particular need.

Ferranti VHT2 battery heptode.



Mullard Pen 26 Universal A.C.-D.C. valve.

The special frequency-changing valves are good examples of this, and well illustrate the interaction between receiver and valve development. The superheterodyne was highly developed with the aid of existing valves largely because high selectivity became a necessity. The valves available were highly suitable for all stages but the frequency-changer, and in this portion of the set designers exercised great skill in obtaining a good performance from valves designed essentially for other functions.

The lack of suitable valves necessitated the use of two in order to obtain satisfactory frequency-changing, and stimulated valve designers into efforts to produce a single specimen with a better performance. The first efforts resulted in the production of the H.F. pentode, which was widely used as a frequency-changer a year ago and is still retained by many firms. Most valve makers will be showing specimens of this class and the Cossor MS/Pen, the Marconi and Osram MSP4, and the Mullard SP4 are good examples.

Although intended largely for use as frequency-changers, this type can also be used for amplifying purposes, and it is only about a year since the truly specialised frequency-changer first made its appearance. The heptode is a seven-electrode valve and in some ways can be regarded as a tetrode mixer valve with a triode oscillator, the coupling between the two being electronic. By the use of valves of this nature, considerable saving is obtained in receivers and an improved performance for a given number of valves is secured. The Ferranti VHT4 was the first representative of this class available, but most makers will now be showing both battery and mains types. Among the latter, the Cossor 41MPG and the Marconi and Osram MX40 will be prominent, while Ferranti will have a battery model, the VHT2. The Mullard frequency-changer, the FC4, although of similar type, is an octode, for it is fitted with a suppressor grid and consists essentially of a pentode mixer and a triode oscillator. The makers claim that this leads to a reduction of background hiss.

Mazda will have a special frequency-changer evolved on different lines. It is the triode pentode and consists of two entirely separate electrode assemblies mounted in the same bulb. It is really a two-valve frequency-changer of conventional type and requiring external oscillator coupling, but with the valves specially designed for the functions which they are called upon to perform. The mains models are the AC/TP, and the TP2620, and the battery valve is listed as the TP22. It is understood that Mullard will also be showing a valve of this type, the TP4.

Cossor 41MPG heptode.

Marconi Q.P.21. output valve.

Apart from frequency-changers, the demand for automatic volume control has led to the production of many special diode types of valve. Most of these have been available for a long time and the duo-diode-triodes, duo-diode-pentodes, and single-diode-tetrodes are well known.

Hivac combined driver and Class "B" valve.

Mazda AC2/Pen/DD.

A duo-diode-output pentode of high efficiency has made its appearance, however and a valve which will give an L.F. output of some 3,400 milliwatts for an H.F. input of only 7 volts R.M.S., and also provide delayed A.V.C. obviously opens up wide possibilities in inexepnsive receivers. This valve is the Mazda AC2/Pen/DD.

In spite of the popularity of the multiple-diode class of valve, it is interesting to see that many firms will be showing simple duo-diodes. These are rated for operating at higher input voltages than the older models, and are an obvious simplification in tending to reduce the number of valve types necessary. One duo-diode can be used in conjunction with a standard type of valve and obviates the necessity for duplicating the range of standard models in a duo-diode multiple class.

Development in output valves has recently been confined to increasing the mutual conductance and power output of pentode valves. The Mazda AC2/Pen delivers an output of some 3,000 milliwatts for only 2.6 volts R.M.S. input and the Cossor 42 MP/Pen has similar characteristics. In battery receivers, Class "B" still holds the field and negative-bias type valves are now the most popular. There are signs, however, of a revival of Q.P.P., and double pentodes are making their appearance, notably the Marconi and Osram QP21.

Modern Valves—

Perhaps the most striking recent development is that of the Universal valve. Valves of this type are intended primarily for operation with their heaters connected in series and permit receivers to be built which can be worked without alteration from either A.C. or D.C. mains. Although there is fair uniformity between different makes as regards the heater potential, discrepancies exist in the current consumed. The Mazda range, for instance, take a uniform 0.2 ampere at from 13 volts to 40 volts according to the type of valve, but the Marconi, Osram and Ferranti ranges all consume 0.3 ampere. The Mullard range, again, is rated for 0.2 ampere, and is distinguished by a special base having side contacts instead of the usual pins.

The 13-volt rating applies to valves such as triodes and H.F. pentodes, but output pentodes require 26 volts or more. In certain cases, where it is intended that the valves be used in parallel for A.C. operation, a 26-volts 0.3 ampere pentode can be obtained alternatively with a heater rated for 13-volts 0.6 ampere. The H.T. rectifiers in this class are often of the half-wave type, but the Marconi and Osram model U.30 is available with the double heater rating and can be connected for half-wave or full-wave rectification or it can be used in a voltage-doubling circuit.

All the more important valves, including frequency-changers, duo-diodes, multiple-diode types, and output pentodes, have a place in the Universal ranges, and as they are designed for either series or parallel operation of the heaters there seems to be no reason why they should not eventually supersede not only the present D.C. types, but the A.C. also. It is to be hoped that this will not be long delayed, for everyone will agree that the number of different types of valve now manufactured is assuming nightmare proportions.

UNBIASED

By FREE GRID

Radiolympia: The Pass-out Problem

IN spite of the oft-repeated advice which I have given them, the exhibition authorities are sticking to August and the heat-wave season for their annual show, obstinately refusing to move it to March, a time of the year when, in my opinion, a radio exhibition is far more desirable from the point of view of exhibitors and public alike.

The same arrangements are, I hear, being made this year for us to stand in hungry queues at lunch-time before the doors of over-crowded restaurants. Apparently the authorities still refuse us the opportunity to slip out to one of the pubs

". . . . to one of the pubs."

across the road, declining to copy the best Continental shows by providing "passes-out," or, as people like to call them, "pass-outs."

With regard to the latter point, I am told that the pidgin English expression is preferred in order to make foreign visitors feel at home, although, in my opinion, the real reason is that the organisers responsible for this sort of thing are of an alien race, such as Scots, Manx, or something outlandish like that, and cannot, therefore, be expected to speak the King's English.

It is with regard to the actual exhibits, however, that I find the greatest dearth of information. Usually at this time of the year I have been almost snowed under by exhibition literature from various firms, but this year for some reason or other every manufacturer seems to have boycotted me. This has not, however, shaken my morale, and I shall not swerve in the slightest degree from my usual practice of revealing to my public the truth, the whole truth, and nothing but the truth about this annual "exhibition."

All Licences, Please

THERE is one great innovation at this year's show about which I do feel that I must give unstinted praise to the exhibition authorities. I refer to their plan for ensuring that those desiring to patronise the B.B.C. theatre will not be compelled this year to form up in weary queues in order to get in.

Their project for the prevention of overcrowding, although it may result in somewhat sparse audiences, can only be described as masterly. The person, whoever he may be, who first thought of compelling each would-be member of the audience to produce his wireless licence at the box office has my warmest commendation.

It was, I learn, first suggested that every would-be patron should produce a receipted invoice to show that he was a set-owner, thus preventing the theatre from being filled by mere celebrity-hunters and sensation-mongers who never have had a set and have no intention of purchasing one.

Second Thoughts

Later, however, it appears that somebody at Broadcasting House above the average intelligence realised that this idea did not ensure that every member of the audience was a contributor to the joint banking account of the B.B.C. and the P.M.G. It was therefore suggested that the wireless licence be substituted for the invoice, as the purchaser of a wireless set is, unfortunately, not *ipso facto* a licence-holder. (There may, of course, be licence-holders who do not own sets, but these come in the congenital idiot class.)

Upon mature consideration, however, I cannot help thinking that, excellent as the plan is, there will be others who will find the same loophole in the scheme that I have. After all, human nature is still far from perfect, and until the P.M.G. insists on following the example of the passport authorities by insisting on a photograph of the holder, licences will still be transferable.

Special Note

I HAVE just been studying a recently published textbook on wireless, written for the benefit of the non-technical listener, which attacks the subject from an entirely new and novel angle.

Apprehended by the Commissioners in Lunacy.

Most people who write books on wireless deliberately incite their readers to drop stones into ponds, thereby causing them to run a very grave risk of being apprehended by the Commissioners in Lunacy. The two people responsible for this new book—whose pseudonyms, by the way, veil the identity of persons very well known in the world of wireless—will have none of this, but deal with the problem by likening the atom, with its positive nucleus and band of satellites, to a mother duck and her brood of ducklings.

I will not disclose any further details, otherwise I may spoil your enjoyment of the book.

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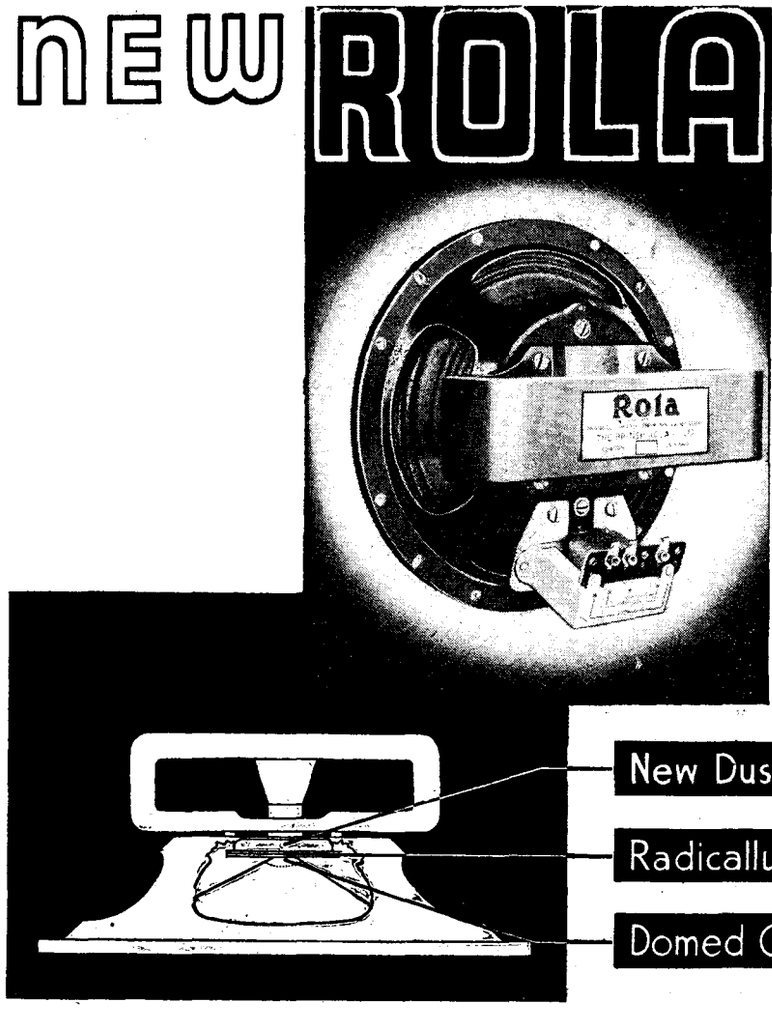

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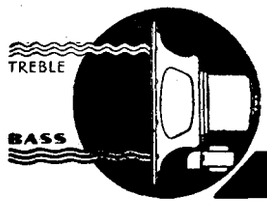

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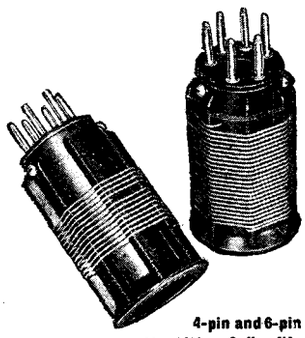

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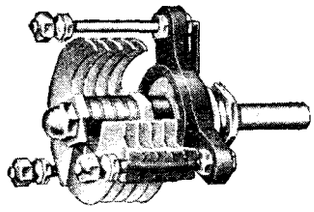

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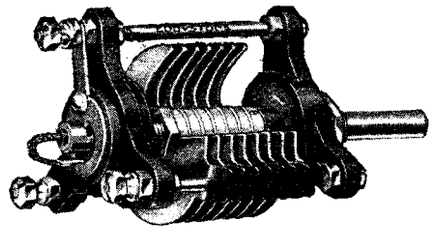

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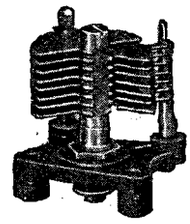

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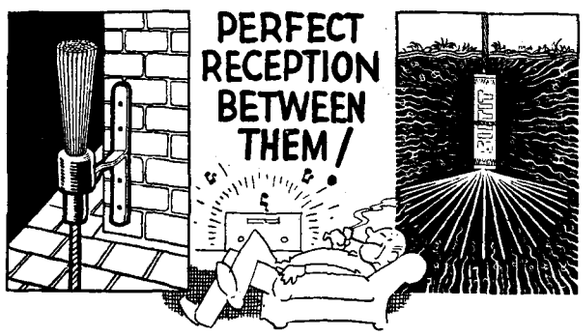

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SPEAKERS, microphones, meters, and all other gear appertaining to P.A. work at bargain prices; callers are invited; stamp for lists.—H. Franks, 23, Percy St., Tottenham Court Rd., W.1. Museum 8585. [6235

Receivers and Amplifiers, Etc.—Contd.

MIDGET Receivers, every one brand new, working off A.C. and D.C. mains, 100-130 or 200-240 volts, by universal adaptor included, all incorporate M.C. speaker, provision for gramophone pick-up, L. and M. wave, complete with valves, etc., Emerson 5-valve chassis (as above), sealed cartons, £3/15; above chassis incorporated in handsome figured cabinet (10×7½×5½), list 10 guineas, at £4/6/3; (12 each following only) Emerson model (3), 321 A.W., Chinese lacquer, ebony and gold, carrying handle, 9½ wide, 8lb., list 12 guineas, at £8/5; model (1) 330 A.W., black lacquer and chromium, with candle, 10½ wide, 7lb., list 10 guineas, at £6/18; model (2) 350 A.W., Crédenza cabinet, with swing doors, list 11 guineas, at £7/8/6; model 1, 2, 3, are superhets., and have built-in aerial: Emerson car radio model 965 6-valve, fits all cars, 9×5×6, installation requires drilling only 2 holes, complete with valves and ignition filter suppressor equipment, with remote control unit for clipping to steering column, list 15 guineas, at £9/12.—Degallier's, 4, Coryton House, 21, Upper Marylebone St., London, W.1. Museum 7795. [6237

MAINS EQUIPMENT.

VORTEXION Leads Again.

VORTEXION Specified Single Span Model, 350-100 m.a., 4v. 5a. C.T., 4v. 2.5a. C.T., 4v. 1a. C.T.; 25/-, less terminals, 23/-, less 5-year guarantee 21/-; power chassis, complete, £3/10; steel chassis only, 7/6; also normal model, shrouded, at 16/-, special shrouded choke 12/6.

VORTEXION.—Quality amplifier or super monodial, 425-0-425, 120 m.a., 4v. 6-8a. C.T., 4v. 3a. C.T., 4v. 1a., 4v. 1a., super shrouded, core size 2¼in.× 1½in., 2½% regulation primary engraved insulated terminals, weight 14lb., 26/- carriage 2/-; normal shrouded, 22/-; open type, 20/-, post 1/3; speaker field replacement choke, 16/-; special output transformer, to "W. W." spec., 12/6.

VORTEXION 7.30h. 120 m.a. Choke, 215 ohms, in die cast shrouding to match; 12/6.

IMITATED, but unequalled. Good enough for a "Wireless World" specification is good enough for you.

VORTEXION Cost Little More than the Cheapest, but unequalled by the dearest.

VORTEXION Standards Despatched by Return.

VORTEXION A.C./34, used by author in construction of A.V.C. Three, as illustrated; 18/-.

GUARANTEED 12 Months, and within 5% normal and 2½% super models, neat shrouding, with detachable feet, as used by Government Departments, etc., etc., any model guaranteed 5 years at extra cost of 2/-.

ALL Secondaries Centre Tapped.

VORTEXION.—250-0-250 60 m.a. 4v. 1 to 2a., 4v. 2 to 4a., open type, 10/-; shouded, 12/6; post 9d.

VORTEXION.—Ferrocart III, 350-0-350, 60 m.a., 4v. 2.5 C.T. 4v. 3.5 C.T.; open type 13/6, shrouded 16/-; post 9d.

VORTEXION.—Super model for H.T.8 or 9 or 10, 4v. 1 to 2, 4v. 2 to 4; open type 14/6; shrouded 16/6; post 1/-.

VORTEXION.—350-0-350, 120 m.a., 4v. 2 to 5a., 4v. 2 to 4a., 4v. 2.5a.; open type, 14/6; shrouded, 16/6; super shrouded model, weight 11lb., 4 filaments to specification, 21/-; post 1/3.

(This advertisement continued on next page.)

Mains Equipment.—Contd.

(This advertisement continued from previous page.)

VORTEXION.—400 or 450 or 500v. 120 m.a., 4v. 2 to 5, 4v. 2 to 5, 4v. 2, 5a.; open type, 19/-; shrouded, 23/-.

VORTEXION.—400 or 450 or 500, 150 m.a., 4v. 4a., 4v. 2.5, 4v. 2, 4v. 2, 4v. 2, core size 2¼×1¼in., a super job, 2% regulation, 35/-; shrouded, with terminals; less terminals, 30/-; open type, 26/-; post 1/3.

VORTEXION Auto Transformers to B.E.S.A. Specification, 100, 110, or 120v. to 200, 220, or 240 volts, 60 watts, 9/-; post 9d.; 120 watts, shrouded 12/6, open type 10/6, post 1/-; 200 watts, shrouded 16/6, post 1/-; 2,000 watts, £4/10.

VORTEXION 1,000-watt Transformers; £4/10, carriage free.

VORTEXION 30h. at 60 m.a. Chokes, 5/6; 40h. at 60 m.a., 8/6; 30h. at 150 m.a., 200 ohms, 10/6 open type, 12/6 shrouded.

VORTEXION Transformers Made to Your Specification; price according to wattage, 6v. filaments same price unless wattage grossly exceeded; special quotations by return.

VORTEXION (S. A. BROWN), 182, The Broadway, Wimbledon, S.W.19. Tel.: Liberty 2814. [5901

TANTALUM for A.C. Chargers H.T. and L.T.—Blackwell's Metallurgical Works, Ltd., Garston, Liverpool. [5039

PARAMOUNT Mains Transformers, equal to any, and better than most; try them once and you will always use them!

PARAMOUNT, single-span model, 350-0-350v. 100 m.a. 4v. 5a., 4v. 1a., 4v. 2.5a., shrouded, screened primary 2½% regulation; 20/-.

PARAMOUNT.—350-0-350v. 120 m.a., 4v. 5a., 4v. 4a., 4v. 2.5a., shrouded, screened primary, suitable for single span; 16/-, post 1/-.

PARAMOUNT Mains Transformers are Guaranteed for 12 months and made from the very best British materials.

PARAMOUNT.—250-0-250v. 60 m.a., 4v. 1-2a., 4v. 2-4a., 10/-, post 9d.

PARAMOUNT.—Chokes, 30h. 60 m.a., 5/6, post 9d.; 20h. 120 m.a., shrouded, 11/-; open, 8/6, post 9d.

PARAMOUNT Products are Fitted with Neat Aluminium frames or shrouds, all filaments are centre tapped, insulating paper between each layer; every component must pass a stiff test before it leaves our works.

PARAMOUNT.—500-0-500v., or 450v., or 400v., 120 m.a., 4v. 5a., 4v. 4a., 4v. 2.5 amps., shrouded, screened primary, 21/-; open 18/-; post 1/3.

PARAMOUNT Transformers for Westinghouse H.T.8, 9, or 10, with 4v. 2a., 4v. 4a., shrouded, 16/-, post 1/-; for H.T.11, 45/-, post 1/6.

PARAMOUNT.—Guaranteed electrolytic condensers, 4+4 mfd., 500v. peak, 3/6, post 3d.; let us quote you for any component you may need.

PARAMOUNT.—Auto-transformers, 100-120v. up to 200-250 volts, or vice versa, 60-watt, 8/6; 120-watt, 10/-; shrouded, 12/-; post 9d.

PARAMOUNT.—Any transformer made to your own specification; price according to wattage; quotations by return.

PARAMOUNT Mains Transformers, manufactured by Brock and Salter, 66, Hartfield Rd., Wimbledon, S.W.19. (one minute from Wimbledon Station). Tel.: Liberty 3226. [6216

HOYNE'S Transformers, fitted with tapped and screened primaries, filaments, all centre tapped, stout cast aluminium clamps and clearly marked terminal strips are fitted to all models; write for list.

HOYNE'S Components are Guaranteed for One Year; one type only manufactured, the best, as used by many well-known set manufacturers after testing all others.

HOYNE'S.—"W.W." transformers, wound strictly to specification of author: "W.W." test reports, June 22nd: "The insulation is particularly good throughout . . . the transformer is satisfactory in all respects."

HOYNE'S.—Push-pull quality amplifier transformer, 25/-, post 1/3; 7/30 henrys choke, 9/6, post 9d.; 20 henrys, 7/6, post 9d.

HOYNE'S.—Single span, 15/-, post 1/-; choke, 10 henrys, 7/6, post 9d.

HOYNE'S.—Everyman A.C. super transformer, 12/6, post 1/-; choke, 10 henrys, 7/6, post 9d.

HOYNE'S.—A.V.C. Straight Four transformer, 18/-, post 1/3; choke, 26 henrys, 12 m.a., 140 ohms, 9/6, post 9d.

HOYNE'S.—A.V.C. Three transformer, 12/6, post 1/-; choke, 30 henrys, 60 m.a., 7/6, post 9d.

HOYNE'S.—250-0-250v. 60 m.a. 4v. 1 to 2a., 4v. 2 to 4a., 10/-, post 9d.; with extra 4v. 1 to 2a. winding, 12/6, post 1/-.

HOYNE'S.—Ferrocart III, 350-0-350v. 60-70 m.a., 4v. 2 to 3a., 4v. 2 to 4a., 12/6, post 1/-; with extra 4v. 1 to 2a. winding, 13/6, post 1/-.

HOYNE'S.—500-450-0-450-500v. 140 m.a., 4v. 2 to 4a., 4v. 4 to 6a., 4v. 2a., 4v. 2a., 27/6, post 1/3; weight 11lb.

HOYNE'S Transformers, built to specifications up to 1 K.V.A., keenest prices, best materials and workmanship; quotation by return.

M. J. HOYNE, ALL-POWER TRANSFORMER, Ltd., Offices and Works, 8a, Gladstone Rd., Wimbledon, S.W.19. Tel.: Liberty 3303. [6079

CABINETS.

MANUFACTURERS' Clearance.

ULTRA "Panther," a modern cabinet, with contrasting figured walnut veneer panels, 20×17×11, 13/6; pedestal type, 35×22×12, 30/-, undrilled; photo sent on request.

SET and Speaker Cabinets; 5/- upwards.

RADIOGRAM Cabinets; 37/6 upwards

SPEAKER Cabinets; 4/6 upwards.

SEND Particulars of Your Requirements (giving size of set, etc.), or call and make your choice from our stocks of over 100 different types; from 3/6 to £4/10.

REFER to Previous Advts. for Detailed List of Bargains.

H. L. SMITH and Co., Ltd., 287-9, Edgware Rd., London, W.2. Tel.: Padd. 5891. [6052

DYNAMOS, ETC.

WIRELESS Generators, hand driven, type E10, 800v. 30 m.a., and 6v. smooth D.C., £5; type M.G.23, 1,100v. 25 m.a., smooth D.C., £4; by Evershed & Vignoles.—Urquhart, 371, Earlsfield Rd., London, S.W. [6186

LOUD-SPEAKERS.

27/6!!!—Brand new B.T.H.-R.K. speakers, 6v. field, suitable for P.A. work, etc.

£2/7/6!!!—B.T.H. speakers, as above, for 100-250v. A.C., complete with field rectifier.

MAGNAVOX D.C.152 (9in. cone), 22/6; Magnavox 154 (6¼in. cone), 16/3; all with hum-bucking coils, power or pentode transformers and 2,500 or 6,500-ohm fields; Magnavox P.M.254, 18/-.

ATTENTION to All Orders Within 24 Hours; carriage paid; cash with order or c.o.d.

WARD, 2nd Floor, 45, Farringdon St., London, E.C.4. Telephone; Holborn 9703. [5723

MAGNAVOX Dual Matched, "Magna" type, 2,500 ohms, 50/- pair; Blue Spot "R" Major chassis, 15/-.—Lee, 68, Clevelands Rd., Burnley. [6239

VAUXHALL.—Magnavox permanent magnets, universal, suitable for Class "B," power or pentode, 6in. cone, 15/6; 7in. cone, 17/6; 10in. cone, 23/-; mains energised, 2,500 or 6,500, 10in. cone, 23/-; 7in. cone, 15/3; brand new, with humbucking coils; state power or pentode transformer; unused manufacturers' stock; immediate delivery.—Vauxhall Utilities, 163a, Strand, W.C.2 (facing Bush House, S.E. Wing). Temple Bar 9338. [6233

VALVES.

ALL Types of Brand New American Valves in Stock; first-class makes, guaranteed.

247, 235, 551, 89, 18, 19, 46, 59, 6A7, 15, 42, 41, 38, 39, 78, 75, 57, 58, 224, 44, 36, 235, 83, 43, 12/-; 25Z5, 4/6; U.X.171A, U.X.199, U.X.280, U.X.245, U.X.226, U.Y.227, 7/6; U.X. 250, U.X.210, U.Z.281, 17/6; U.X.867 photocells, 25/-; various transmitting valves in stock; post paid; cash with order or c.o.d.

WARD, 2nd Floor, 45, Farringdon St., London, E.C.4. 'Phone: Holborn 9703. [5722

FREE.—List of American and non-ring valves.—Epton, 93, New Rd., Chingford, E.4. [6086

METROPOLITAN RADIO SERVICE Co. for Guaranteed American Valves; any type at keenest prices; terms to trade.—1021, Finchley Rd., Golders Green, N.W.11. Speedwell 3000. [0436

AMERICAN Valves, brand new, manufacturers' 90 days' guarantee, stock of bankrupt retailer, replacements for all U.S.A. Midget and other receivers, 27, 45, 7/- each; 2A5, 2A7, 2B7, 24, 35, 46, 47, 55, 56, 57, 58, 6A7, 6B7, 77, 78, 25Z5, 80, 43, 37, 11/- each; carriage paid; cash with order or c.o.d.—Degallier's, 4/21, Upper Marylebone St., London, W.1. Museum 7795. [6236

SURPLUS Valves.—All brand new; battery types, 2-volt, H.F.2, L.F.2, L.P.2, 1/9; super power, P.P.2, 2/6; screens and pentodes, 3/9; A.C. mains, 4-volt 1 amp., general purpose, 3/3; power, 4/-; screens and pentodes, 4/6; full wave rectifiers, 3/6; postage paid, cash with order, or c.o.d. over 10/-.—Clarion Radio Valve Co., 895, Tyburn Rd., Erdington, Birmingham. [6224

PREMIER SUPPLY STORES Announce the Purchase of the Complete Stock of a World Famous Continental valve manufacturer; all the following standard main types fully guaranteed, 4/6 each; H., H.L., L. power, medium, high, low mag., and variable mu screen grids, one, three and four Watt A.C. output, directly heated pentodes, 250v. 60 m.a. full wave rectifiers, D.C. types, 20v. 18 amp., filaments, screen grid H., H.L. power.

THE Following Types, 5/6 each: 350v. 120 m.a., full wave rectifier, 500v. 120 m.a. full wave rectifier, 2½ watt indirectly heated pentode.

THE Following American Types, 4/6: 250, 112, 171, 210, 245, 226, 47, 46, 24, 35, 51, 57, 58, 55.

PREMIER SUPPLY STORES, 20 and 22, High St., Clapham, S.W.4. [6242

COMPONENTS, ETC., FOR SALE.

R.

RYALL'S RADIO, 33, Chancery Lane, London, W.C.2 (nearest Tube, Chancery Lane; 'bus 67 passes door, or tram to Savoy St.). Holborn 3529. Open Saturday afternoon. Close 7 p.m., Saturday 5 p.m., Thursday closed 1 o'clock.

SET Repairs, any commercial or amateur built set serviced, at "trade" prices, British or American, satisfaction guaranteed.

RADIOPHONE Radiopaks, R.F. superhet, 117.5 K.C., 30/-; 110 K.C. ditto; B.P. superhet, 110 K.C., 30/-; all postage 1/3; Clydon dual thumb drive, 0.005, new, 7/6.

PAIR R.I. Class B Transformer and Choke, second-hand, 14/-; Lewcos frame aerial, 7/6; Rich and Bundy chokes, E154 25H. at 50 m.a., 90 ohms, 12/6.

GARRARD D/S Gramophone Motor, complete with unit plate, perfect, plays 3 12in. records, cost £3, 25/-; Varley EP24 transformer, 500/5000v., 3-4v. 5 amp. windings, new, 31/6.

FERRANTI Transformers, A.F.4, 7/6; A.F.3, 10/6; A.F.5, 18/6; A.F.7, 18/6; A.F.5c, 20/-; A.F.5cs, 22/6; O.P.M.1, 10/-; O.P.M.1c, 15/6; B1 choke, 10/6; O.P.M.16c, 15/6; O.P.M.11c, 16/6; A.F.7c, 21/6.

SIFAM 0-6v. Meter, 10/-; Weston 301 0-100 m.a., 20/-; Turner 0-100 m.a., with cut-out switch, 17/6; Weston 0-300 m.a., projecting, 20/-; Ferranti, 0-10 amps., 15/-; Weston 301, centre zero, bakelite cased, 20/-; 0-100 m.a., Sifam 0-300 m.a., 15/-; all otherwise moving coil and flush type.

R. [6232

1/6.—Cadmium plated chassis, 4-valve, pressed steel, 14×9; post 6d

2/9.—Plew A.V.C. units for battery receivers, prevents fading, list 10/-, brand new.—Kay, 167, City Rd., London, E.C.1. [6159

R·G·D introduce Two New Models of Exceptional Performance

Model 1203 "ALL WAVE" Radio Gramophone

These models represent the high-water mark of radio gramophone design and performance, and are de-luxe instruments in the highest sense of the word.

See them at Olympia, and you will agree that they are beyond compare. Hear them demonstrated, and you will realise that they stand in a class apart. For sheer beauty of reproduction they are unsurpassed, and worthily maintain the R.G.D. reputation as being "the Aristocrats of the Radio World."

★ **Model 1203 Auto, 13 valve ALL WAVE Radio Gramophone, operating on**

4 WAVE BANDS **15-30 metres, 30-60 metres, 195-550 metres, 750-2000 metres.**

WORLD-WIDE RECEPTION,
DUAL MATCHED SPEAKERS,
UNDISTORTED OUTPUT 6 WATTS.

The ideal instrument for world-wide reception from 15 to 2,000 metres. Reception of short wave stations is as simple as that of home stations, and the quality of reproduction is typically R.G.D. A new type Piezo Crystal Pick-up is incorporated, which gives amazing fidelity of gramophone reproduction. Automatic Record Changer.

ONE HUNDRED & THIRTY GUINEAS.

★ **Model 1202 Auto, with 3 stages of Selectivity, switch-controlled, and Triple Speakers** (response Flat from 70 to 10,000 c.p.s.)

A 12 Valve Superheterodyne Radio Gramophone.

The H.F. Circuits are controlled by a special switch giving 3 degrees of selectivity. This notable feature, in conjunction with twin moving coil speakers, and a special high frequency horn type speaker, gives an audio response approx., flat from 70 to 10,000 c.p.s. Thus the complete orchestral scale with the overtones so essential to perfect reproduction is rendered with remarkable fidelity.

The equipment includes Automatic Record Changer and new type Piezo Crystal Pick-up. The complete specifications of all R.G.D. instruments will be sent post free on request.

Model 1202 AUTO - 107 GNS. **Model 1202 Non-Auto - 100 GNS.**

The complete range comprises models from 50 to 130 GNS.

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Send complete literature dealing with the new 1935 Radio gramophones.

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The Wireless World

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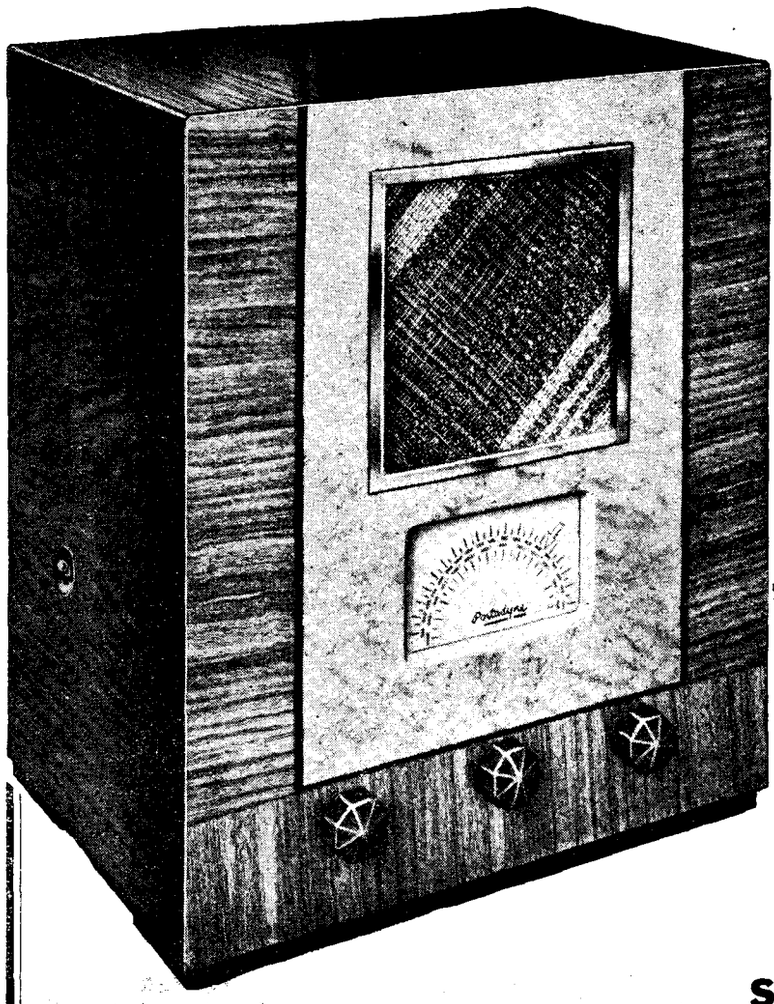
with

Complete Foreign Programmes

Friday, August 17th, 1934.

No. 781. Vol. XXXV. No. 7.



Four Super-Hets that give Super Performance!

Radio enthusiasts will be intensely interested in the specifications of the new "Portadyne" Super-Hets. These receivers embody all the latest ideas in Radio design. Come to Olympia and see them. You can examine a stripped chassis of each model at your leisure and obtain any information you may desire from our technical experts.

P.B.6 TRANSPORTABLE 6-Valve BATTERY SUPER-HET RECEIVER, using Frame Aerial.

CIRCUIT. Variable-Mu H.F. Pentode Signal-Frequency Amplifier preceding H.F. Pentode Frequency Changer—Band-Pass Intermediate Frequency Amplifier (H.F. Pentode)—Double Diode Triode Detector-Amplifier, R.C. coupled to Driver Stage—followed by latest Bias type "Class B" Out-put Valve.

SPECIAL FEATURES. 1,000 milli-watts undistorted output high quality permanent magnet Moving Coil Loud Speaker—Full Automatic Volume Control—Battery Economy Switch for local listening—Absolute 9 K.C. Selectivity—On-off Switch operated by the Volume Control Knob. This control also affects gramophone pick-up volume.

TUNING. Single control, full vision scale with exclusive projected light tuning device.

13½ gns.

or H.P. Terms: Deposit £1 12s. and 12 monthly payments of £1 4s. 6d.

H.T. CONSUMPTION. The standing H.T. current is as little as 6 m/a. when listening to the local station, rising to not more than 9 m/a. on distant stations.

THE OTHER MODELS ARE

P.A.6 Transportable 6-Valve Electric (A.C.) Super-Het. incorporating Frame Aerial.
14½ gns. or: Deposit £1 15s. 3d. and 12 monthly payments of £1 6s. 3d.

A.37 5-Valve Electric (A.C.) Super-Het. A triumph at such a moderate price.
12½ gns. or: Deposit £1 9s. and 12 monthly payments of £1 2s. 9d.

B.37 5-Valve Battery Super-Het. incorporating "Class B."
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SEE THESE SETS AT OLYMPIA
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Then ask your Dealer to demonstrate a "Portadyne." He will be pleased to do so, either in your own home or at his Showroom, without obligation on your part.

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Realism in Radio means

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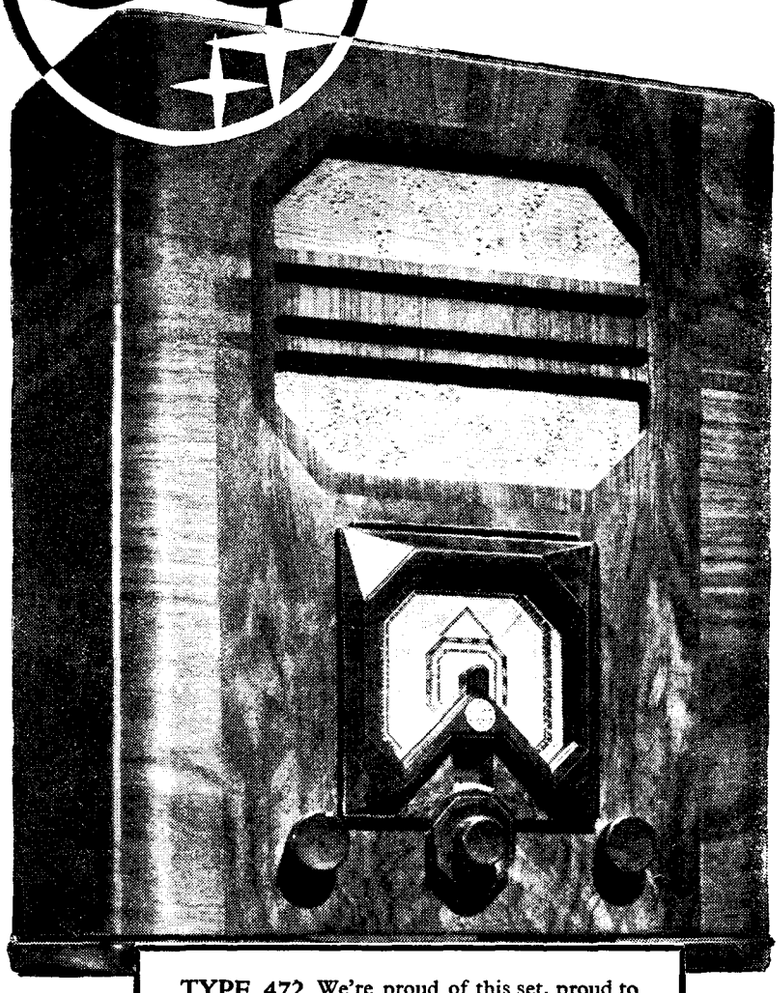
SUPER-HET RECEIVERS

PORTADYNE RADIO, PORTADYNE WORKS, GORST ROAD, NORTH ACTON, LONDON, N.W.10.

QUALITY never so high
PRICE never so low



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When you hear the deep rich tone and superlative musical quality of this brilliant new Philips, you will realise that here is radio-value never before attained.

For here is a receiver as perfect as engineering skill and designing genius can make it. It contains every feature known to science for creating complete, over-all performance — every feature refined to the *n*th degree by the world's largest and most experienced radio manufacturers.

If lower prices ever tempt you remember this: Philips quality and value have built Philips popularity — popularity which has made production so great and price so low that more people listen to Philips receivers than any other kind. A wide selection of sets to suit every need.

TYPE 472 We're proud of this set, proud to offer it to you for as little as 15 gns. It's a 6-valve Superinductance receiver, especially constructed for simple control and high selectivity. There are both A.C. and Universal A.C./D.C. models. It has a distinctly silent back-ground, no fading or whistling. When *you* hear this set you will *know* instantly that you are listening to a richness of tone refined to rare perfection.
PRICE 15 GNS. or on 12 equal monthly payments of £1.9.6.
472U. Universal model A.C./D.C. Mains. **PRICE 16 GNS.** or on 12 equal monthly payments of £1.11.0.

TYPE 588A. 6-valve superheterodyne receiver for A.C. mains only. **PRICE 12 GNS.** Or by 12 monthly payments of £1 . 3 . 6.

TYPE 588U. Same as 588A, but for either A.C. or D.C. mains. **PRICE 13 GNS.** Or by 12 monthly payments of £1 . 5 . 6.

TYPE 274A. 5-valve receiver for A.C. mains only. **PRICE 9 GNS.** Or by 12 monthly payments of 17/6d. each.

TYPE 372B. 6-valve superinductance receiver for battery operation. **PRICE 11 GNS.** Or by 12 monthly payments of £1 . 1 . 6 each.

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To Philips Lamps Ltd., 145 Charing Cross Road, W.C.2. Please send me a free copy of your interesting booklet, "Bringing Home the Radio Stars", which outlines in detail every wireless set in the Philips range.

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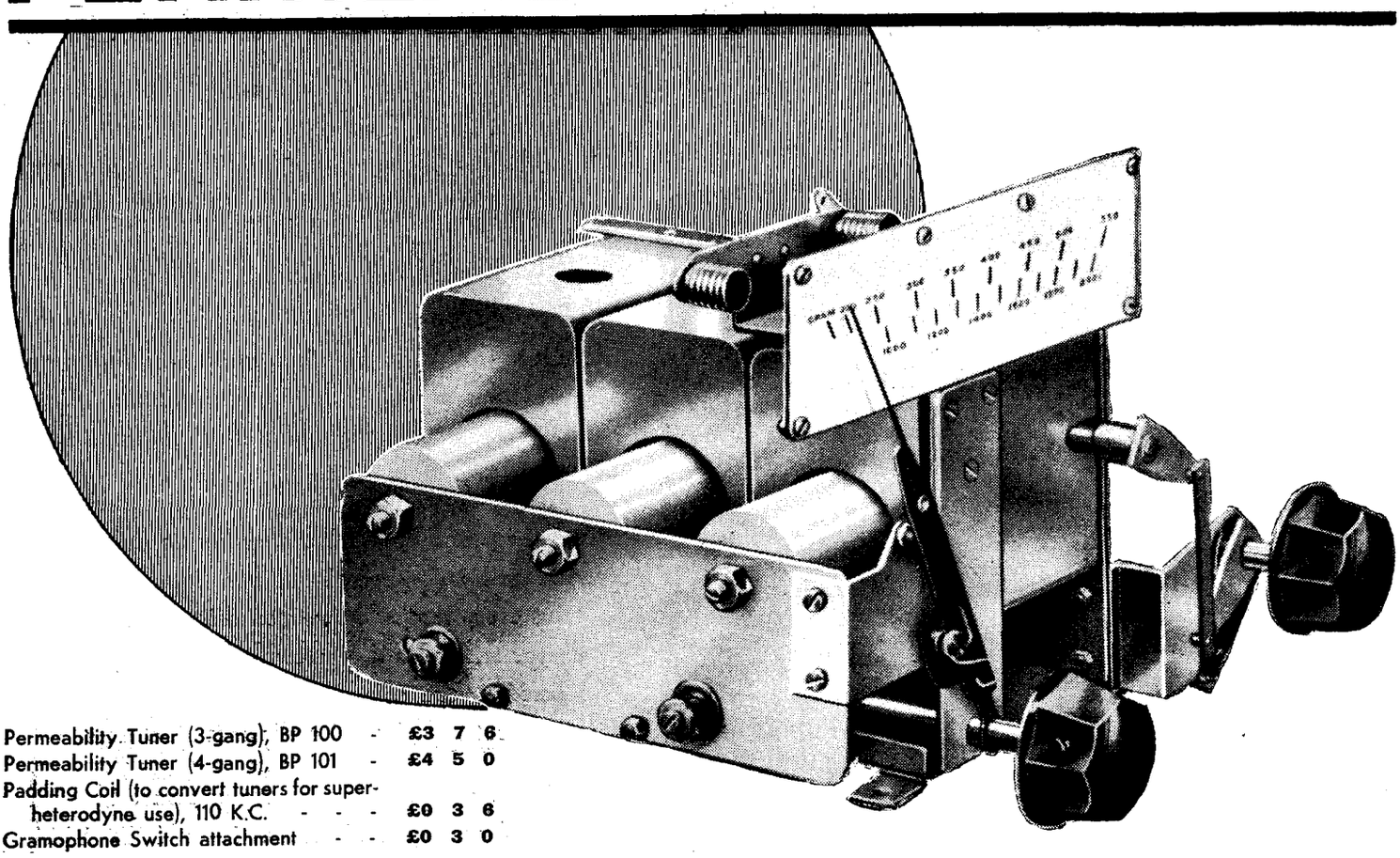
PERMEABILITY TUNER



Permeability Tuner (3-gang), BP 100 -	£3 7 6
Permeability Tuner (4-gang), BP 101 -	£4 5 0
Padding Coil (to convert tuners for super-heterodyne use), 110 K.C. - - -	£0 3 6
Gramophone Switch attachment - -	£0 3 0

Both selectivity and quality remain constant over the *whole* of *both* wavebands. ● The inductance of the coil is varied by sliding a powdered iron core into and around the coil ● It is the perfect tuning unit; making possible the design of a receiver giving good quality at all wavelengths—quality obtainable being limited only by station separation and reception conditions ● Both 3- and 4-gang units available. "3-gangs" can be used as a band-pass filter followed by single intervalve circuit, or as three single tuned circuits. "4-gangs" can be used as TWO band-pass filters or as band-pass filter and two single tuned circuits ● Perfect tracking of aerial circuit ● Initial matching of circuits is maintained.

Varley

PROPRIETORS:- OLIVER PELL CONTROL LTD.

FOREMOST AS PIONEERS

Advertisement of Varley (Oliver Pell Control, Ltd.), Bloomfield Road, Woolwich, S.E.18. *Telephone: Woolwich 2345*

Mention of "The Wireless World," when writing to advertisers, will ensure prompt attention.

Ferranti working overtime to meet the demand for a

20 GUINEA SET AT 15 GNS!

The Ferranti factory is now working at full capacity on the new 15 gn. Arcadia set! Which isn't really very surprising: because no other set at this price gives you so much for your money! Take a look at these "star" features.

High Note Uplift. After prolonged experiment Ferranti engineers have managed to produce purity of reproduction never before attained in a Superhet. Briefly, all intruding harmonics and noises are eliminated on the radio frequency side, and the higher frequencies are specially amplified on the audio frequency side; bass and treble are properly balanced. The resulting reproduction is a revelation in its purity and beauty of tone.

"All-in" Dial (shown on right). A wonderful visible control dial, which shows you everything you want to know. Station, volume and tone are all visibly indicated. Names of stations *and* wavelengths are shown on the dial.

Full Automatic Volume Control, which gives you an even degree of volume throughout the whole range of stations and prevents "fading" on foreign stations.

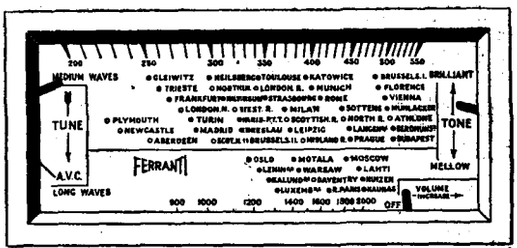
Electric Tuning, giving scientifically accurate tuning adjustment and, therefore, purity of reproduction.

Lovely Cabinet. Quilted Maple, Figured Walnut and Macassar Ebony . . . three rich woods of different colours and grains, make this new Ferranti Arcadia the most beautiful set ever produced at 15 gns.

The Ferranti Arcadia is offered to you not as a new and untried experiment, but as an established success. For here is a set that is already giving reliable radio entertainment to thousands of listeners all over the British Isles: and yet is as modern as the hour, having all the new features that are now the talk of Olympia—and one or two more, besides. There is everything to be said for buying a set that has been "out" for a few months: because any brand new mechanical production—however brilliantly designed and made—is almost certain to have a few preliminary teething troubles. If you buy a Ferranti Arcadia you will not be bothered or annoyed by any such trifling faults. For the new Arcadia has been well and truly put through its paces!

12 GUINEA SENSATION

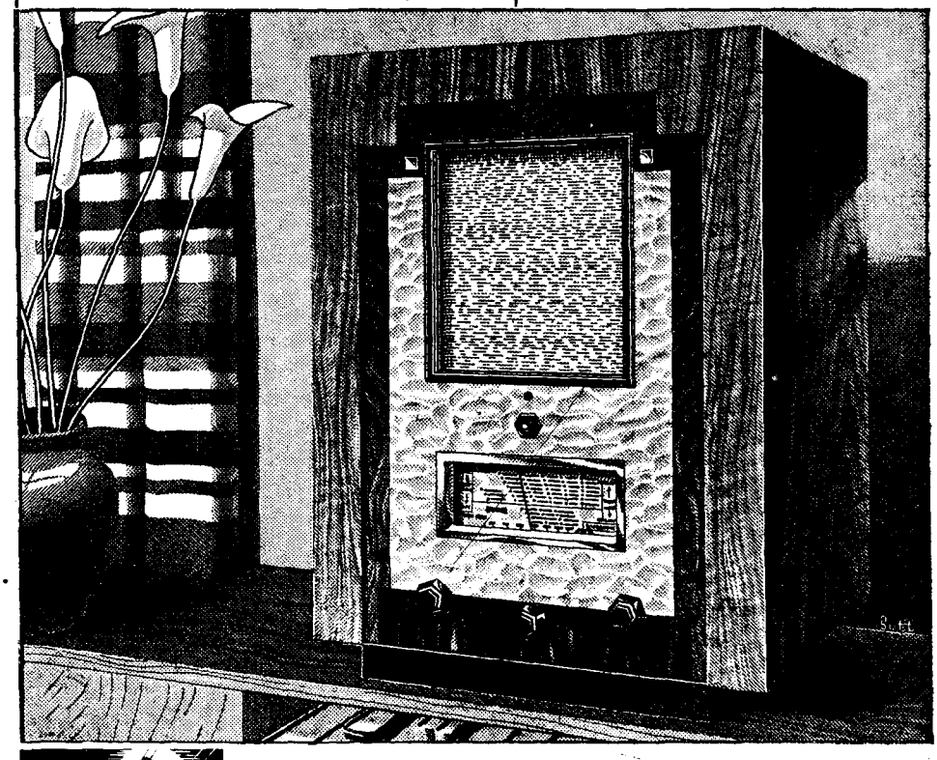
If you can't quite afford 15 gns., ask your dealer — or write to Ferranti — for details of the new Lancastria Superhet at 12 gns. This amazing set has most of the technical features of the Arcadia (except High Note Uplift) but the chassis is housed in a slightly smaller cabinet for the sake of economy.



The "DAILY TELEGRAPH" Radio Correspondent writes of the Ferranti "All-in" dial: "It is the car instrument board applied to radio. I had imagined that sound alone was sufficient guide to the working of a set, but in practice found myself instantly subservient to this new idea of watching the pointers."

The "NEWS CHRONICLE" Radio Correspondent writes:—"One glance at the dial, and you know exactly what the set is adjusted for without examining knobs and fiddling with switches."

SPECIFICATION 5-valve Superhet of advanced type for A.C. Mains. Highly sensitive, with 2½ watt Triode Output. High Note Uplift. Continuously variable tone control. Automatic volume control. Ferranti moving coil speaker. Floating chassis to obviate resonance. One knob tuning. 'All-in' dial, framed in chromium and brilliantly illuminated, showing station names and wavelengths, Electric Tuning, and visual indications of the waveband, degree of volume, and relative shade of tone. Mains aerial. Terminals for extra speaker. Cut-out switch for internal speaker. Lucerne selectivity on Lucerne station dial. Ferranti valves. Provision for gramophone pick-up. Large 3-tone cabinet with recessed panelling. Dimensions: 20½ in. high by 15½ in. wide by 9⅛ in. deep . . 15 gns., or 35/- deposit, and 12 monthly payments of 25/8d. Made throughout at Hollinwood, Lancs.



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To FERRANTI LTD. HOLLINWOOD, LANCS. or BUSH HOUSE, LONDON, W.C.2

Please send me full details of the Ferranti 1934 range:—

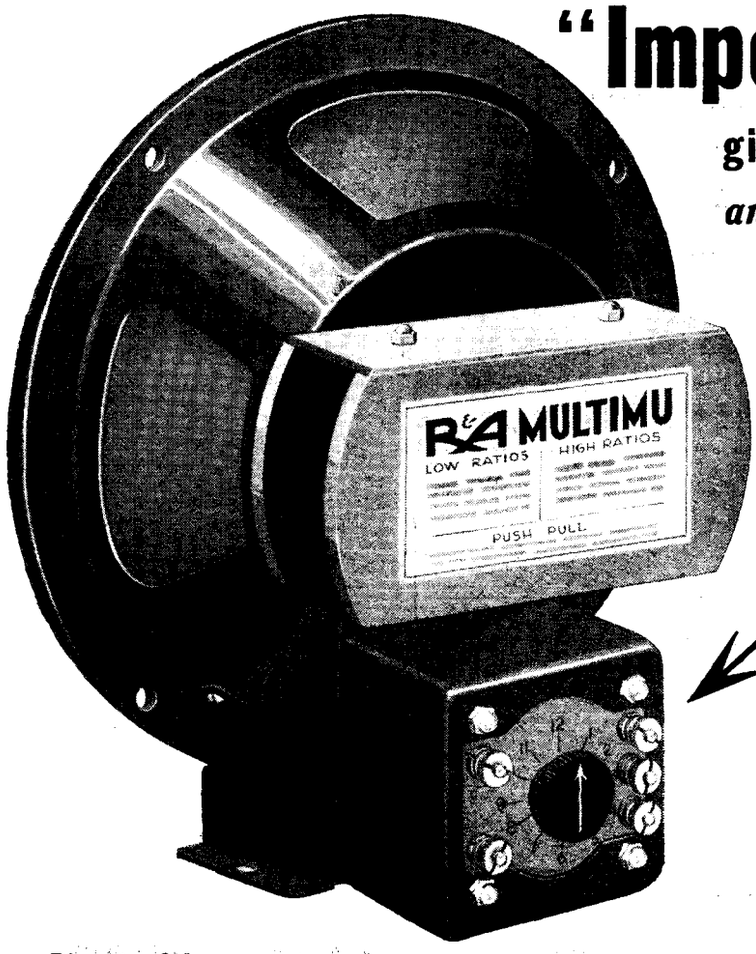
NAME

ADDRESS

W.W.

"Impedance Tuning"

gives instantaneous matching with *any* valve or circuit—1 to 40,000 ohms



The R&A BRITISH MADE

MULTIMU

P.M.M.C. REPRODUCER

solves the 'matching' problem

This instrument embodies the latest development in Moving Coil Reproducers—"Impedance Tuning"—a system which enables the reproducer to be instantaneously and permanently tuned as accurately to your receiver as your receiver is to the broadcast station, regardless of make or type of output. The tens of thousands of owners of R. & A. Reproducers who have expressed delight at the quality and sensitivity of previous models will be amazed at the astounding performance of the Multimu. The new magnet system incorporated in this instrument is so efficient that the sensitivity is even greater than many field excited electro dynamic models, giving an equal brilliance and attack in reproduction.

Diameter 8½"
Height 8¾"
Depth 4¼"

Maximum undistorted input, 4 watts A.C.

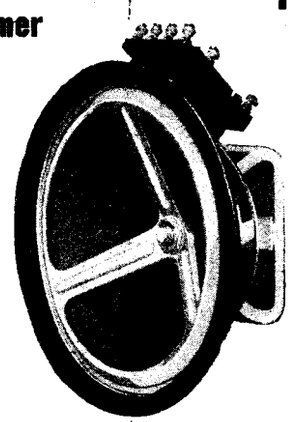
42/-

"ALPHA" has 58 ratio Super Transformer

This 10" Permanent Magnet Moving Coil Reproducer DE LUXE fitted with the new well-known and revolutionary principle of design and construction has been further improved by the fitting of a 58 ratio super transformer. This transformer is a modified form of the O.P. 58 giving 21 low ratios for extension purposes, 25 high ratios for triodes and pentodes and 12 ratios for pushpull, Class B., and Q.P.P. The super magnet fitted has a flux density of 9,000 lines per square centimetre in the gap and the instrument will handle with complete absence of distress inputs as high as 6 to 7 watts undistorted A.C.

Diameter 10½". Depth 5¼".

55/-



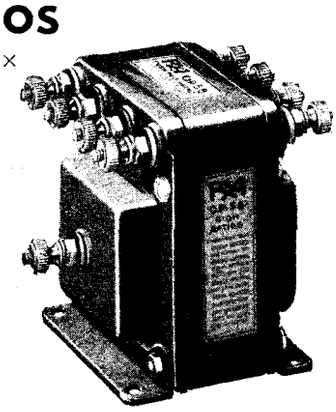
R&A "O.P.58" OUTPUT POWER TRANSFORMER for universal use.

An Output Power Transformer, specially designed for universal application, designed and produced at the request of technical experts.
Massively constructed and suitable for use with heavy currents. Completely shrouded and fitted with large terminals for connections. 58 ratios available as follows:—
21 ratios for low impedance matching from 1 to 3·85 up to 2.6 to 1.
25 ratios for high impedance matching from "15.5 to 1" up to "120 to 1."
12 ratios for pushpull matching from 30 to 1 to 120 to 1.

58 ratios

Dimensions 3¼" × 2¾" × 3¼"

18/6



R&A BRITISH MADE

OLYMPIA, STAND 53, or send a post card for full details of the 1935 models. Prices from 21/- to 55/-.

Britain's Foremost Reproducers

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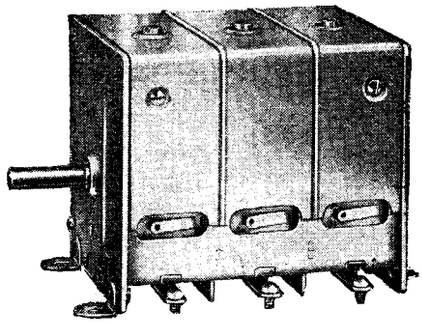
Mention of "The Wireless World," when writing to advertisers, will ensure prompt attention.

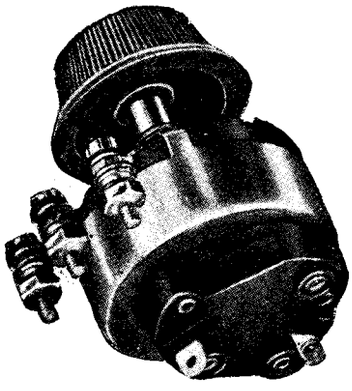
SOME of the POLAR and POLAR-N.S.F. PRODUCTS on STAND 87 RADIOLYMPIA



POLAR 'MIDGET' GANG CONDENSERS

Steel frame and cover. Ball bearing shaft. Small overall dimensions. Trimmers operated from top. Matched within ½% or 1 mfd. whichever is the greater.

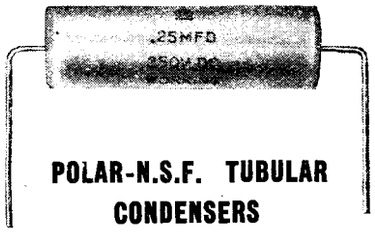
2 gang	11/-
3 gang	16/6
3 gang Superhet type	16/6



POLAR-N.S.F. VOLUME CONTROLS

Special carbon element. Noiseless in action. Insulated spindle with knob. Mechanically sound throughout.

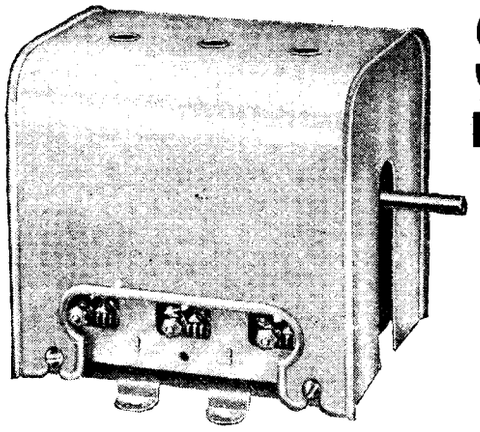
	with switch	without switch
5,000, 10,000, 50,000, 100,000 ohms. ¼, ½ and 1 megohm.	6/-	5/6



POLAR-N.S.F. TUBULAR CONDENSERS

NON-INDUCTIVE. High grade paper di-electric. Low P.F. Wire ends. Tested at 1,500v. D.C. Working 350v. D.C.

from .0001 to .5 mfd. from **1/-** each.



POLAR 'MINOR' GANG CONDENSERS

Steel frame and Cover. Brass rotor shaft. Trimmers operated from top. Matched to within ½% or 1 mmfd. whichever is the greater.

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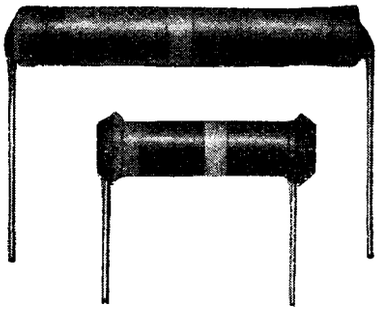
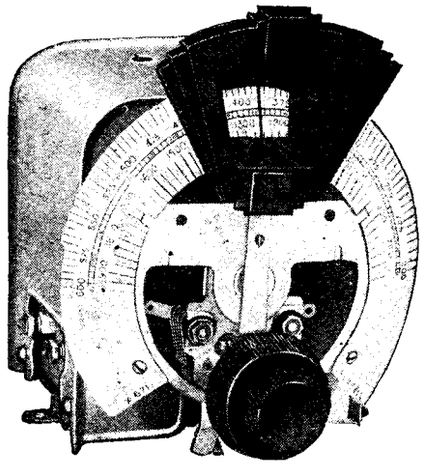
3 gang	18/9
3 gang Superhet	18/9
4 gang	25/-
4 gang Superhet	25/-



POLAR-N.S.F. RESISTORS and GRID LEAKS

Constant and noiseless in operation. Wire ends. Standard R.M.A. Colour Code. Made in values from 100 to 250,000 ohms.

RESISTORS—1 watt 1/-, 2 watt 2-/-, 3 watt 3/-.
GRID LEAKS—.1, .25, .5, 1, 2, 3, 4, 5 megohms 1/- each.



POLAR 'UNIKNOB' TWO GANG

Steel frame. Air di-electric trimmer across front section controlled by knob situated concentrically with tuning knob.

2×.0005 .. .. **18/6**

Fitted with 'Uniknob Arcuate,' 'Uniknob Horizontal' or 'Uniknob Semicircular' drive .. 1/3 extra.

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Only the highest quality materials used. Low P.F. Constant capacity. Low leakage current. Max. peak voltage 500v. D.C.

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6 mfd.	5/-
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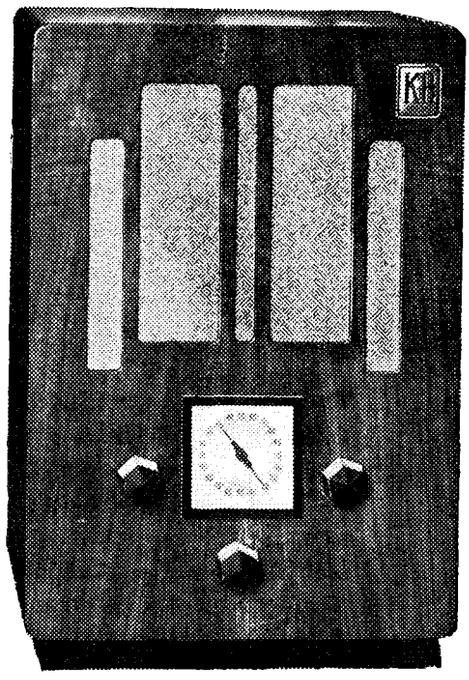
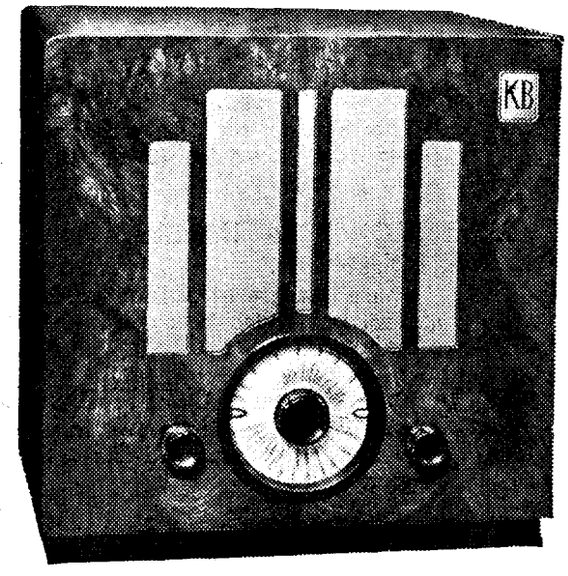
CA 5105

2 new KB SUCCESSES!





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3 VALVES. MOVING COIL SPEAKER

£5·15 OR 10/- A MONTH

Here's one of the high-lights of the show! Do you remember the original K B 'Pup'? More than 200,000 listeners have owned one. Now comes its successor—the 'New Pup' of 1935. We have aimed wholly and solely at giving the most and the best that we can for the money—really satisfying reception, and handsome cabinets.

The 'New Pup' brings in a good range of British and Continental stations with fine volume and pure tone. It has full-vision dial with names of principal stations. Four aerial tappings provide alternative selectivity.

You must *see* this set for yourself, hear it, compare it. Then we believe you'll agree the value is unique.

KB 'New Pup' 3-valve Battery model. Oak cabinet. **£5.15** *or first payment of 12/- (including 2/- insurance) and 12 monthly payments of 10/-*

K.B. 'NEW PUP' 3-valve A.C. model £6-17-6 FINE WALNUT FINISHED CABINET

or first payment of 14/- (including 2/- insurance) and 12 monthly payments of 12/-

KB RADIO from £5·15 to 65 guineas

See all the new **KB** *models at* **STAND 84**
RADIOLYMPIA

KB '381' SUPERHET

With delayed automatic volume control

5 VALVES. A.C. or D.C.

£10·10 OR 18/- A MONTH

Are you looking for radio that will bring you—*and go on bringing you* —first class entertainment *without trouble?* Here it is. Never has a receiver undergone such searching tests as this new superhet. It was 'taken for a ride' all over England, and stood up to the severest trials. It can never meet, in normal use, demands it has not already met.

The '381' is a clean, clever job. Every component has earned its place. Every essential is there. We wanted extra robust valves, and had them made specially. We wanted high selectivity—and you'll find we got it. Now 18 months' hard work is done, and the sets are ready for you to hear and compare.

The '381' has five valves, including rectifier. Operates on any A.C. or D.C. supply, 200-250 volts. Full vision dial marked with station names and wavelengths. Designed for K B Rejectostat System. Handsome walnut cabinet.

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Address ..... W.W.17/8/34.

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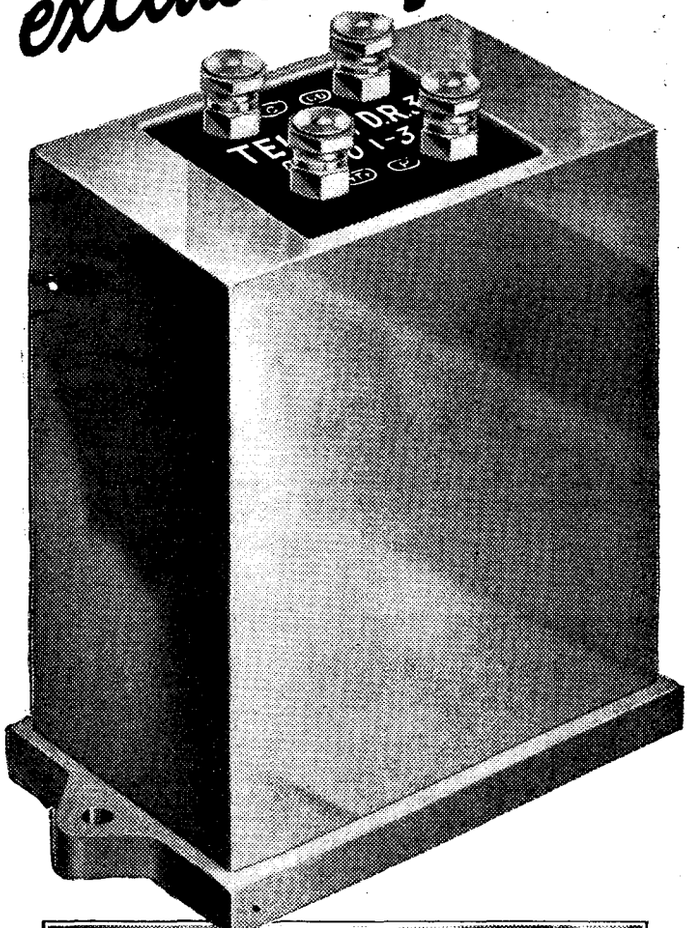
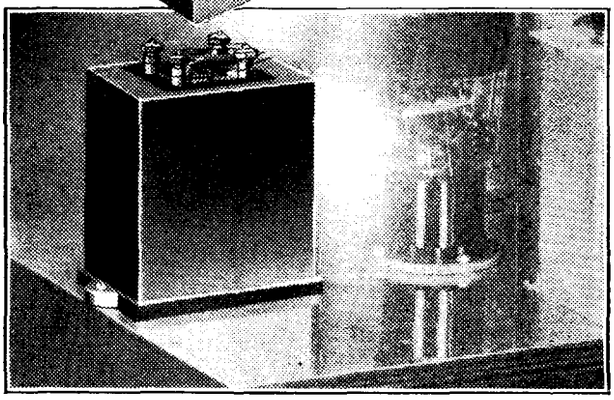
D.R.3 L.F. TRANSFORMER

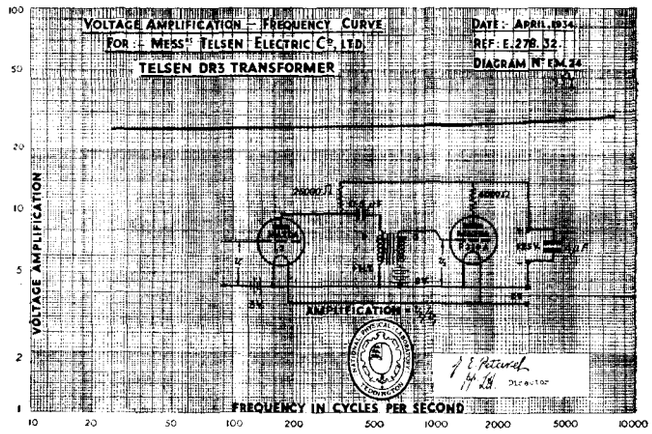
exclusively specified FOR THE 'WIRELESS WORLD'

Olympic S.S.Six





Close-up of section of the "Olympic S.S.Six" showing position occupied by the Telsen D.R.3 Transformer.



THE L.F. TRANSFORMER WITH A STRAIGHT-LINE CHARACTERISTIC

THE remarkable performance of the Telsen D.R. transformer is the result of entirely new principles of design and construction, formulated by Telsen technicians after intensive research extending over a considerable period. Not only does it provide a characteristic which reveals a new high-level of performance—as indicated by the National Physical Laboratory curve shown above—but, by means of spaced layer windings impregnated with a non-hygroscopic material of very low specific inductive capacity, it absolutely eliminates the possibility of shorted turns or breakdowns due to large magnetic surges. Its high efficiency is *permanent*. D.R.3. (Ratio 3-1) D.R.5. (Ratio 5-1) **8/6**

THE NEW TELSEN G.S.4 TRANSFORMER

The same advanced principles which resulted in the development of the Telsen D.R. Transformers, have also been applied to directly-fed types, resulting in the Telsen G.S.4 Transformers. A silicon steel alloy core ensures an extremely high inductance without saturation when the primary is passing the normal anode current of detector valves. Can be connected directly into the anode circuit—max. D.C. primary current 5 m.a. Primary Inductance 120H. at o.D.C. Ratio 1-4. W.457 **12/6**

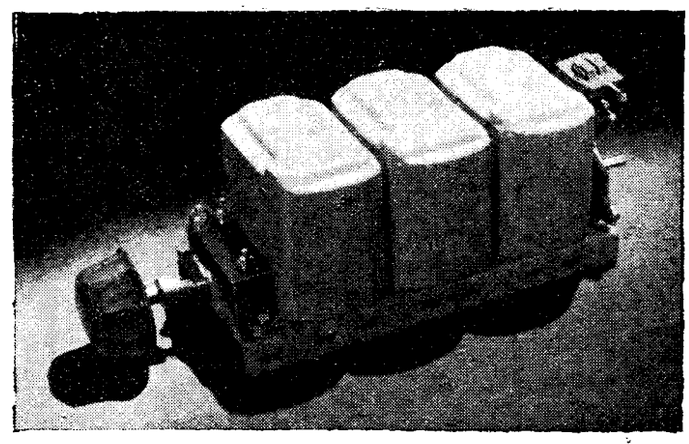
ALWAYS INSIST ON TELSEN TRIPLE-TESTED GUARANTEED COMPONENTS

Announcement by THE TELSEN ELECTRIC COMPANY LIMITED, ASTON, BIRMINGHAM

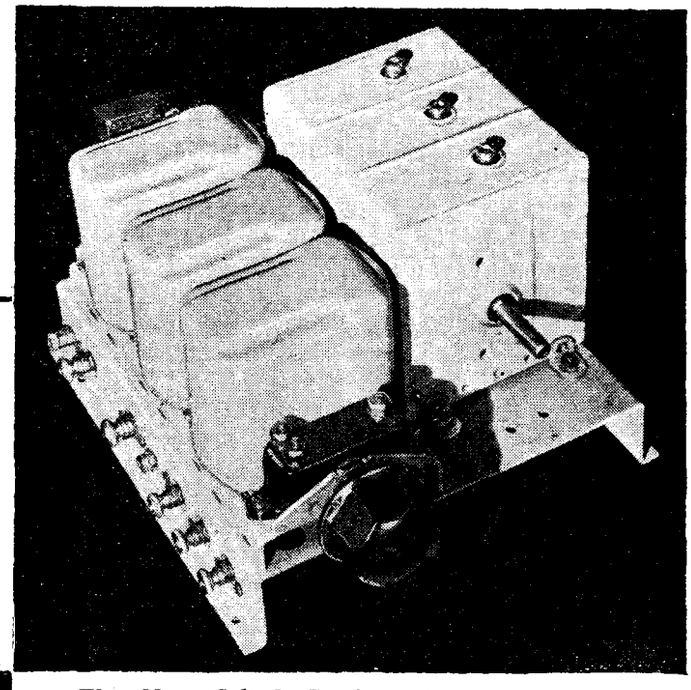
Olympia's finest components are on Stand 38

Year in, year out, Colvern are constantly experimenting and conducting researches so that their products will keep ever ahead and provide the maximum possible results. And now—the new Colvern components are here—even further advanced in efficiency, precision and design! These improved components will set an entirely new standard in reception—only by fitting them in your set can you be assured of the most brilliant results possible. Do not fail to visit the Colvern Stand at Olympia—No. 38.

Made under licence from patentee, Hans Vogt.



The latest type Ferrocart coils, with greater efficiency and more advanced design. Each **12/6**



The New Colpak Tuning Unit incorporating Ferrocart coils. Price complete **57/6**

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free BLUEPRINTS OF SPLENDID SPECIALLY DESIGNED "UP TO THE MINUTE" SETS.

To COLVERN Ltd., Romford, Essex. Please send me full details and Blueprint of the COLPAK CLASS B A.C. MAINS SET ★

★ *Strike out name of blueprint not required*

Stamps value 3d. to cover postage are enclosed

NAME.....

ADDRESS.....

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The Wireless World

THE PRACTICAL RADIO JOURNAL

24th Year of Publication

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CONTENTS

EDITORIAL COMMENT

Wireless and Electricity Supply

Popularity of A.C.-D.C. Sets

THE advantages of mains operation of wireless sets are being more and more widely recognised. This year's Radio Show at Olympia is more than ever a mains-set exhibition, the battery set being no longer popular, except when the owner is unfortunate enough to be without an electric supply.

Most certainly wireless has benefited the electrical industry and the suppliers of electricity in particular, not so much because the wireless set uses electricity, but indirectly, because wireless is to-day so popular that houses without electricity are no longer attractive. The electrical industry collectively attaches much importance to wireless, because it provides an added inducement to the public to become electrically minded.

This year the manufacturers of wireless sets have met the demand for universal A.C.—D.C. receivers, so helping to solve one of the problems of the electricity supplier. Hitherto, with no choice other than a D.C. set for D.C. mains, the public have had to be compensated by the supply authorities when a change in the supply to A.C. was made. Now that universal sets are available, this difficulty may be expected to disappear, because in purchasing new sets in a D.C. area the public will be disposed to select A.C.—D.C. sets which will serve them equally well either in another locality or when the supply is changed. In this way, compensation will be necessary only for old sets installed at an earlier date.

The question of the installation of universal sets, by the way, has not been properly covered by the Institution of Electrical Engineers in their Wiring Rules, now known as the Regulations for the Electrical Equipment of Buildings. It should be noted that great attention is paid to these rules by fire-insurance companies, and yet the case of A.C.—D.C. universal sets is not dealt with in these regulations. Some addition is necessary to bring them into line and to avoid controversy at a later date, and, incidentally, to set at rest any anxiety felt by users of these sets as to their position in respect of their fire policies.

Set Testing Equipment

Welcome Signs at Olympia

A VERY welcome indication of the growing recognition of the need for competent servicing of wireless sets is in evidence at Olympia this year. Set testing and servicing equipment is being shown on several stands, whereas a year or so ago one could have searched Olympia in vain for any apparatus of this kind.

An enormous proportion of the mishandling of wireless sets which require service has been due to insufficient technical knowledge and the absence of proper testing apparatus. Now, with such apparatus available, there should no longer be any excuse for bad service, nor for heavy bills for replacements of valves and other components because the actual fault has not been diagnosed, Incidentally, delays should be avoided, because there will be no necessity to return sets to the manufacturers for the repair of trivial defects which a properly equipped service engineer should be able to locate and correct on the spot.

OLYMPIA 1934

GUIDE TO THE SHOW

Classified Review of Outstanding Exhibits

ONE of the most encouraging and commendable features of this year's Show is the marked tendency to cater for those whose tastes and requirements are not entirely satisfied by standard broadcast receivers. This adds greatly to the attractions of the Exhibition, and every visitor, from the merest novice to the experienced enthusiast, will find something to interest him. The tendency to concentrate on quality of reproduction is especially gratifying, and high-quality amplifiers, and particularly loud speakers, are more prominent than in previous years.

In the components section, interest will be mainly concentrated on tuning apparatus, such as improved iron-cored coils and variable condensers, while the new testing equipment and measuring instruments show that much important work has been done in devising means for the scientific analysis of receiver performance and fault tracing.

This "Guide to the Show" has been arranged in such a way as to make it particularly useful to the visitor with limited time at his disposal. The simpler and less expensive standard sets, the more ambitious multi-valve receivers, short-wave and special-purpose apparatus, are all treated under appropriate headings, while other sections are devoted to components, accessories, and loud speakers.

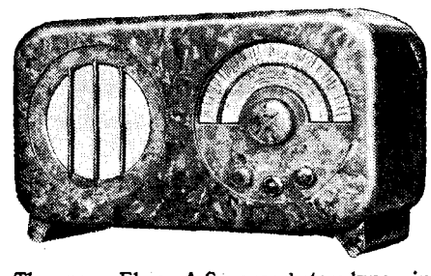
Next week's issue will contain a detailed report, prepared by the technical staff of "The Wireless World" after actual inspection, on the more important exhibits on every stand.

GENERAL-PURPOSE RECEIVERS

JUDGING by the fact that the majority of manufacturers are staging a four-valve (plus rectifier) A.C. superheterodyne as their principal exhibit at Olympia, it seems certain that the majority who go there to choose a new set are expected to decide on one of that type. It will, therefore, be convenient to set an admittedly quite arbitrary limit of four valves for general-purpose receivers, although the day is fast approaching—if it has not already arrived—when we must abandon our old habit of classifying a receiver by the number of valves included in it. Why, for example, should a set move up to a higher class merely because the designer prefers to use a separate diode valve for rectification instead of the more usual multiple diode which performs other functions as well?

Although the typical small superheterodyne has a total of four receiving valves, some designers have been able to achieve remarkable results with even fewer; for example, as readers of our recent review of the Ferranti Lancastria Superhet will remember, an exceptional degree of selectivity is attained in that set with only three valves. The Ekco Universal Superheterodyne receiver, which will be described later, is another example which employs the same number of valves; the second detector, which is a diode, is combined with the output pentode in both these receivers.

In the popular class of four-valve superheterodynes there is naturally much diversity of design. The cheapest models include comparatively little in the way of modern refinements, but there are many other sets with elaborations, amongst which may be mentioned the Marconiphone, H.M.V., and C.A.C. models. The two first-mentioned manufacturers also produce simpler sets. The C.A.C. receiver has the unusual feature, almost unique in its class, of twin loud speakers and a special circuit arrangement which helps to overcome the distortion normally produced by slightly inaccurate tuning, and is, therefore, likely to give better results than usual in unskilled hands. In the McMichael receiver iron-cored tuning coils and tone correction are features of the design.



The new Ekco A.C. superheterodyne, in bakelite cabinet.

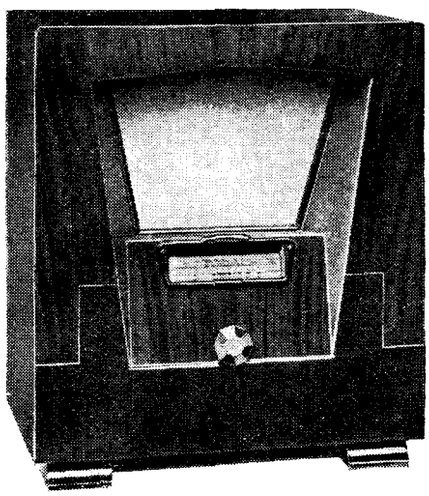
So far as the A.C. mains-operated receivers are concerned, almost all the sets employ standard valves, but a very interesting departure from conventional practice is to be found in the G.E.C. Superhet A.V.C. Five, which, though designed for A.C., employs universal valves of the 13-volt 0.3 amp. type. The heating elements of these valves are connected in parallel. Examples of what is nowadays called "functionalism" in external design are to be seen in a number of sets, but few will provoke more controversy than the new Ekco productions; the Model 85 four-valve superhet, with which we are here concerned, is housed in a moulded bakelite cabinet of plain design, and appears to be very well proportioned. The tuning dial is abnormally clear, but the art of the designer is shown by the fact that

Olympia 1934—

it does not look unsightly. Another set in which exceptional pains have been taken in the design of the tuning scale is the Clarke Atlas small superhet for A.C. mains.

The H.M.V. Superhet 440 and the Edge Radio (Drummer) model are amongst the considerable number fitted with the valuable feature of variable tone control, while the Cossor set includes the neon lamp tuning indicator recently developed by its manufacturers. Other small superheterodynes are also exhibited by Aerodyne, Climax, Bush Radio, Regentone, etc.

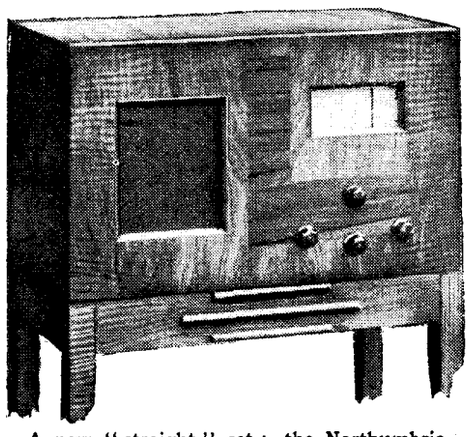
All those who are supplied with D.C. current, and those whose future movements are uncertain, will be interested in investigating the claims of universal A.C.-D.C. mains receivers, which operate interchangeably on either form of supply. Original difficulties in the design of this type of set have now



The Regentone A.C. superheterodyne.

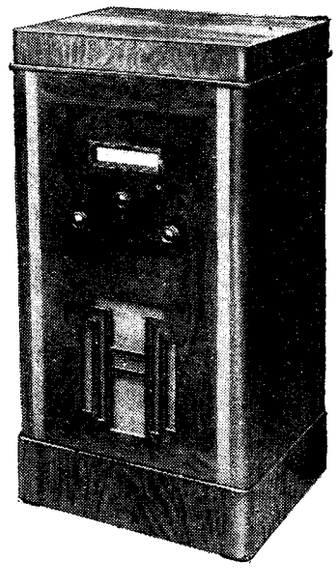
been overcome, and an extremely satisfying performance, even in the matter of power output—which is the sole remaining limitation—is now offered. The power output naturally depends to some extent on the mains voltage, but, thanks to improvement in valve technique, satisfactory volume is obtainable in all normal circumstances.

As in the case of sets designed for A.C., the small superheterodyne is again an extremely popular circuit arrangement; in the K.-B. model, for example, it is combined with a built-in anti-interference filter, which should ensure a quiet background even when the set is connected to "noisy" mains. Provision is also made for the fitting of matching transformers used in connection with a screened aerial down-lead system.



A new "straight" set: the Northumbria Five-Six.

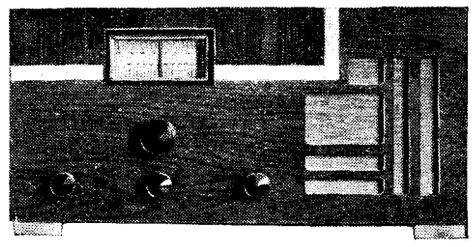
In the Halcyon universal superhet is to be found an interesting A.V.C. system as well as a three-point adjustable tone control. Probably the only three-valve universal superhet is the Ekco model, of which the circular moulded bakelite case strikes an even more revolutionary note than does the



The Lampex Universal A.C.-D.C. radio-gramophone.

cabinet of its A.C. mains counterpart. The Sunbeam midget universal is unique with regard to its extreme compactness; the same firm also shows a universal superheterodyne of more normal dimensions.

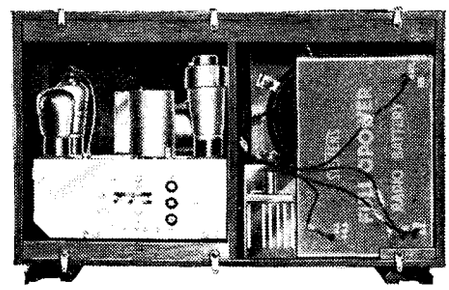
Although there are so many universal superheterodynes, the "straight" H.F.-det.-L.F. circuit is widely favoured for its special purpose—even more so than for A.C. mains receivers. Straight circuits are embodied in the productions of Telsen, Consolidated, Ace, etc.



The Edge battery superheterodyne.

Reverting to the subject of A.C. mains receivers, it is clear that those who prefer straight circuits are still well catered for, in spite of the trend towards superheterodynes. Apart from questions of personal preference, of course, financial considerations must also be taken into account; generally speaking, these receivers cost two or three pounds less than a four-valve superheterodyne. Among the makers catering for this demand are Lissen, Cossor, Telsen, Aerodyne, and Ace.

There are still a number of excellent and technically interesting multi-stage straight receivers which are discussed under their appropriate headings. There is also the Northumbria Five-Six model for A.C. mains, which embodies four pentode valves with iron-cored tuning coils in a "2 H.F." circuit. In spite of the fact that a fifth valve in the form of a separate diode is employed for detection and A.V.C. purposes, the

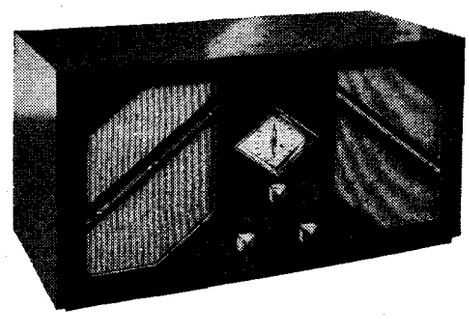


Mullard's first complete receiver.

receiver may be included in our present category of four-valve sets.

A few years ago battery users had justification for complaining that they were always neglected at the Olympia Show. A feature of last year's Exhibition was a decided change of attitude in this respect, and now even more attention has been devoted to the production of up-to-date battery sets, which include all the latest technical developments, and offer an amazingly good performance for an average anode current consumption which in most cases does not exceed 10 milliamps.

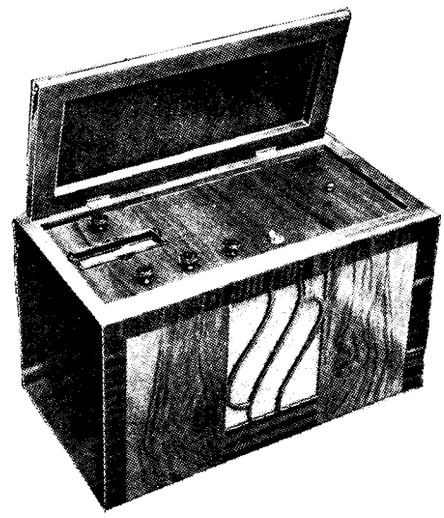
Starting at the bottom end of the scale, we have a class of extremely simple and low-priced detector-L.F. three-valve sets, which



Burgoyne Class "B" de Luxe.

are plainly intended to satisfy the comparatively modest requirements of those who do not expect a high degree of selectivity or a wide choice of programmes. The outstanding advantages of these sets are clearly economy in first cost and upkeep, as well as probable freedom from "service" troubles. Examples are shown by K.-B., G.E.C., Burton, Orr Radio, Burgoyne, Lampex, and Aerodyne.

It is probably true to say that the straight H.F.-det.-L.F. three-valve circuit now finds



Milnes battery superheterodyne.

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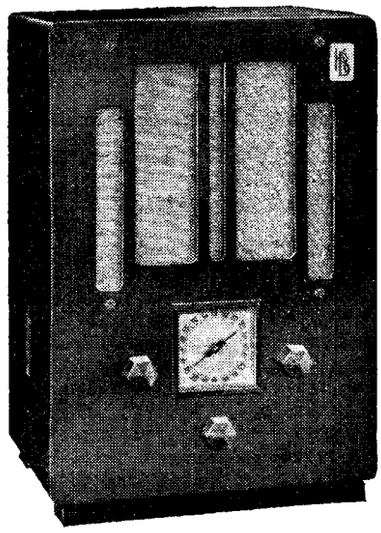
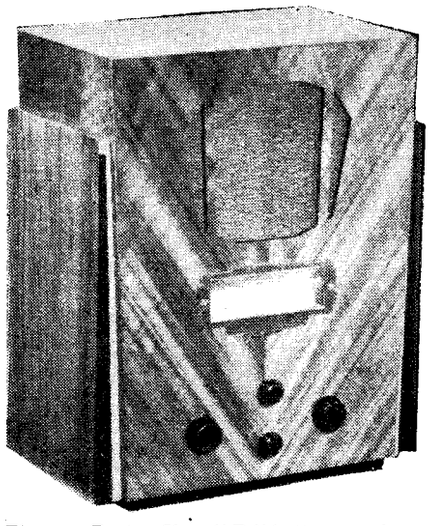
its most important application in battery sets, and many interesting examples of this ever-popular general-purpose arrangement are to be seen. The entry of the well-known valve manufacturing firm of Mullard into the receiver market will be noted with special interest; the first production of this com-



Kolster-Brandes 3-valve battery set.

pany is in the form of an H.F.-det.-L.F. battery set with three pentodes, which perform the functions of H.F. amplification, detection, and output. The use of a pentode detector is especially interesting; this type of valve does not impose heavy damping on the preceding tuned circuit, and this fact, coupled with the use of a tapped grid coil, has enabled the designer to dispense with the complication of reaction. Litz-wound high-efficiency coils are employed in the two tuned circuits. The set is housed in a horizontal cabinet, as is the new H.M.V. Long Three, another example of a similar circuit arrangement. The Cossor set in this category has iron-cored tuning coils.



The new Burton Class "B" battery receiver.

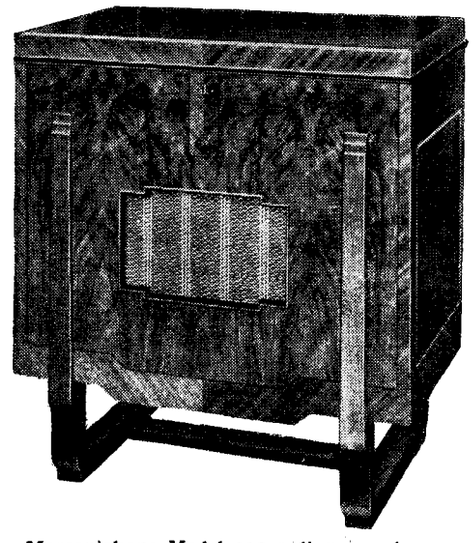
Generally speaking, the more expensive three-valve battery receivers include band-pass tuning in the aerial input circuit, while the simpler ones are of the two-circuit type. Many manufacturers offer the choice of either arrangement, and similarly with regard to battery economy devices, the same set is often available with optional pentode output or either Class "B" or Q.P.P. Sets under this general classification are shown by Lissen, Alba, Climax, Beethoven, etc. Burton is specialising in battery sets, both with and without Class "B" amplification.

There are a number of small battery superheterodynes, comparable in every way with their A.C. counterparts, but, as a rule, including an extra valve, and so they are being dealt with in this forecast as multi-valve receivers. But there is at least one four-valve battery superheterodyne; this is the Edge Model 44, with a heptode frequency changer, a variable-mu H.F. pentode as an I.F. amplifier, a double diode triode for detection and A.V.C., and Q.P.P. output. There is even a three-valve battery superhet—the Bush Radio model in which a Westector performs the funtions of detector, AVC device, and current economiser.

A new and interesting attempt to solve the battery user's problem is exemplified in the Milnes superheterodyne, which is fitted with the nickel-iron H.T. accumulators for which its makers are well known. Matters are so arranged that the H.T. battery is charged from the L.T. accumulator by operation of a switch.

MULTI-STAGE SETS

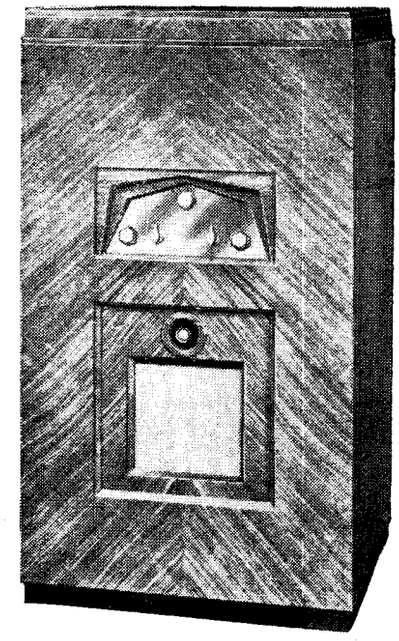
THE popularity of the superheterodyne has been amply demonstrated at previous Exhibitions, but in the past there has always been a goodly number of straight sets on view. This year, however, the



Marconiphone Model 292 radiogramophone.

superheterodyne will be practically universal and few makers will be showing straight sets. This does not necessarily mean an increase in the uniformity of the products of different firms, however, for the superheterodyne probably offers more scope than the straight set for individuality in design. The largest set on view, however, is of the straight type with no less than seventeen valves, but the superheterodynes range from about three to twelve valves, and between these extremes lies a bewildering variety.

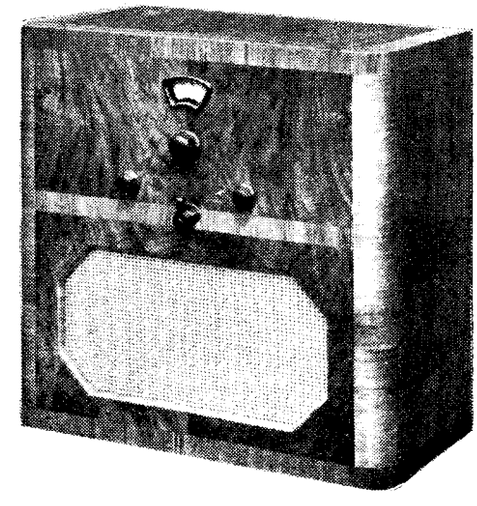
In the Marconiphone range of receivers will be found the Model 292 radiogramophone. This is an eight-valve receiver in which an H.F. stage is included and preceded by a band-pass filter. A heptode frequency-changer is used, and there are two I.F. stages feeding a duo-diode-triode for detection and L.F. amplification. A separate duo-diode-triode is fitted for A.V.C. purposes, and the output stage is of the push-pull type with triode valves and capable of an output of some 5 watts. Of particular interest are the inclusion of Q.A.V.C. and an auto-compensated volume



The R.G.D. gramophone amplifier.

control, this latter being arranged so that the quality of reproduction remains aurally unaffected by the volume level. Last, but not least, variable selectivity is included, and it is possible at will to change the band-width from 6 kc/s to 12 kc/s.

Radio Gramophone Development Co. will be showing a wide range of large receivers, among which pride of place must be given to the Model 1202 twelve-valve receiver. The Model 703, however, although provided with only seven valves, is not without interest, for it includes variable selectivity. Three signal-frequency circuits are used, and there are four tuned circuits in the I.F. amplifier. The selectivity is controlled by varying the constants of these circuits, and the cut-off frequency can be set at will to 3,000, 4,000 or 7,000 cycles. A.V.C. is included



McMichael twin-speaker superheterodyne.

and the L.F. circuits are resistance-coupled, while the triode output valve can deliver 3 watts to the dual loud speakers.

Philips are newcomers to the field of the superheterodyne, and have hitherto made

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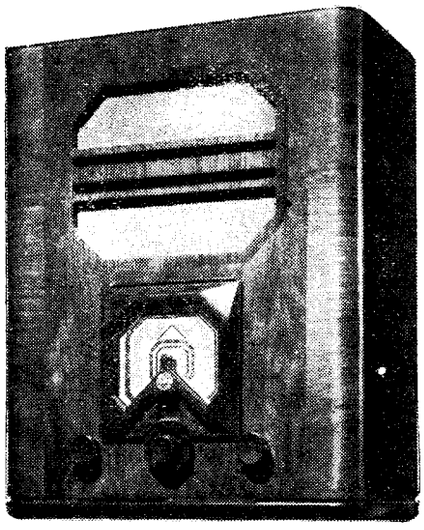
only straight sets. This year they will be showing both. The Model 588-A is a superheterodyne including seven tuned circuits. An octode frequency-changer is used, and there is an H.F. pentode in the single I.F. stage. The detector is a diode, and pentodes are employed not only for the output stage but also for the L.F. amplifier. A.V.C. is included, and the set is designed for A.C. operation at any supply voltage from 100 volts to 260 volts. It is priced at 12 guineas.

A straight set shown by the same firm costs 11 guineas. This is the Model 372-B, and it is a battery set. There are two H.F. stages and a diode detector, while a screen-grid valve is used as the first stage L.F. amplifier, and is resistance-coupled to the driver valve which, in turn, feeds the Class "B" output valve through a transformer.

The Kolster-Brandes battery superheterodyne also has a Class "B" output stage rated for 2 watts output. H.F. pentodes are used in the signal-frequency amplifier, the frequency-changer, and the I.F. circuits,



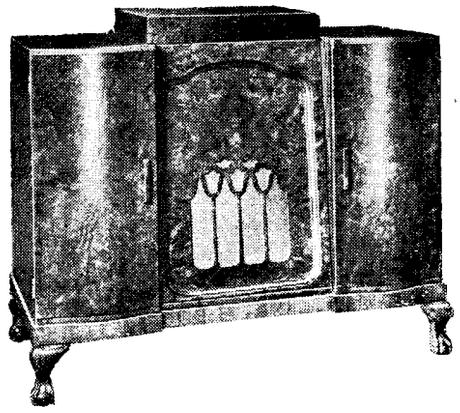
Philips A.C. Superinductance receiver.

while a duo-diode-triode provides detection, L.F. amplification, and delayed A.V.C. This receiver is fitted with variable selectivity, as is also the Model 383, a six-valve Universal mains set, which includes such refinements as Q.A.V.C. and a neon tuning indicator.

Portable receivers have improved enormously since the days when the term portable was synonymous with poor quality of reproduction. A portable need no longer labour under such disapprobation, however, and modern examples are capable of a very high standard of performance. Marconiphone will be showing a six-valve model of the superheterodyne type in which both signal and intermediate frequency amplification are included. The frequency-changer is a detector-oscillator, and the triode detector feeds a Q.P.P. output stage giving an output of 1,250 milliwatts to the moving-coil loud speaker. A.V.C. is obtained with the aid of a metal rectifier, and the H.T. current consumption is only some 8 mA.

The same firm will also have a transportable set for A.C. operation with a built-in frame aerial. The arrangement of valves is similar to that in the battery set, but a duo-diode-triode is used to provide detection, L.F. amplification, and delayed A.V.C., while the output valve is a pentode rated for 2 watts output.

The well-known firm of Ekco will have an interesting receiver on view in which frame

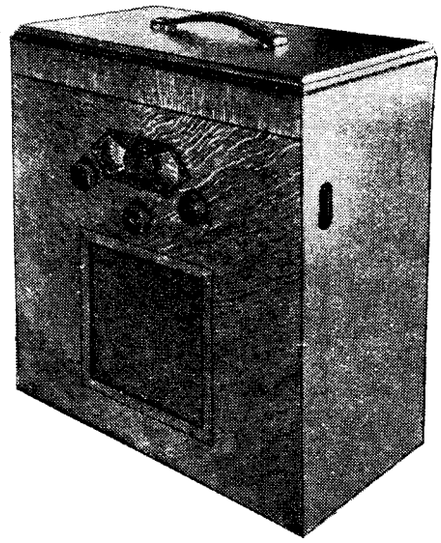


C.A.C. Console radio-gramophone.

aerials are provided. This is the Model 95, and it is designed for Universal operation. There is a signal-frequency H.F. stage and an octode frequency-changer, while an H.F. pentode is used in the I.F. amplifier. A.V.C. is included, together with a static suppressor, and the output stage is a pentode. A battery model is fitted with a triode-pentode for frequency-changing, and there is a quiescent push-pull output stage.

The City Accumulator Company's Austin Battery Superhet has a heptode frequency-changer and a single I.F. stage. A.V.C. is provided by a duo-diode-triode, which is fitted in addition to the driver and Class "B" valves. This set is priced at 16 guineas.

Among the new Pye receivers will be the models CR/DC and CR/AC. The first of these is for D.C. mains working, and it includes an H.F. stage before the two-valve frequency-changer. A single I.F. valve is used, and feeds a duo-diode-triode detector and A.V.C. valve. The output of three watts is obtained with a pentode and noise

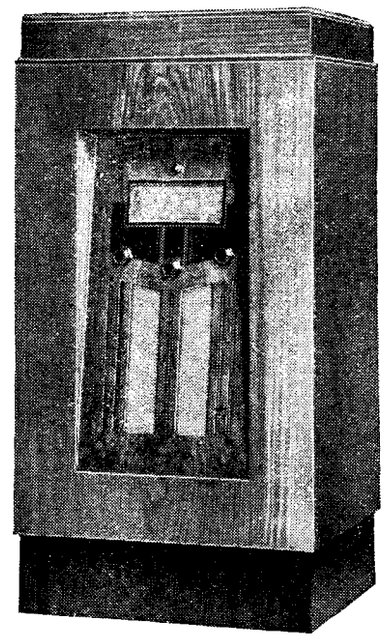


The Pye S/Q portable.

suppression is included. The CR/AC is an A.C. set, and although the set follows the same general lines, a detector-oscillator is used and the output valve is a triode. Both models are priced at 20 guineas.

The Ferranti Gloria Consolette is again a superheterodyne, with both signal-frequency and I.F. amplification, for which H.F. pentodes are used. The frequency-changer is a heptode, and the duo-diode-triode, which provides detection, A.V.C., and L.F. amplification, feeds a triode output valve, giving an output of 2,500 milliwatts. An additional triode is embodied for Q.A.V.C. purposes. A visual tuning indicator is fitted and the set costs 22 guineas. This firm will also be showing a portable model for battery operation and fitted with a frame aerial at the price of 15 guineas.

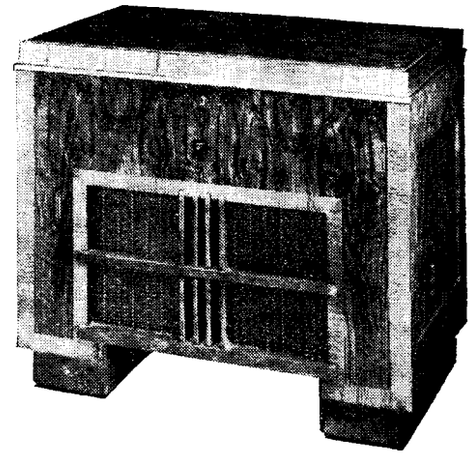
The models of the Gramophone Company will be distinguished by the fitting of "Fluid Light Tuning," a specialised form of visual tuning indicator. The Model 463



The Ferranti Arcadiagram.

is a transportable—a term which has come to denote a set built for frame aerial working but mains operation. The set is for A.C. mains, and has an output of 2 watts obtained from a pentode. The frequency-changer is a detector-oscillator, and both signal-frequency and I.F. amplifiers are fitted. The price is 16 guineas. An A.C. set by the same firm for operation with an external aerial has a two-valve frequency-changer, and metal rectifiers are used for detection and A.V.C. purposes, while the output valve is a triode.

Halcyon Radio will have a six-valve superheterodyne which includes A.V.C. and a visual tuning indicator, and has an output of 3 watts. This set is priced at 19 guineas, but is also available in radio-gramophone form at 39 guineas, and a larger output stage is then included.



H.M.V. Duo-Diffusion Autoradiogram Nine.

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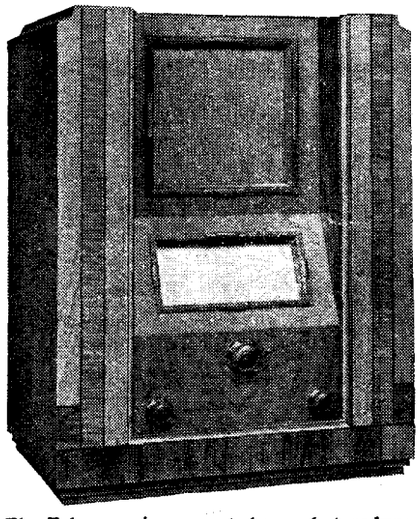
The Dynatron receivers shown by Hacker and Sons will all be of the straight type, and their largest model embodies no fewer than seventeen valves! This is a radio-gramophone with tuning ranges covering short, medium and long wavelengths, and six iron-cored coils are used in the tuning system. The low-frequency amplifier alone includes six valves, and has an output of

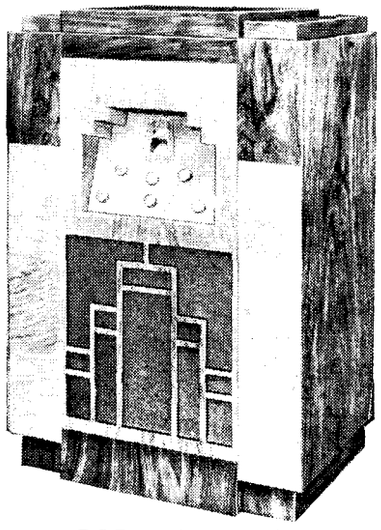


The Telsen mains-operated superheterodyne.

12 watts, and two valves are used in conjunction with a special neon searchlight tuning indicator. Variable selectivity is fitted. A wide range of smaller sets will also be shown.

Among the Edge Radio receivers the Model MS6 will repay inspection. It is a superheterodyne in which the frequency-changer is preceded by an H.F. stage and the single I.F. valve feeds the duo-diode-triode detector and A.V.C. valve. A pentode output valve feeds 3 watts to dual loud speakers, and a static suppressor is included. The price is 19 guineas. The R.G.8, by the same firm, is unusual in that it embodies no less than four loud speakers, one of which is of the piezo-electric type. A push-pull output stage is used, and the sensitivity is claimed to be greater than 0.5 μV.

The Eldeco Stenode is unusual in that no effort is made to preserve the upper register in the tuning circuits, but tone-correction in the L.F. amplifier is relied upon entirely for this. Instead of band-pass circuits the tuning circuits are loosely coupled to give



B.S.R. radio-gramophone.

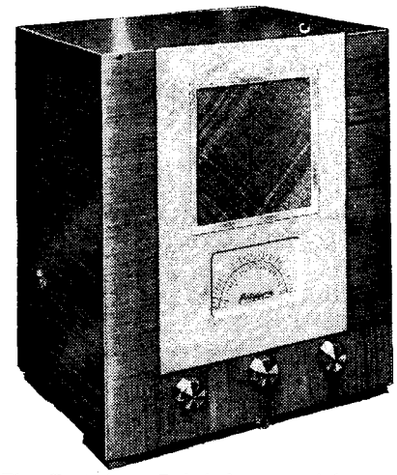
maximum selectivity. A two-valve frequency-changer is used, and a single-diode-tetrode is used for A.V.C. purposes. The set is designed for A.C. operation, and includes a visual tuning indicator; it is priced at £25. The same firm will also be showing a battery set, including A.V.C., and fitted with a quiescent push-pull output stage. This is the Q.P.7, and is designed for use with an outdoor aerial, but a similar set for frame-aerial operation will also be on view.

A number of interesting superheterodynes will be found on the Telsen stand, and the Model 3435 is of particular interest if only because the makers quote definite figures for its performance. A signal-frequency stage of amplification is embodied with a triode-pentode frequency-changer and a single I.F. stage. The detector is a duo-diode and feeds a pentode rated for an output of 3.5 watts. Iron-core coils are used to obtain high selectivity and freedom from second-channel interference, while visual tuning and A.V.C. are both fitted.

The performance curves published by the makers show that at 1,000 kc/s the response at a frequency 9 kc/s different from resonance is about 0.001 of that at resonance. The maximum sensitivity is given as 2 μV. and the variation over the waveband does not exceed 10 db. The overall frequency response shows a loss of 6.4 db. at 40 cycles and a loss of 12.4 at 6,000 cycles.

Models are available also for battery operation, and in these a heptode frequency-changer is used, and the detector is followed by a driver and Class "B" stage giving an output of 1,200 milliwatts.

The Alba five-valve set is priced at 14½ guineas, and A.V.C. operates on three stages.



The Portadyne P.A.6 frame-aerial superheterodyne.

The set is designed for Universal operation from A.C. or D.C. mains, and has an output of 3.5 watts. It is claimed that an aerial input of less than 10 micro-volts is necessary for standard output.

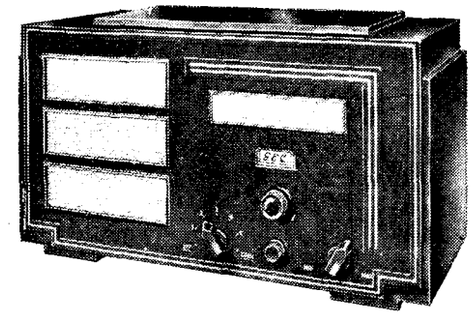
The Burgoyne battery superheterodyne has a band-pass aerial tuning circuit preceding the frequency-changer, for which an H.F. pentode is used as a detector-oscillator. There is a single I.F. stage and a triode detector, while the output stage is of the Class "B" type.

The Invicta 635 model, which will be shown by Orr Radio, Ltd., employs an octode frequency-changer with a single I.F. stage. The detector is one of the new duo-diodes, and feeds a separate triode L.F. amplifier, which, in turn, feeds the output pentode. This set is priced at £12 19s. 6d., but for £15 a similar model fitted with dual loud speakers may be obtained.

The Birmingham Sound Reproducers' four-valve receiver is of the straight type, with two H.F. stages and iron-cored coils. A duo-diode-pentode forms the detector and provides A.V.C., while the output valve is a triode. A visual tuning indicator is fitted and the set is priced at 22 guineas.

SHORT-WAVE SETS

ALTHOUGH the short-wave receivers on show will form a small proportion of the Exhibition, they are by no means an uninteresting section, and to many will be the

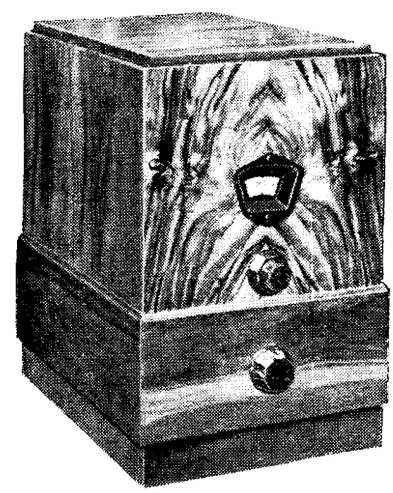


The G.E.C. Overseas 7 mains receiver.

most important. Developments are confined chiefly to the production of sets with built-in coils and with A.V.C. systems specially designed to overcome high-speed fading, while mains operation is becoming the rule rather than the exception.

The General Electric Co., Ltd., will be showing their Overseas 7 receiver which has a tuning range of from 12 metres to 550 metres, and so includes the medium as well as the short wavebands. The set is designed for A.C. operation and is fitted with A.V.C., while a tone control is included. A signal-frequency H.F. valve is employed with a detector-oscillator for the frequency-changer. There is a single I.F. valve, and a duo-diode-triode acts as the detector and first stage L.F. amplifier while providing A.V.C. The output valve is a pentode.

The Overseas model of British Radiophone is provided with two ranges covering 15-55 metres and 195-560 metres, but a similar set is available and known as the Continental model, in which the third range of 800-2,000



C.A.C. short-wave converter.

metres is included. These sets embody a signal-frequency H.F. stage with ganged tuned circuits and an octode is used for frequency-changing. There is a single I.F. stage and A.V.C. with a low time constant

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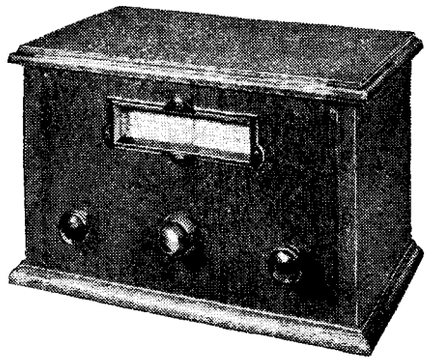
is incorporated, while a special silencing valve is fitted to eliminate inter-station noise.

An all-wave receiver designed for Universal operation from A.C. and D.C. mains and fitted with a barretter for regulating the heater current will be shown by All-Wave International Radio and Television. A tuned aerial system is embodied, the first valve is an octode frequency-changer, and there are two I.F. stages operating at a frequency of 465 kc/s. In order to suppress interference picked up by the supply mains, H.F. chokes are fitted in the leads to the receiver.

The Eddystone receivers will well repay inspection and include both battery and mains models, while converters will be found on many stands. Kolster-Brandes will have a converter designed chiefly for use with their broadcast receivers, while a three-valve instrument suitable for use with any standard receiver and designed for operation from A.C. or D.C. mains will be found on the Dynatron stand. The City Accumulator



Eelex mains-type short-wave converter.

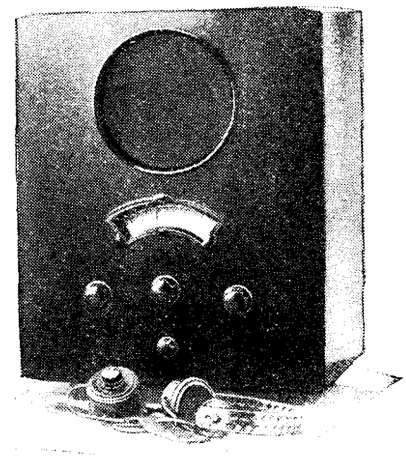
Company will have a two-valve converter for A.C. operation, in which an H.F. stage precedes a detector-oscillator. Plug-in coils are used to cover the short wavebands, and the unit contains its own mains equipment. Eastick and Sons also have a short wave converter of similar type in addition to a number of small battery operated units.

MISCELLANEOUS RECEIVERS AND AMPLIFIERS

IT must be a source of gratification to all of us that the technique of sound amplification, originally developed for wireless reception, has been turned to such good account in alleviating the lot of those who suffer from deafness. Thanks to co-operation between aurists and radio engineers, great progress has already been made, and even more important developments may be anticipated.

At last year's Exhibition interest was aroused by the Multitone deaf-aid receiver, which, in addition to the usual loud speaker, embodied arrangements for a deaf person to listen simultaneously through headphones. By operation of a switch the loud speaker could also be converted into a microphone, thus enabling the deaf person to listen to conversation going on in the same room. An A.C. version of this piece of apparatus has now been produced; several improvements have been embodied in it, including a device for overcoming the masking of high notes by strongly reproduced tones in the lower and middle registers. This development is also included in other deaf-aid apparatus made by the same firm, including a special amplifier for use in schools for the deaf, which has eight separate outputs, with independent tone control for each one.

Interesting deaf-aid appliances, portable



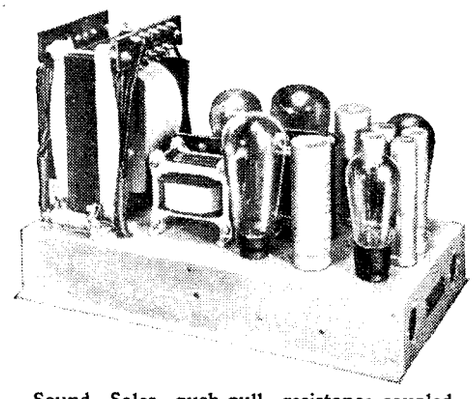
The Multitone deaf-aid receiver.

and non-portable, are also shown by specialist firms such as Ardente and Ossicaide, who also produce various types of sound-amplifying equipment for other purposes. Mention should also be made of the B.S.R. and Film Industries amplifiers.

Resistance-coupled push-pull amplification is embodied in apparatus shown by R.G.D., Haynes Radio, C.A.C., and Sound Sales. The productions of the last-mentioned two firms are based on a design recently published in *The Wireless World*, but the Sound Sales version has been modified to give an even greater output by the use of PP. 5/400 valves: the original PX.4's may still be used, however, after changing over a few connections.

Enthusiasts who place quality of reproduction before all other considerations will be interested in the very ambitious Hartley-Turner medium-distance receiver, which was described last week. Comparable with this somewhat specialised type of receiver are the tuner-detector and amplifier units shown by B.S.R. and Haynes Radio, both the productions of firms which cater for those who require more flexibility and scope than is provided by the ordinary broadcast set.

The listener-motorist is catered for by car radio sets shown by Lissen, Baker, and Sunbeam; there is sufficient difference between



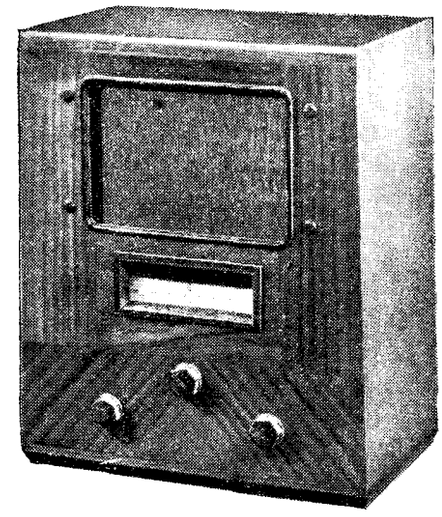
Sound Sales push-pull resistance-coupled amplifier.

the aims of the designers of these receivers to satisfy the sometimes divergent requirements of those who wish to equip their cars for broadcast reception.

Most of the more ambitious portable sets are multi-stage superheterodynes, although the straight four-valve circuit is still preferred for the general-purpose self-contained battery set of medium range. Examples of this class of receiver are shown by Beethoven, Burgoyne, McMichael, Portadyne, Powertone, Pye, etc.

The true lightweight portable is long overdue, but at last seems to have reached the stage of commercial production. The Radio Development Company are showing a tiny self-contained receiver for headphone listening, weighing only 3 lb., and measuring 4⅜in. by 6¼in. by 4½in.—about the size of a small box camera. A two-valve super-regenerative circuit is employed.

Kit sets for home construction are exhibited by Lissen and Cossor. The new Lissen kit receiver has a three-valve H.F.-det.-L.F. circuit with band-pass tuning and a pentode output valve; to facilitate assembly and wiring, the three tuning coils are supplied in the form of a unit. Cossor kits are also of the H.F.-det.-L.F. type, and are available for both battery and A.C. mains supply. Ferranti are sponsoring a number of receivers for home construction, including an A.C. superheterodyne with optional outputs of 2½, 6½, and 12 watts; also short-wave superheterodynes and adaptors for both A.C. and battery feed. Although these sets are not "kits" in the ordinarily ac-



Lissen 3-valve battery set.

cepted meaning of the expression—they are not supplied in the form of complete sets of parts—they may be included under this general classification.

LOUD SPEAKERS

MOST manufacturers of moving-coil loud speaker units, if they have not introduced radically new designs this year, will be showing important modifications and additions to their products. A visit to the British Rola stand, for instance, is necessary to get an adequate idea of the exceptionally wide range of types available both to the public and to the set manufacturer. All the new models are fitted with sealed air gaps incorporating a new form of corrugated centring diaphragm, while the main moulded paper diaphragms are also provided with concentric corrugations. A wide range of extension loud speakers, including cabinet models, will also be a feature of this stand.

Reproducers and Amplifiers, Ltd., are

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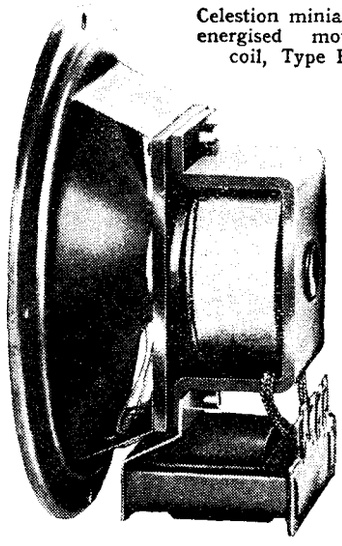
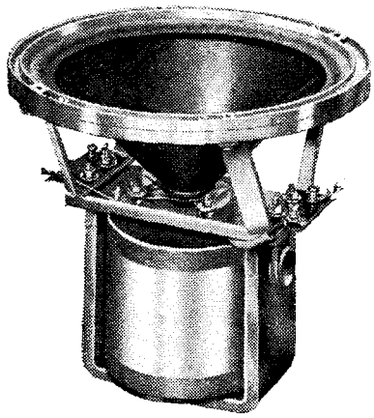
continuing their well-known "Multex" extension loud speaker, and also the Type 60 four-pole balanced armature unit with 12-inch cone. A new transformer has been



Celestion miniature energised moving coil, Type E5.

designed for the "Aipha" unit, and the totally enclosed "Victor" model will now be sold only as a separate unit without transformer. The exhibit which will probably attract most attention on this stand, however, is the new "Multimu" unit, which incorporates a new type of magnet system and an output transformer giving a range of effective impedances from 1-40,000 ohms in 58 ratios.

Very few alterations have been found necessary in the programme of Celestion, Ltd. A new model, the PPM10, supersedes



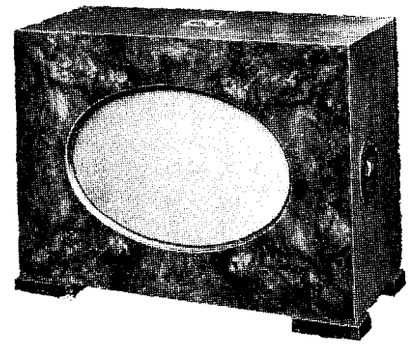
Hartley Turner high-quality moving-coil loud speaker.

the PPM29, while the PPM9 and 19 are to be replaced by new models known as the PPM8 and 8H. A midget unit known as the E5 will be added to the range of energised models.

The Baker's Selhurst "Super-Power" energised and permanent-magnet loud speakers will be shown, together with the "Permag," "Justone," and "Extentone" units. In the latter class an addition to the range of models has been made in the "Fydelitone" series. These permanent-magnet units are housed in handsome moulded cabinets which are obtainable in a variety of shades, including black and chromium.

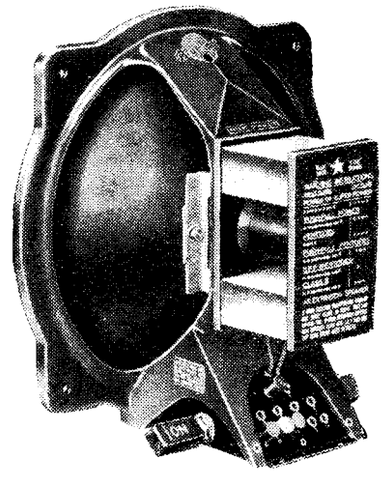
The Amplion MC22 and "Audiola" models will be supplemented by a new series of "Lion" permanent-magnet moving-coil loud speakers. Important features of the design will be a completely sealed magnetic gap and a special high-inductance transformer designed to work in conjunction with double pentode output valves.

Those who go to Olympia this year in search of a high-quality reproducer will find their range of choice considerably wider than in previous years. The B.T.-H. Ediswan "R.K. Senior," the Ferranti M1, the Hartley Turner and Voigt loud speakers will make their reappearance with minor alterations and improvements, but without losing those essential characteristics which have given them so large a following in the past. Among the most noteworthy additions to the high-quality class of reproducers will be found the Magnavox Model 66, the Birmingham Sound Reproducers' "Heavy Duty" and "Auditorium" units, the Haynes Radio "Senior" and "Standard" energised models, and the H.M.V. Model 178 double-cone elliptical diaphragm loud speaker.



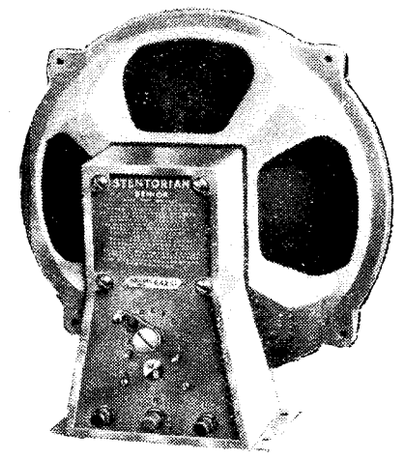
H.M.V. double-cone loud speaker, Model 178.

From a constructional point of view, the Blue Spot "Super Dual" is one of the most interesting of the new quality reproducers. In addition to the fact that two separate units, designed to deal with the high and low frequencies, are incorporated in a single unit, this model is noteworthy for the use of the new nickel-aluminium alloy which will be found in the magnets of a large number of loud speakers this year. The Goodmans "Grille" unit, for instance, is now making use of a magnet of this type, and the 12-watt permanent-magnet model by the same firm shows that magnets of large dimensions can be quite easily constructed with this material. Usually the magnets are of the built-up type, examples of which are to be found in the Blue Spot "Star," Milnes "De Luxe," and the



Blue Spot "Star," with the latest type of magnet.

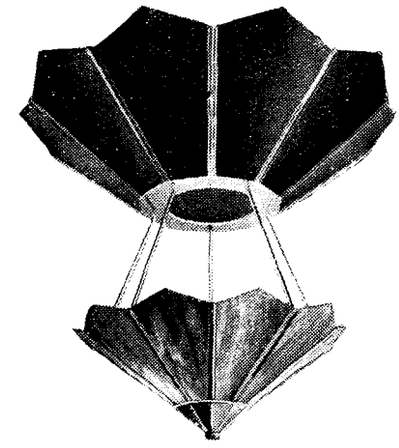
Wharfedale "Bronze" and "Golden" models. The Whiteley Electrical "Stentorian" range, however, affords practical



Whiteley Electrical "Stentorian Senior."

proof that the material is equally adaptable to cast magnets of special design.

In conclusion, mention should be made of two noteworthy departures from conventional design in loud speaker construction. We refer to the "Bowl" loud speaker, which will be shown by Kingsway Radio, and the combined lampshade and non-directional baffle giving 360° distribution of sound, which will be found on the stand of Michell and Brown.



Michell and Brown "Mastersinger" loud speaker.

COMPONENTS AND ACCESSORIES

IF a few of the components in the Exhibition described as new models seem familiar, it must be remembered that this may be the first occasion on which these items have been shown by the makers in a comprehensive display of their products. Furthermore, each complete exhibit represents the individual firm's contribution towards the advance of wireless during the past year, as well as the provisions made for future development. Then, as many of these recently introduced items are probably known only by photographic illustrations, a first-hand examination may quite likely reveal some important feature of the design previously overlooked.

As those who perhaps made their tour of the stands on the opening day have found, there is no paucity of quite new components being shown for the first time. Improvements in coils are always looked

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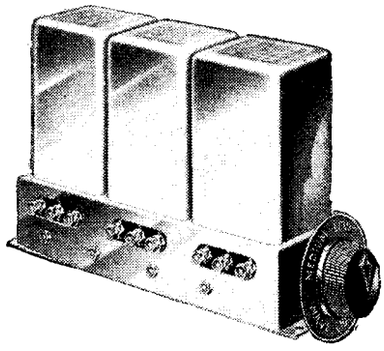
for with keen interest, since they have a marked bearing on the performance of this season's sets.

Colvern is now adopting a new method of mounting the coils in their type G coil unit, which makes for a more robust construction, though the electrical characteristics of the coils themselves remain the same. The Wearite air-cored coils, hitherto available in unit form comprising two or more coils, are now shown as single units, but with provision for ganging the incorporated switches.

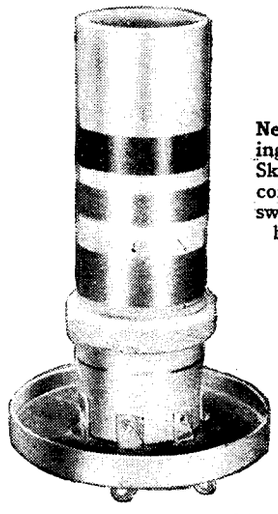
A complete new series of iron-cored coils can be seen on Telsen's stand. They are



Telsen superhet, triple coil unit.

made in twin- and triple-coil units mounted on a metal chassis enclosing the switches. The range includes coil assemblies for straight and superheterodyne circuits.

"Skeletonised" coils is the description adopted by Bulgin for this firm's new series. They are dual-range coils without built-in switches but screened in accordance with present-day practice. Coils without switches seem popular this year, for the Varley Duo-Nicore series, which is entirely new, are shown in this form, as some constructors wish to utilise existing switches.



Neatly arranged windings on the new Bulgin Skeletonised screened coils. Waveband switches are not embodied in the coil.

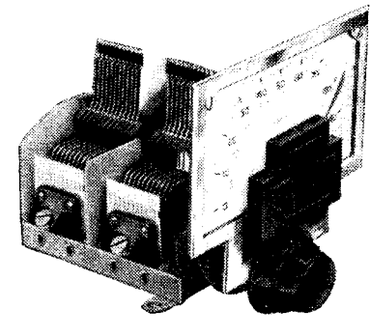
Then again, a coil of this type can be easily fitted in place of an old-style one in early sets, for many receivers of a few years ago had the waveband switch mounted on the panel. A core of high permeability is employed, and although the coil is quite small, it is claimed to be very efficient.

Another new Varley product is the Nicore Flat-Gang units. Introduced some months ago they have been considerably modified recently and the overall length reduced by an appreciable amount, the four-gang unit, for example, now being no longer than the earlier triple-coil chassis. This firm is responsible, also, for fostering interest in permeability tuning; the experimental model shown last year is greatly improved and is now shown in finished form as three- and four-circuit tuning units for use in straight, as well as in superheterodyne receivers. Graham Farish has a new series of "Formo" coils with iron cores. They are screened, mounted on a Steatite base and intended to be used with external switches.

The new season's gang-condensers are definitely smaller; any reduction in size makes, of course, for a more rigid construction and the risk of condenser units becoming mis-matched in transit, or during assembling on the chassis, is likewise lessened.

The Jackson Baby-Gang, in twin- and triple-types, is a typical example, while Polar has a new miniature type described as the Midget Gang condenser. It has a steel frame, the trimmers are mounted on the top and the rotor shaft is supported in ball bearings at the front end. Telsen has some new variable condensers in single and ganged types, so, also, has Graham Farish, a single and a two-gang model being included in their new "Formo" range of components.

Composite tuning units, comprising matched coils and condensers, are shown this year by the City Accumulator Co. in addition to Jackson Bros. and Colvern. The C.A.C. Superpak is a triple unit designed especially for use in superheterodyne cir-

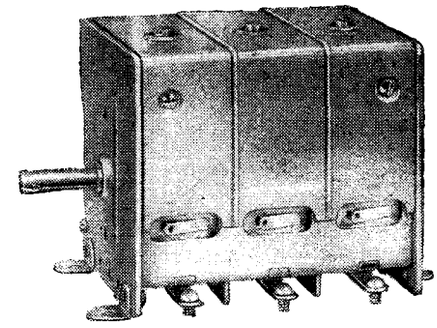


Graham Farish "Formo" condenser and new dial.

cuits with 110 k.c. I.F. amplifiers. The J.B. Linacore is a three-circuit unit also but arranged for straight sets. It has iron-cored coils, band-pass input and one tuned H.F. circuit. A universal model is available for mains or battery valves.

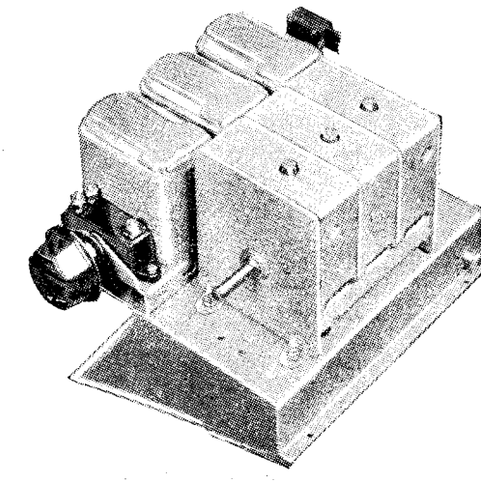
Then Colvern has a new type H Colpak fitted with the latest Ferrocart coils, miniature gang condenser and combined waveband, on-off and gramophone switch. These special units certainly help to lighten the work of the home constructor as all the wiring associated with the coils and condensers is done by the makers.

Quite a casual examination of any receiver chassis in the Exhibition will reveal the very important part played by fixed condensers and resistances in modern sets, where a score or more of each will often be



Polar midget three-gang condenser.

found. That these two components have been the subject of considerable attention on the part of manufacturers is naturally understandable. On the receiver chassis

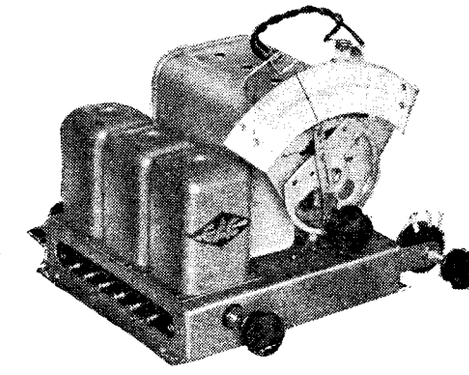


The latest Ferrocart coils are now fitted to Colvern Colpak.

the small tubular condenser usually predominates, so we find such well-known firms as T.C.C., Ferranti, Erie and now Polar, including them in their respective ranges. Dubilier has had a small flat type with tags, and designed for suspending in the wiring like the tubular style, in their list for some time past.

The newcomers are Polar, with their N.S.F. range, Ferranti and Erie. Sizes from 0.0001 mfd. to 0.5 mfds. are now available. This pattern is fitted with wire ends, and can very conveniently be worked into the wiring, or joined between any two of the larger components.

Electrolytic smoothing condensers are present in larger numbers, and in a greater variety of styles, than hitherto. Dubilier



C.A.C. Superpak embodying iron-cored coils.

has many new models for examination, all of which are of the dry type. One is a high-voltage condenser—500 volts D.C. peak working—made in multiple capacities, such as 8+8 and 8+4 mfds., with or without the metal case joined to the negative electrodes. Then there is a reversible type introduced for use in A.C./D.C. sets.

Their low voltage range has been extended, and covers working voltages of from 10 to 100 D.C., one model being rated at 4,000 mfds. at 12 volts D.C. working. This series is intended mainly for use in grid bias de-coupling circuits. Dubilier has augmented also their range of paper condensers to meet every present-day need.

The Graham Farish "Formo" condensers are assembled in small cylindrical cases, the case forming one connection and a terminal at the top provides the other.

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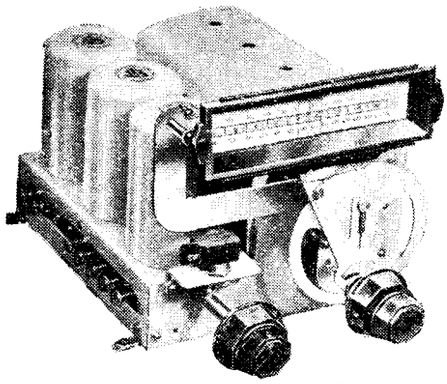
Ferranti has now introduced a range of dry electrolytic condensers in both tubular and impregnated cardboard containers for high-voltage working, and some models of

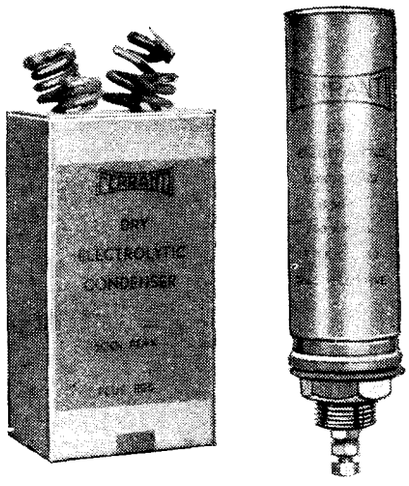


J. B. Linacore, fitted with new full vision scale.

the low-voltage high-capacity type for grid-bias circuit decoupling. Examples of some high-voltage paper condensers are shown by Sound Sales and Amplion, while Polar has a new N.S.F. dry electrolytic condenser in 4, 6, and 8 mfds. sizes for 500 volts D.C. peak working.

There are further examples of electrolytic and paper condensers on the Bulgin and T.C.C. stands, and the visitor must not omit to examine the many different types of T.M.C.-Hydra paper dielectric smoothing condensers made by the Telephone Manufacturing Co.

Practically all the new fixed resistances in the Exhibition are of the composition type, yet the wire-wound variety are sufficiently numerous to meet present-day needs, as they are required only for heavy-duty work.



Two styles of Ferranti high voltage dry electrolytic condensers.

The Polar-N.S.F. resistors are shown in one-, two-, and three-watt types from 100 ohms to 0.25 megohm, and a grid-leak pattern from 0.1 to 5 megohms

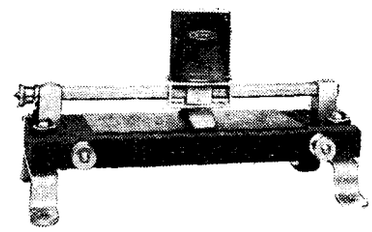
An interesting feature of the new Ferranti resistances is that they are obtainable in the half-watt size. Known as the G.5, this range includes all standard values up to 250,000 ohms. The one-watt series extends to 2 megohms, and they are available as plain resistors with wire ends or mounted in a baseboard-type holder.

Erie resistances will be found on the Radio Resistor Co.'s stand; the carbon composition type in one-, two-, and three-watt rating, and a heavy-duty wire-wound series of from 5 to 100 watts dissipation. Also there are grid leaks from 0.25 to 40 megohms.

Dubilier has a heavy-duty wire-wound resistor styled the "Spirohm"; these are 10-watt resistors, and range from 200 ohms to 50,000 ohms. Resistances capable of carrying very heavy currents are found on Bulgin's stand, where there are some special types for D.C. and A.C./D.C. sets. Partridge and Wilson are showing a range of Davenset heavy-duty variable resistances designed primarily for battery charging equipment.

Variable potentiometers for use as volume controls in L.F. circuits are now usually of the graphite type, for one of 0.25 megohm or higher is the most common value. Typical examples are the Erie, Polar-N.S.F., Bulgin, Ferranti, and Colvern makes, and some of these firms include, also, wire-wound models.

The overseas visitor interested in short-wave reception as well as his confrère in



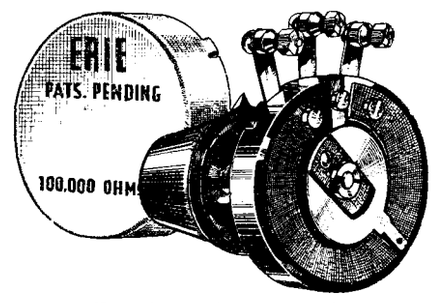
Davenset heavy-duty variable resistance.

this country, must add the stands of Wearite, Bulgin, Telsen, Eastick and Polar to that of Eddystone this year, as all these firms have some short-wave components. Wearite's S-W coils are wound on skeleton plug-in formers made from a particularly hard and good insulator known as Mycalex. The three coils available cover a waveband of from 12 to 160 metres, with a condenser of the usual size employed on these wavelengths. Their valveholder is made of the same material and they have a new short-wave H.F. choke.

The Telsen short-wave coil is a screened type with a built-in switch and covers 18-31 metres and 30-56 metres when tuned by a 0.00016 mfd. condenser. It is wound on a ribbed former and appears to be a quite efficient coil.

Bulgin has a number of interesting items, including a five-way coil assembly, a new range of four short-wave coils of the plug-in variety covering 10 to 180 metres, and some ultra-short-wave self-supporting and air-spaced coils for the 5- to 10-meter band. A low-loss type valveholder for baseboard mounting is included, also.

Variable condensers are shown by Polar and J.B., while Eastick has a novel reversible short-wave coil, giving two wave-ranges without switching.

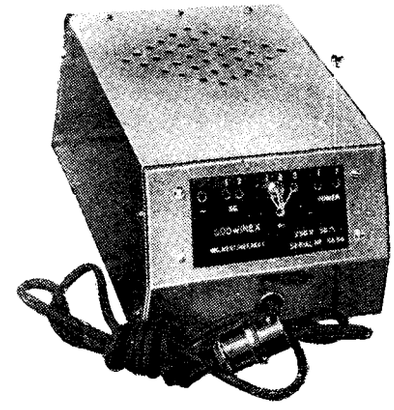


New Erie volume control

Mention of Eddystone components has been left to the last as the range is so extensive that it embraces every sphere of short- and ultra-short-wave work. The interested reader must bide here awhile and examine the many items at leisure.

The battery set user interested in ways and means of prolonging the life of the H.T. battery has two courses open to him. The output stage can be converted to the Class "B" or Q.P.P. arrangement, or an H.T. economy unit fitted. Several firms are showing components for either of the two push-pull systems, notable examples being Bulgin, Wearite, Telsen, Sound Sales, Benjamin, Ferranti, Hartley-Turner, Graham Farish and Varley, while for the battery economy devices a visit to the Benjamin and the Varley stands will enable the units made by these firms to be examined. They conserve H.T. by regulating the grid bias of the output valve according to the strength of signals.

At least one new model of a battery eliminator can usually be found on Clarke's Atlas stand, and this year is no exception. It is styled the T10/30 model and works off A.C., giving three output D.C. voltages with a maximum of 150 volts at 30 mA. It embodies an adjustment to keep all output voltages at the rated value at different current loads and includes a trickle charger. The new Heayberd model also embodies an adjustment on the panel to maintain a constant output at all voltage tappings with current loads of the order of 15, 30 and 50 mA. It takes the form of a stud switch to give artificial loading at the lower current demands.



Dyson Godwinex H.T. eliminator.

Regentone has one new model, the V.P.30, for A.C. mains, which is fitted with a voltage regulator. It gives a maximum of 30 mA. output and has provision for trickle charging the L.T. battery. Then, of course, there are the Ferranti, Ekco, Dyson and Mains Power Radio units, in addition to which Harmer and Simmons is showing battery eliminators among other items.

The M-L anode converter has for long been available as a source of H.T. supply for battery sets, these machines being driven from a six-volt accumulator or from house lighting installations. This year these small converters are available for operating short-wave sets and they should prove of particular interest to the overseas listener, for whom several models have been designed especially. In some a new form of neon stabiliser is embodied to maintain a constant output voltage at all loads to meet the particular requirements of Class "B" and Q.P.P. sets. There are models, also, for use with car radio receivers, all to be found on the stand of C. A. Vandervell.

Here, also, are the C.A.V. dry batteries and L.T. accumulators, and it is interesting to record that the demand for these articles

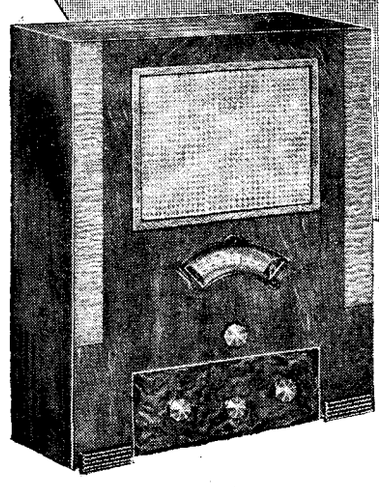
Here's a chance to "Pick a winner"

AFTER IT HAS WON!

INTIMATE TECHNICAL TALKS. No. 1

By the DESIGNER.

There is a great deal of capital being made just now out of visual tuning indicators for Superhet Receivers, and it might be thought that these devices were almost essential for accurate tuning. True, there are many sets on the market in which the omission of a tuning indicator will probably lead to distortion when the set is handled by the average non-technical listener. However, in the "Austin" range of sets the tuning indicator is unnecessary, as our Superhets are designed to give absolutely faithful reproduction whether tuned accurately to resonance or just off resonance. The signal and A.V.C. diodes are suitably fed from points in the circuit where there is a considerable disparity of selectivity, and "sideband screech" is thus avoided. This means that even in the hands of the inexperienced the C.A.C. "AUSTIN" Superhets will provide perfect quality of reproduction without such adventitious aids as the visual tuning indicator.



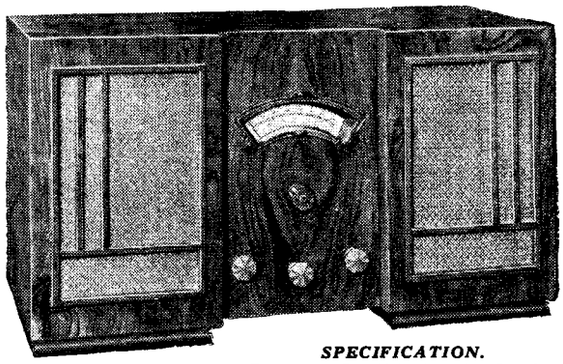
SPECIFICATION.

Five Valve Superhet Receiver for battery operation. 9 in. P.M. Moving-coil Speaker. Provision for pick-up and external speaker. Band-pass tuning with link-coupling. Over 2 watts A.C. output.

Price 16 Guineas

or 12 equal monthly payments of **31/6.**

Fully guaranteed for 12 months.



SPECIFICATION.

Table Model Five Valve (including Rectifier) Superhet for A.C. Mains with Twin-matched 8 in. Energised Rola Speakers. Provision for Pick-up. External Speaker and Mains Aerial

Price 18 Guineas

or 12 equal payments of **35/5.**

YOU are not gambling a single farthing when you buy an "Austin" set For you are paying, not for experiment, but for *proved performance.* The most gruelling test, made by independent radio experts, found "Austin" sets completely triumphant. Uniquely so! For in every way their performance was remarkable. Even the most captious critics readily confess that the "Austin" interpretation of radio is something entirely new, and right ahead of any previous performance. And the cabinet work, with its remarkable beauty of design and finish, marks a new era. All sets are made by skilled craftsmen. There is no "mass production," with the possibility of attendant shoddiness. And every set is designed and built under the personal supervision of that far-seeing expert, Major W. I. G. Page, B.Sc. (late Technical Staff, "The Wireless World.") Why not hear an "Austin" for yourself—*to-day!*

OLYMPIA.
August 16—25.
Stand No. 89.
Phone: Shepherds Bush 2843.

SCOTTISH RADIO EXHIBITION
Kelvin Hall, Glasgow.
August 31—September 8.
Stand No. 82.

NORTHERN RADIO EXHIBITION
City Hall, Manchester.
September 14—22.
Stand No. 73.

THE NEW & BETTER RADIO

Austin

ADVERT. OF THE CITY ACCUMULATOR CO. LTD., 18-20, NORMAN'S BLDGS., CENTRAL STREET, LONDON, E.C.1. **Phone No.: Clerkenwell 6206 (3 lines).**

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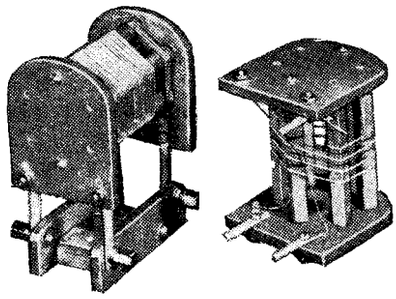
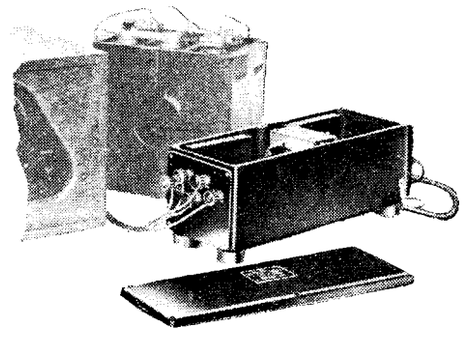
remains as large as ever, for well over a dozen firms are showing them. Several improvements have been effected in the design of H.T. and L.T. accumulators, Fuller has adopted a new type of inter-cell connector in their S/DMHG high-tension accumulator unit to prevent acid creeping.



Wearite short-wave coils wound on Mycalex formers.

Block Batteries has some new models of their plate-less L.T. cells. The National Accumulator Co. is making a special feature of "Tell-Tale" charge indicators, and Siemens have introduced a new 300-volt dry battery for cathode ray tube excitation. A good selection of batteries of all types are shown, also by Ever-Ready, Drydex, Smith, Grosvenor, G.E.C., Britannia Batteries, British G.W.Z., Hellesens, Milnes and Vee-Cee, among others.

Power transformers and components associated with the supply of H.T. and L.T. from the mains naturally occupy a prominent place in the exhibition, for not only do they figure in all-mains sets, but find an application in battery eliminators and chargers. Furthermore, some special models are now available for use with cathode ray tubes in television apparatus.



M-L anode convertor for short-wave receivers.

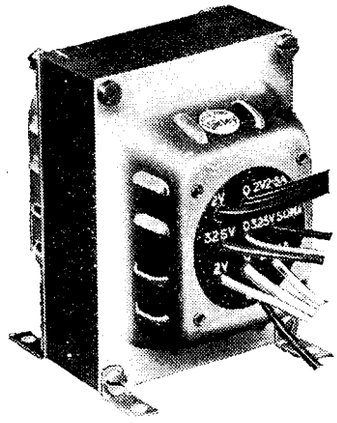
Sound Sales has a special display of this class of apparatus. Heayberd, Ferranti, Davenset, Wearite, Bulgin, Harmer and Simmons, I., Varley, Telsen and Hartley-Turner represent a few of the firms now interested in the manufacture of power transformers and chokes.

The suppression of electrical interference is a subject in which many readers must be keenly interested, for the high sensitivity of modern sets renders them particularly susceptible to quite small electrical disturbances. Belling-Lee has made a special study of this subject, and developed filter units for attaching to domestic apparatus, such offenders as neon signs and other advertising devices, in addition to a range of units for filtering out the interference at the receiver.

T.C.C. has a condenser anti-interference unit, which is now shown in an improved form, while Dubilier has introduced a filtering device for interposing between the set and the electric supply point.

Special apparatus for the servicing of receivers is far more prominent this year. The latest developments in receiver design, whilst making for a better all-round performance, has led to greater complication in the circuit, so that servicing is now becoming quite a highly skilled business. Signal generators, modulated oscillators, power output meters, and the many other items used in testing departments, constitute the principal apparatus falling under this heading.

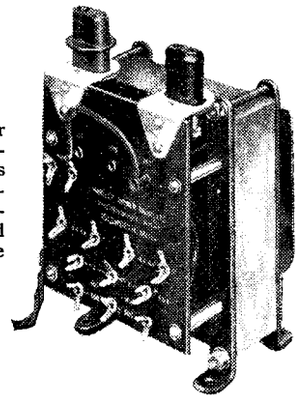
Everett and Edgcumbe are showing a small portable signal generator and power output meter in addition to the Radiolab complete valve and test set. The Weston Electrical Instrument Co.'s model 694 oscillator has a frequency range of 100 to 3,000 kc. on the fundamentals and, by utilising



New style Varley power transformer.

the harmonics, can be extended to 21 megacycles. Their Radio Set Analyzer, model E665, is now supplied with adaptors to take 4-, 5-, 7- and 9-pin valves, in addition to which provision is made for the measurement of condensers.

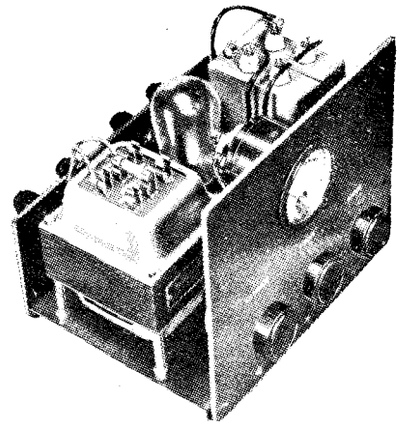
Modulated oscillators of the dynatron and heterodyne type for D.C. A.C./D.C. and battery operation are shown by Wm. F. Brown. Frequency stability under all conditions of working is one of the features claimed for this range of instruments. There are several audio-frequency oscillators and a series of valve voltmeters.



Hartley Turner mains transformer, which is of robust construction, includes insulated high-voltage connectors.

Equipment of a similar nature is shown, also, by the Birmingham Sound Reproducers, while the Automatic Coil Winder Co. has a small portable modulated oscillator.

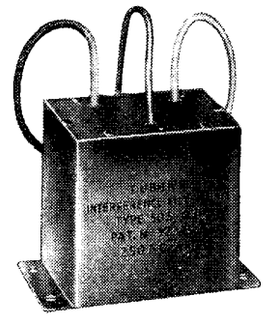
This constitutes one class of the test apparatus now available; the other section holds some interest for the ordinary listener as it includes such instruments as the Ferranti A.C./D.C. Circuit Tester, the Automatic Coil Winder Co.'s range of combined meters, to which has been added a Universal model of the AvoMinor. A.C. as well as D.C. measurements can now be made with this instrument. Various types of moving coil and moving iron meters are shown by Ferranti and Everett Edgcumbe, and there



Sound Sales mains supply unit for cathode-ray tubes.

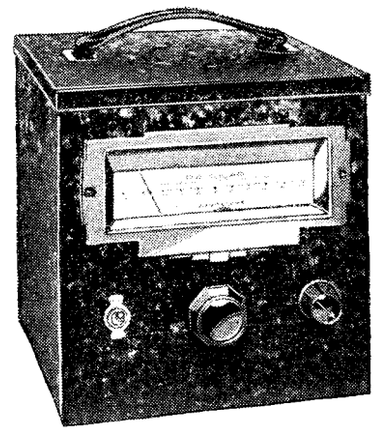
are two new Pifco models, the Rotameter and the A.C./D.C. Radiometer, for examination.

Particular attention is given this year by the Multitone Electric Co. to the needs of the deaf. The Deaf-Aid radio set of last year has been followed by further models, correcting circuits being embodied to adjust the frequency response to suit individual needs. Mains and battery models are shown.



Dubilier interference filter unit provided with lengthy rubber-covered connecting leads.

Special equipment for car radio is well in evidence, and several firms are now interested in this subject. The Electro-Dynamic Construction Co.'s H.T. converter for installation in motor cars is a most compact unit, measuring $5\frac{3}{4}$in. × $5\frac{3}{4}$in. × $3\frac{1}{4}$in., including the filter, and it weighs but 8 lb. There is a specially designed anode converter for car radio receivers now included in the M-L range of small machines on the stand of C.A.V.



Radiolab oscillator; an Everett Edgcumbe product.

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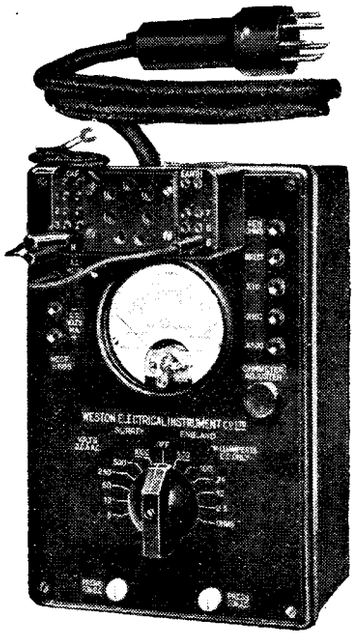
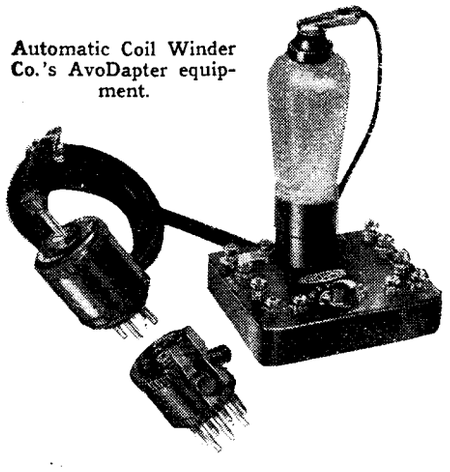
Weather-proof aerials for fitting under the running-boards are shown by Aerialite, and the National Radio Service Co., while those who use a portable or transportable set in the car will find the Carryset satchel on the Electrico stand useful, as it is designed to give protection to the set.

Miscellaneous items are to be found in many parts of the Exhibition, many being



Weston portable set tester.

of particular interest to the home constructor. For example, Henley's Telegraph Works Co. is showing several models of the Solon electric soldering iron, the domestic size being ideal for home use. Plugs, sockets, and connectors of every conceivable pattern, fuses, and the like, abound on the Belling-Lee stand, and Clix, also, has a good

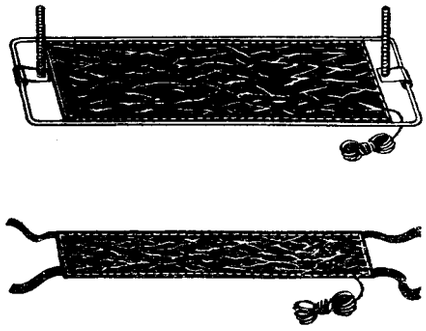


Automatic Coil Winder Co.'s AvoDapter equipment.

display of assorted items of this kind, in addition to an extensive range of chassis-type valveholders.

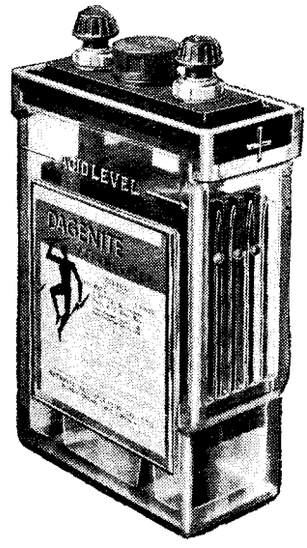
There is a moving-coil microphone made by Film Industries, and a capacity type by Voigt Patents. Indoor aerials are featured by British Pix. A special heavy-duty mains transformer has been designed by Sound Sales for *The Wireless World* Quality Amplifier, to enable the power output to be raised to twelve watts by the substitution of suitable output valves. This firm is showing, also, a home A.C. mains charger for car and radio batteries, and there is a model in the Newton series that serves the same purpose. Both Heayberd and Dyson have some further examples of small portable trickle chargers.

Heavy-duty charging equipment of the type installed in battery service stations is well in evidence this year. The Newton



Motor-car running board aerials made by Aerialite.

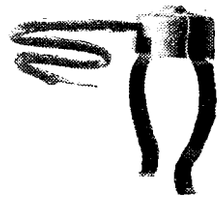
range, to be found on the stand of C.A.V., includes no fewer than fourteen different models. Then Partridge and Wilson are making a special display of Davenset charging equipment. The Electro-Dynamic Construction Co. has an interesting array of



"Tell Tale" charge indicators embodied in National Accumulator Co.'s Dagenite cells.

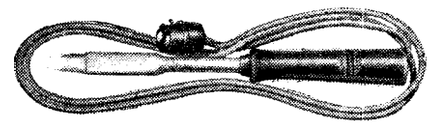
machines for fitting on cars for use in conjunction with public address apparatus.

The Westinghouse range forms another example of commercial charging plant, and finally there is the Reliance series of motor-generator sets, made by Diggle. On the Westinghouse stand the visitor will find the well-known metal-oxide rectifiers. As the



Belling-Lee valve top plug screened connector.

range of H.T. and L.T. models for wireless and charging purposes adequately meets all present-day needs, no further additions have been thought necessary on this occasion, though there are two new items of no little interest. One is a modified Westector, styled the WX6, developed primarily for use



Solon electric soldering iron for domestic use.

in "straight" sets and giving efficient operation at all radio frequencies up to 1,500 kc/s (200 metres).

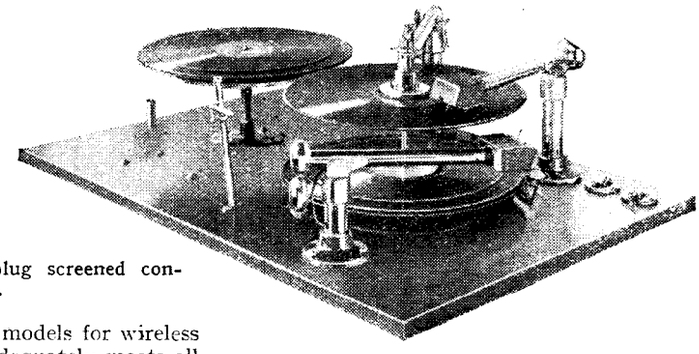
The other is a series of high-voltage low-current rectifiers for cathode-ray tube voltage supply from A.C. mains. Known as the type H, there are half-wave models giving from 40 to 750 volts output at 5 mA. and two for use in voltage doubler circuits where a 1,000 or 1,500 volts D.C. is required.

GRAMOPHONE ACCESSORIES

THIS section may be conveniently divided into gramophone pick-ups, electric turntable motors and record changers. In the latter sub-division a very ingenious design, in which both sides of the record are played alternately by pick-ups mounted above and below the record, will be shown by the Automatic Radio Gramophone Co., Ltd. No turntable in the accepted sense of the term is employed, the record being held at the centre by a specially designed two-claw chuck. The instrument will carry up to twenty-five records and 10- and 12-inch discs may be mixed indiscriminately, a feeler rod being arranged to gauge the size of the record as it passes from the magazine to the playing position and to adjust the starting position of the pick-ups accordingly. The G.E.C. will also be showing a record changer, and the well-proved design of the Garrard Engineering Co. will again be available for demonstration.

The latter firm have brought out a modified type of radio-gramophone unit incorporating a pick-up in addition to the electric turntable and suitable for immediate installation in radio-gramophone cabinets. It is similar in purpose to the Type A units shown last year but is of smaller size, the overall dimensions being $14\frac{1}{2} \times 13\frac{1}{4}$. Visitors to this stand should also make a point of examining the new "Universal" motor Type U5.

The marketing of the Simpson Synchronous turntable has been taken over by Kingsway Radio, and working models showing the principle of operation will be exhibited on this stand.



Record changer by the Automatic Radio Gramophone Co.

The popularity of the H.M.V. No. 11 pick-up designed to fit the tone arms of existing acoustic gramophones has justified its con-

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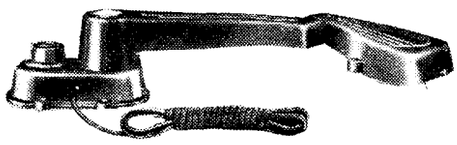
tinuance in the new season's programme, and the Celestion Type P2 pick-up is also continued unchanged.

The Marconiphone Model 25 is now fitted with a hum-neutralising coil and the electrical output has been increased. The new Blue Spot pick-up will also repay examination. A volume control is incorporated, and it is fitted with a very convenient form of lifting head. Finally, there is the



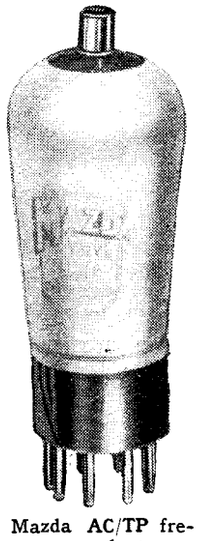
Blue Spot pick-up and volume control.

new B.T.H. needle armature pick-up, which has a remarkably high output for this type of instrument and is notable for the absence of objectionable armature resonance.

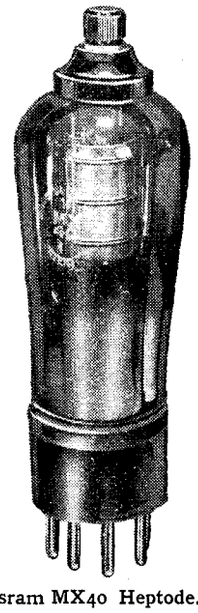
VALVES

ONE of the chief developments of recent months has been the production of Universal valves, and specimens will be found on the stands of many firms. The valves are all of the indirectly-heated type, and they are intended to be operated with their heaters connected in series. Each range, therefore, is designed for constant current rather than constant voltage operation.

Marconi and Osram will be showing a range which includes a heptode, a variable-mu H.F. pentode, a triode, a duo-diode-triode, and an output pentode, and each valve has a heater rated for 13 volts at 0.3 ampere. The rectifier in the series, the U.30, takes the same current, but is rated for 26 volts. A type 301 barretter for heater current regulation will also be available.



Mazda AC/TP frequency-changer.



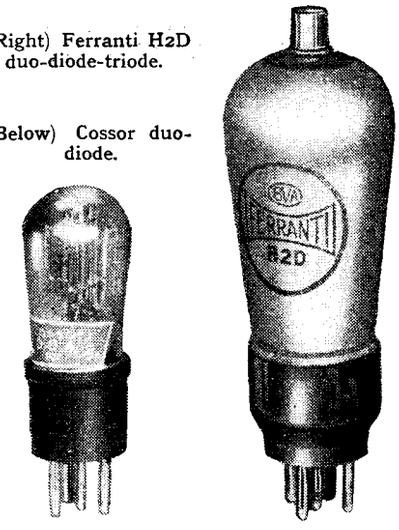
Osram MX40 Heptode.

Universal valves of similar heater ratings will also be found on the Ferranti stand, but the Mazda and the Mullard types are all designed for a current of 0.2 ampere only. The Mazda VP.1321 is an H.F. pentode with a screen-grid designed for operation at 250 volts, so that a screen-feed potentiometer is unnecessary. Its heater is rated at 13 volts, and it has a mutual conductance of 2.7 mA./V. The VP.1320 is a similar valve, but designed for working at a somewhat lower screen voltage. A triode-pentode valve is included in the range, and has a 26-volts heater, while other valves comprise a duo-diode, a duo-diode-triode, a duo-diode-output pentode of high efficiency, and rectifiers.

The Mullard range comprises an octode frequency-changer, H.F. pentodes of both plain and variable-mu types, a duo-diode, an output pentode and a rectifier. The control grid in all valves is brought out to a top cap and gold metallising is used, while this series is fitted with special side-contact bases instead of the familiar pins.

(Right) Ferranti H2D duo-diode-triode.

(Below) Cossor duo-diode.



Although it seems probable that such valves will in time supersede the ordinary A.C. and D.C. types, these are still continued, and many new additions are being made to the A.C. ranges. Practically every firm will have a special frequency-changer valve, and Marconi and Osram have the X21 and the MX40 heptodes for battery and A.C. operation respectively. The Ferranti VHT2 and VHT4 heptodes will also be on view, and Cossor will have an A.C. heptode—the 41.MPG. Mullard will be showing an octode, the F.C.4, this being essentially a heptode with the addition of a suppressor grid, and also the TP4—a triode-pentode. This type of valve falls into the multiple, as distinct from the multi-electrode, class, for it consists of a separate triode and H.F. pentode built into the same bulb. It functions, therefore, in a manner identical with that of the conventional two-valve frequency changer, but has the advantage that the valves are specially designed for the work which they are called upon to perform. Mazda frequency-changers are also of the triode-pentode type, and several models will be shown—the AC/TP for A.C. working, the TP.22 for battery sets, the TP.2620 in the Universal range, and the TP.1340 for car radio.

Duo-diodes have been introduced by Cossor, Mazda, and Mullard, and it is claimed that they can handle a larger input than the small diodes fitted in valves of the multiple-diode type. Their use in the larger class of receiver, therefore, may prove advantageous. Few additions have been made recently to this multiple-diode class, so that the introduction of separate duo-diode valves might lead one to believe that the limit has been reached here.

The 362 output triode.

In battery valves Marconi and Osram will show a variable-mu screen-grid valve, a triode, and an output pentode in which certain details, but not the external anode, of the Catkin construction have been adopted. The Q.P.21 double output pentode for quiescent push-pull will also be on view. This valve has an output of about 1 watt and can be fed from any push-pull transformer. A double-pentode of similar type, but with both screen-grids brought out to separate contacts, will be shown by Mazda; this valve has a 9-pin base.

Mullard have produced a Class "B" valve designed for operation with negative grid bias and capable of an output of about 1,500 milliwatts, and their range of battery valves has been extended by the inclusion of H.F. pentodes. A Class "B" valve in the 362 range, the BX2, is rated for the unusually large output of 3 watts, but it requires an anode potential of 180 volts and a signal input of 40 volts peak. A Q.P.P. double-pentode will be found on the Hivac stand, and among a wide range of all types is a combined driver and Class "B" valve. This consists of three triodes built into a single glass envelope. One triode forms the driver valve, and the other two are connected in push-pull to make the familiar double-triode used for Class "B" amplification.

H.F. pentodes have in the past been characterised by higher grid-anode capacities than screen-grid types, but in the Marconi and Osram VMP4/K the commendably low figure of 0.002 mmfd. has been reached. This valve is of the Catkin type. Another new product of these firms is the PX25A, a valve of similar characteristics to the well-known PX25, but designed especially for push-pull operation, and a pair of them will give an output of no less than 16.5 watts.

News of the Week

Current Events in Brief Review

Radiolympia, 1934

THE Olympia Radio Show is now in full swing. It runs until August 25th, and is open each day from 11 a.m. to 10 p.m., admission 1s. 6d.

The number of exhibitors approaches 200.

High definition television is being demonstrated hourly by the Radio Research Board in the "Radio Weather House" in the East Gallery of the Grand Hall. Part of each show consists of an explanatory two - reel talking film. The second portion consists of an actual demonstration of the cathode ray system.

Budapest to Bangkok

PRINCE BIKDIPAYA MALAKUL OF BANGKOK has telegraphed to the Budapest broadcasting station the following message: "We receive your transmissions magnificently, but to my great regret only after 10 p.m. We much enjoy the melodies of the gipsy bands."

Classes in Radio Servicing

RADIO servicing is included in the syllabus of the Music Trades' School in connection with the Northern Polytechnic, Holloway, London, N.7. Day classes commence on September 10th and evening classes on September 24th. Full particulars can be obtained from the Secretary, Northern Polytechnic, Holloway, London, N.7.

Better French Programmes

GREAT improvements in French broadcasting programmes are forecast as a result of the Congress of the French National Broadcasting Federation in Marseilles last week, when representatives of the principal stations discussed the trend of programme policy.

The delegates confirmed their opposition to the principle of advertising at State radio stations.

S.O.S.: New Style

BROADCASTING helped to avert a grave accident during a recent motor race in Czechoslovakia. In the neighbourhood of Prague one of the competitors broke a wheel. The wheel was replaced, but as the car started off a mechanic observed that the axle had been seriously damaged and was likely to give way at any moment. For some reason it was impossible to telephone to the next "check" to warn the driver. One of the party, however, had the idea of getting in touch with the Prague broadcasting station. The station was telephoned, and within a few moments an announcement was made at the microphone, as a result of which a listener was able to intercept the racer in the nick of time.

Warning

ALL German broadcasts of a political nature are now preceded by the announcement: "Hier ist die Reichssendeleitung."

German Radio Show

THE annual German radio show at Berlin opens to-day at the Tempelhof Aerodrome under the shadow of the famous Funkturm.

6,500 Pirates

SINCE October last, when Poland passed an anti-pirate law, 6,500 unlicensed listeners have been prosecuted. In several cases offenders were sent to prison.

Stimulating

DAYTIME transmissions in Holland during recent months, it is stated, have been calculated to "stimulate the activity of factory workers." The programmes consist of light music, especially marches.

"N" Stations in America

UNDER international treaty the official call letters of American radio stations begin with "W" or "K." A new prefix, "N," has now been added to the list to conform with naval regulations. All holders of amateur radio station licences who are regularly commissioned or enlisted members of the U.S. Naval Reserve may use the new prefix.

Broadcasting from Jerusalem

A SITE for the new broadcasting station at Jerusalem has been selected about seven miles north of the city. The construction and installation of the station has been entrusted by the Palestine Department of Posts and Telegraphs to the Marconi Company and work on the manufacture of the equipment has started at the company's works at Chelmsford. The station will have a power of 20 kilowatts and, according to the Lucerne Plan, will operate on 449.1 metres, i.e., the same as North Regional. The transmitter is, however, adjustable from 200 to 545 metres.

Belgian Broadcasting House

THE new Belgian Radio House at Ixelles-les-Bruxelles will have seventeen studios, including a concert hall. Following the B.B.C. system, a radio dramatic control panel will be used with four studios for broadcasting plays. There will also be four talks studios. Construction is to begin early next year.

"The Times" Broadcasting Number

NO phase of broadcasting—technical, artistic, or administrative—is left untouched in the Broadcasting Number of *The Times*, published this week. In twenty-eight copiously illustrated pages, the "big names" in radio tell the story of how broadcasting has evolved and how it is conducted to-day. The contributors include Mr. J. H. Whitley, Chairman of the B.B.C., who sent a special message; Sir John Reith, G.B.E., Director-General ("The Evolution of Broadcasting"); Lt.-Col. J. T. C. Moore-Brabazon, M.B. ("The Radio Industry"); Professor E. V. Appleton, F.R.S. ("Short Waves"); M. Raymond Braillard ("The Lucerne Plan"); and Sir Walford Davies ("Musical Education by Wireless"). In addition there are numerous unsigned contributions.

In a sense this special number constitutes a Year Book of broadcasting. It was issued with *The Times* of August 14th, and we understand that copies are still available from the Publisher, Printing House Square, London, E.C.4.

A Sidelight on the Vienna Tragedy

THE smashing of amplifier valves at the Vienna studio may have altered the course of political events, according to a correspondent in Austria. The latest investigations into the recent Nazi attack on the Vienna station show that during the fierce fight between the insurgents and the police a bullet penetrated the microphone amplifier, and it was due to this that further transmissions were stopped. Otherwise it is probable that the Nazis would have continued exhorting their followers by wireless and that there would have been a general uprising in all parts of the country.

Up-to-date Budapest

EXTENSIVE alterations to Budapest Broadcasting House includes one "theatre" studio, two medium-sized studios and smaller rooms for talks and gramophone recitals.

Budapest, which is already famous for its "conductor's silence cabinet," will now have one of the most up-to-date broadcasting buildings in Europe.

New Police Radio Station

SCOTLAND YARD will shortly erect a police wireless station at Grove Park, Camberwell, to replace the existing station at headquarters. It is stated that Whitehall is unsuitable for radio purposes owing to interference. It is intended to dismantle the headquarters plant and transfer it to Camberwell. The Metropolitan Police are at present using nearly 250 radio-equipped motors which will be in constant touch with the Camberwell station. All messages will be sent out in morse.

Brazilian Contract for Britain

THE Marconi Company has received an important contract from the Brazilian Government for the construction and installation of nine wireless transmitting and receiving stations to provide a network of new telephone and telegraph services throughout Brazil.

To provide skilled personnel for the operation of the stations the Brazilian Government has arranged to send a number of operators for training to the Marconi College at Chelmsford, Essex.

Licensed Radio Dealers

NO German firm may introduce a new model of loud speaker or receiving set during the period from February 1st to July 31st, according to the new regulations governing the radio industry. According to our Berlin correspondent the measure is designed to avoid prejudicing sales at the Leipzig Spring Fair.

All radio dealers must now be registered and must be furnished with official cards. There are now 37,000 retailers and 750 wholesalers.

BY BEAM TO TOKYO. These Japanese girl athletes competing in the World Games, London, approached the B.B.C. last week for permission to broadcast to Japan. Although unable to help, the B.B.C. referred them to the P.M.G., with the result shown in the picture. They are talking by beam from the International Telephone Exchange, Faraday Building.

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The Wireless World

FOREIGN PROGRAMME SUPPLEMENT

SUNDAY

AUGUST THE NINETEENTH

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.—1.0 to 3.0 p.m.,** Records. **8.30,** Time. **8.31,** Sacred Music by the Station Orchestra. **8.50,** Eily Murnaghan (Soprano). **9.5,** The Mysterious Adventures of Ellis Palmer—Play. **9.50,** Florence D. Comerton (Violin). **10.5,** Music by the Station Ensemble. **10.15,** Talk on Sport. **10.30,** Myles J. Kelly (Baritone). **10.45,** F. O'Higgins (Traditional Fiddle). **11.0,** Time; News; Weather; Close Down.

BASLE.—Relays **Beromünster.**

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**6.10 a.m.,** Motto. **6.15,** See **Hamburg. 8.0,** Programme for Farmers. **8.55,** Political Programme. **9.45,** Talk: The Neubabelsberg Orchid Industry. **10.5,** Weather. **10.10,** Interval. **10.20,** Programme to be announced. **11.0,** Poems. **11.15,** Weather. **11.30,** Records. **11.50,** Greetings. **12 Noon,** See **Hamburg.** In the interval at **12.55 p.m.,** Time. **2.0,** A Play for Children. **2.45,** Chess. **3.0,** Records; Report of the European Swimming Championships at Magdeburg. **4.0,** See **Königsberg.** In the interval, International Tennis Match Report. **6.0,** Report from the Radio Exhibition. **6.20,** Der Brautraub—Comedy with Old Songs (Stolze). **7.0,** Concert. Plebiscite Results in the interval. **8.0,** See **Cologne.** In the interval at **10.0,** News and Plebiscite Results. **10.30,** Concert. Plebiscite Results in the intervals.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Gym. **6.15,** See **Hamburg. 8.15,** Between Town and Country. **8.20,** Interval. **8.30,** Talk: Comradeship. **10.5,** Weather. **10.10,** Interval. **11.30,** Emmy Bettendorf and Gerhard Hüsch Records. **12 Noon,** See **Leipzig. 2.0 to 6.0 p.m.,** See **Cologne. 6.0,** Concert by the Dietrich Schrammel Quartet. **6.50,** Vocal and Instrumental Concert: Trio in G for Flute, Violin and Viola (Reuss); Five Songs, Op. 67, with String Trio Accompaniment (Weismann). **7.40,** Sports Report. **8.0,** See **Cologne.** Plebiscite Results in the intervals. **10.0,** See **Berlin (Deutschlandsender). 10.20,** Weather; News; Sports Notes. **10.50,** Light Music by Gerhard Hoffmann's Orchestra. Plebiscite Results in the intervals.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**7.30 a.m.,** Gym. **8.0,** Interval. **10.0,** Roman Catholic Address. **10.45,** Concert by the Berne Municipal Orchestra. **11.20,** Readings. **11.45,** Recital of Old French Songs to the Harp by Marguerite de Reding and A. Heinichen. **12.5 p.m.,** Concert by the Station Orchestra. **12.30,** Time; News. **12.40,** Operetta Music. **1.30,** Talks for Farmers. **2.30,** Interval. **4.0,** Caruso Records. **4.30,** Reading. **5.0,** Concert of Viennese Music. **6.0,** Chess Lesson. **6.30,** Teddy-Bear's English Half-hour. **7.0,** Time; Sports Results. **7.5,** History Reading. **7.35,** Records. **7.50,** Obwalden Programme. **9.0,** News. **9.10,** Concert with Hungarian Music. **10.15,** Sports Report and Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.30 a.m.,** See **Prague. 9.0,** Roman Catholic Service. **10.0,** Religious Address. **10.15,** Programme Announcements. **10.20,** Records. **10.30,** See **Brno. 11.0,** Concert by the Municipal Orchestra, relayed from the Piestany. Soloist: Berze (Songs). Flora Waltz (Leopold); Overture (Mouton); Romanian Rhapsody (Margariteson); Hindu Song from Sadko (Rimsky-Korsakov); Slovak Dance (Smatek); Four Indian Love Lyrics (Woodforde-Finden). **12 Noon,** See **Prague. 1.45 to 1.50 p.m.,** Water-Level. **4.0,** Concert by the Municipal Orchestra, relayed from **Piestany.** Conductor: Obruca Overture (Roskosny); Polka in A (Horky); Dolorosa (Lindemann); Potpourri of French Music (Mouton); Two Waltzes (Dvorák); Potpourri of British Music (Humphries); Slovak March (Obruca). **5.0,** Records. **5.30,** Reading. **5.50,** Pianoforte Recital by Macudzinski. **6.15,** Hungarian Transmission: Choral Concert of Hungarian and Slovak Songs. **6.55,** See **Prague. 8.10,** Slav Folk Songs by Richard Weiss. **8.45,** Concert by a Mandoline Orchestra. **9.20,** Love's Crime—Comedy in One Act (Hennequin). **10.0,** See **Prague. 10.20,** News in Hungarian; Sports Notes. **10.30,** See **Prague. 11.30** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.—5.0 a.m.,** Hymn; Motto. **5.10,** Records. In the interval at **5.40,** Time; Weather. **6.0,** Records. **6.10,** Time; Weather. **6.15,** See **Hamburg. 8.15,** Greetings. **8.25,** 'Cello Recital by Peter Lehmann: Sonata in F, Op. 6 (R. Strauss); Intermezzo and Spanish Dance (Granados). **9.0,** Concert by a Boys' Choir and Orchestra relayed from Oels; Conductor, Schiller; Soloist, Gerhard Kern (Organ). **10.0,** Concert for the Berlin Radio Exhibition; The Station Orchestra; Conductor, Prade. **12 Noon,** Readings. **12.15,** Talk, with Records: **12.50 p.m.,** Two Ballad Poems. **1.0,** Concert. Conductor, Prade. **2.0,** News. **2.10** (from **Gleiwitz**), Talk for Women. **2.30,** Gramophone Cabaret. **3.30,** A Fairy Play for Children. **4.0,** See **Königsberg.** In the interval at **5.0,** Talk: Mushrooms. **6.0,** Two Humorous Stories in Dialect. **6.30,** Sports Report. **7.0,** See **Berlin (Deutschlandsender). 7.30,** Weekly Review. **8.0 to 10.0,** See **Cologne. 10.0** till Close Down, See **Berlin (Deutschlandsender). 10.45,** Dance Music. **1.0 a.m. (Monday),** Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.30 a.m.,** See **Prague. 10.30,** Recitations. **11.0,** See **Bratislava. 12 Noon,** See **Prague. 1.55 p.m.,** Records. **2.20 to 2.50,** German Transmission: Programme for Farmers; Report. **4.0,** See **Moravská-Ostrava. 5.55,** See **Prague. 8.10,** Song and Pianoforte Recital. **8.40,** See **Prague. 9.10,** Reading. **9.25,** Guitar Recital: Selection from Russian and Ludmilla (Glinka); Study (Soloviev); Caucasion Song (Kazbek). **9.40,** Recital by a Vocal Quintet. **10.0 to 11.30,** See **Prague. 11.30** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**10.0 a.m.,** Concert of Light Music by the Radio Orchestra. Soloist: Barnes (Bass). Souvenir d'Athènes (Leopold); Song, Du meine Morgensonne (Wrangel); Echos de Russie (Léopold); Songs: (a) Le cor (Flégier), (b) The Two Grenadiers (Schumann); Russian Waltz, Troica (de Bottari); Piece (Goldmann); Selection from Carmen (Bizet); Selection from Le tribut de Zamora (Gounod); Arlequinade (Albert). **11.0,** Records. **11.55,** Weather. **12 Noon,** Massenet Concert by the Symphony Orchestra. Overture, Phèdre; Suite, Scènes alsaciennes; Le dernier sommeil de la Vierge; Record: Air from Don Quichotte; Selection from Manon; Scènes napolitaines. **1.0 p.m.,** News. **1.10,** Records. **1.30,** Extracts from Knock—Comedy (Jules Romains). **1.40,** Records. **2.0,** Interval. **5.0,** Dance Music relayed from the Casino, Spa. **6.0,** Concert by the Radio Orchestra, and Soloists. **7.0,** Records. **7.15,** Religious Address. **7.30,** Music Talk. **8.0,** Records. **8.15,** Concert Version of Werther—Opera (Massenet), relayed from the Casino, Spa. In the interval, Four Humorous Sketches on Records: (a) La sourde qui ne veut pas entendre (Carol and Delamare), (b) La voyante (Simon), (c) Témoignage (Simon). After the Concert, News; Dance Music. **12 Midnight,** Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish.—**10.0 a.m.,** Records. **11.0,** Concert by the Radio Orchestra. Soloists: Barnes (Bass), Lombart (Marimba). España (Chabrier); Juegos (Turina); Spanish Dance (Sarasate); Two Songs: Prologue from Mephistopheles (Boito), (b) Canta pe' me (de Curtis). Marimba Solo: Funny Notes (Nicholls). Polka, Kladenska (Prazsky); Egyptián March (Joh. Strauss); Perpetuum mobile (Joh. Strauss); Rhapsody (Hartung); Nutcracker Suite (Tchaikovsky). **11.57,** Weather. **12 Noon,** La nuit ensorcelée (Chopin-Aubert), on Records. **12.15 p.m.,** Commentary on the Pilgrimage from the Yser to Dixmude. **1.0** (approx.), News. **1.10** (approx.), Mendelssohn Concert by the Symphony Orchestra. Overture, Ruy Blas; Andante from the Symphony in A; Die Spinnerin; Suite from A Midsummer Night's Dream. **2.0,** Interval. **5.0,** Dance Records. **5.30,** Sports Notes. **6.0,** Polovtsian Dances (Borodin), on Records. **6.15,** Chamber Music. Hubert and Commissarie (Violins), Cootmans (Clarinet), and Marinus De Jong (Pianoforte). **7.15,** Roman Catholic Address. **7.30,** News. **7.55,** Music Review. **8.0,** Italian Programme by the Symphony Orchestra. Soloist: Sterkens (Songs). Overture, The Barber of Seville (Rossini); Selection from La Traviata (Verdi); Aria from Rigoletto (Verdi); Selection from Cavalleria rusticana (Mascagni); Aria from The Sunken Bell (Respighi); Selection from La Bohème (Puccini). **8.45,** Two Readings (Tchekov). **9.0,** Concert, relayed from the Kursaal, **Ostend. 10.10,** News. **10.20,** Dance Records. **12 Midnight** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**10.30 a.m.,** Hymn. **10.45,** Sacred Music. **11.0,** Concert by the Station Orchestra. **12 Noon,** Amusement Guide; Water Level; Records. **12.45 p.m.,** Recitations, with Pianoforte Accompaniment. **1.15,** Time; Weather; News. **1.40,** Records. **5.0,** Talk. **5.15,** Romanian Music. **5.30,** Weekly Review. **5.45,** Talk for Peasants. **6.0,** Time; Weather. **6.5,** Dance Music by the Tauster-Seidmann Jazz Band. **7.30,** Talk. **7.45,** Records. **8.0,** Talk. **8.15,** Concert of Belgian Music by the Station Orchestra. Overture, Cain (Brusselmans); Prelude to Le chevalier maudit (Gye); Prelude to Jean Michel (Dupuis); Suite, Week-end (Caludi). **9.0,** Sports Results. **9.10,** Concert of Romanian Music, by the Station Orchestra. Minuet from the Orchestral Suite (Enesco); Divertissement (Dragoi); Suite (Ghiga), conducted by the Composer. **10.0,** News. **10.30,** Programme relayed from the Bassin Lido.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**9.15 a.m.,** News. **10.0,** Protestant Service. **11.0,** Roman Catholic Service. **12.30 p.m.,** Concert by the Opera House Orchestra. Conductor, Ferentsik. Overture, Tannhäuser (Wagner); Symphony No. 6 (Beethoven); Hungarian Folk Songs (Bartok); Les Préludes (Liszt). **2.0,** Records. **3.0,** Programme for Farmers. **3.45,** Concert by the Bertha Chamber Orchestra. **4.30,** Talk: The Hungarian Plain. **5.0,** Sports Report. **6.15,** Talk. **6.45,** Humorous Programme. **7.40,** Talk. **8.15,** Cavalleria rusticana—One-Act Opera (Mascagni), followed by Orchestral Concert, from the Open-Air Theatre in the Zoological Gardens. Soloist, Maria Németh. **10.15,** News. **10.45,** Concert by the Kiss Cigány Band from the Hotel Metropole.

CASSEL.—Relays **Frankfurt.**

COLOGNE

685 kc/s, 455.9 metres; 60 kW.—**6.15 a.m.,** See **Hamburg. 8.0,** Time; News. **8.10,** Talk for Peasants. **8.30 to 9.0,** Service. **9.15,** Surprise Programme. **10.15,** Talk with Records: Scandinavian Folk Music. **10.45,** Readings. **11.0,** Concert by the Station Orchestra; Conductor, Buschkötter; Soloists, Kläre Hansen (Soprano), Grape (Pianoforte), and Engels (Tenor): Introductory Talk; Sonata (Sterkel); Three Songs (Neefe); Symphony, Maria Theresa (Handel). **12 Noon,** Wind Band Concert, relayed from the Drachenfels. In the intervals at **12.55 p.m.,** Greetings, and **1.0,** Announcements. **2.0,** Variety Concert for the Radio Exhibition, Berlin. Leo Eysoldt's Orchestra, the Station Schrammel Quartet, a Saarbrücken Miners' Band, the Six Merry Singers, and Willy Schneider (Baritone). **3.0,** Talks for Parents. **3.20,** Report from the Rifle Shooting Competitions at Ahaus. **3.40,** Report from a Stud. **4.0,** Variety Concert. In the interval, at **4.30,** Report from a Falcon Sanctuary. **6.0,** Talk with Records: Caruso. **6.40,** Instrumental Concert; Terese Sarata Kuermann (Violin), Arbeiter ('Cello), and Rummel (Pianoforte): Violin and Pianoforte Duet Scherzo-Tarantella (Wieniawsky); Pianoforte Solo (Chopin); Variations in B flat; Tarantella for 'Cello and Pianoforte (Popper). **7.0,** See **Berlin (Deutschlandsender). 8.0,** Concert for the Radio Exhibition, Berlin; The Small Station Orchestra, a Saarbrücken Miners' Band, the Six Merry Singers, Engels and a Strolling Singer (Tenors); Conductor, Eysoldt; Overture, Euryanthe (Weber); Ballet Music from Undine (Lortzing); The Flight of the Bumble Bee (Rimsky-Korsakov); Dance of the Tumblers (Rimsky-Korsakov); Prelude to Donna Diana (Reznicek); Tenor Solos (Wolf): (a) Verborgenheit, (b) Heimweh; Interlude by the Saarbrücken Miners' Band and Engels (Tenor); Overture, Manfred (Schumann); Selection from The Nutcracker Ballet (Tchaikovsky); Kaiserwalzer (Strauss); Tenor Solo, Ich zieh in die Welt (Kneip); Polka, Bahnfrei (Strauss); Songs: (a) Für dich allein (Geehl), (b) Italian Folk Song; The Six Merry Singers: Tarantella and Folk Dance; Military March (Schubert). In the interval, at **10.0 p.m.,** Time; News.

COPENHAGEN.—Relays **Kalundborg. CORK**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**10.0 a.m. to 12 Noon,** Programme in English by the International Broadcasting Company of London. **10.0,** Novelty Orchestra. **10.15,** Concert. A Summer Afternoon in England. **10.30,** Sacred Music. **10.45,** Military Band Music. **11.0,** Sacred Music. **11.30,** Happy Half-hour. Orchestral Music. **12 Noon to 2.0 p.m.,** Programme in French. **2.0 to 6.30,** Programme

in English by the I.B.C. **2.0,** Dance Music. **2.30,** Concert of Gramophone Records. **3.0,** Request Programme. **3.30,** Tears and Laughter—Concert. **4.0,** Light Orchestral Music. In the interval at **4.15,** The Thought of the Week. The Rev. James Wall, M.A., Precentor of Durham Cathedral. **4.30,** The I.B.C. Nursery Corner, with Flossie and the Uncles. Birthday Greetings. **4.45,** Music for the Children. **5.0,** I.B.C. Members' Request Programme. Compiled by Mrs. Vera Edwards, of St. John's Road, Sandown, Isle of Wight—My Romance. **5.30,** Concert. By the Sea and River. **5.45,** Syncopated Pianoforte Solos. **6.0,** Dance Music. **6.30 to 9.30,** Programme in French. **9.30** till Close Down, Programme in English by the I.B.C. **9.30,** Dance Music. **10.0,** Old Favourites. **10.15,** Orchestral Music. **10.30,** Light Music. **11.0,** Round the Opera Houses of Europe. **11.30,** Dance Music by the I.B.C. (Ireland), Ltd. **12 Midnight,** Club Concert for Ipswich Listeners. Dance Music. **12.30 a.m. (Monday),** I.B.C. Time Signal. **12.31,** Dance Music. **1.0,** I.B.C. Goodnight Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**6.15 a.m.,** See **Hamburg. 8.15,** Time; News. **8.25,** Gym. **8.45,** Sacred Music. **9.0,** Protestant Service. **9.45;** Literary Programme. **10.30,** Concert by the Humoria Choral Society; Conductor, Koch: Song (Hegra); Songs (Schubert): (a) Der Entfernten, (b) An den Frühling, (c) Chorus from Rosamunde, (d) Dörfchen, (e) Gondelfahrer, (f) Trinklied. **11.30,** Reading. **11.45,** Interval. **12 Noon,** Concert for the Radio Exhibition. Operetta and Dance Music by the Station Orchestra; Conductor, Merten; Soloists, Lena Martin-Bössnicker (Soprano) and Peter Anders (Tenor): Overture, Tantalusqualen (Suppé); Waltz from Der Opernball (Lanner); Overture, Ihre Excellenz (Heuberger); Overture, Waldmeister (Joh. Strauss); Two Airs from Die Fledermaus (Joh. Strauss); Overture, The Arabian Nights (Joh. Strauss); March (Blankenburg); Ländler (Lanner); March (Hellmesberger); Ich hab' kein Geld (Millöcker); Er soll dein Herr sein (Millöcker); Lob der Polin (Millöcker); March from Der Obersteiger (Zeller); Duet from Der Bettelstudent (Millöcker); March from The Bird-Fancier (Zeller); Overture, Marches and Waltz from Die Landstreicher (Ziehrer); Waltz (Lincke); March (Gangiberger). **2.0, p.m.,** Punch in a Paddleboat—Sketch (Freyberg. **3.0,** Programme for Farmers. **4.0,** See **Cologne. 6.0,** Talk. **6.30,** Report: The Tenth International German Motor Grand Prix at Freiburg. **7.0,** Variety Programme. **7.30,** Sports Report. **7.40,** See **Leipzig. 8.0,** See **Cologne. 10.0,** See **Stuttgart. 10.20,** Time; News. **10.35,** Local News; Weather; Sports Report. **10.45,** Concert by the Station Orchestra; Conductor, Merten; Soloist, Karl Nentwig (Tenor). **12 Midnight,** See **Stuttgart. 2.0 a.m. (Monday),** Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg, and Hanover, 1,330 kc/s, 225.6 metres.**—**6.15 a.m.,** Hamburg Harbour Concert. **8.15,** Time; News. **8.30,** Gym. **8.45,** Wireless Notes. **9.0,** Records. **9.30** (from **Hanover**), Roman Catholic Service. **11.0,** Modern Songs and Lyrics: Songs of Strüver and Wehding; Lyrics of Luetjens, Gath, Eich and Scheller. **11.20,** Recital by the Station Choir and Günther Bobrik and Willy Essmann (Recitations); Conductor and Organist, Gregor. **12 Noon,** Concert by the Station Orchestra; Conductor, Secker. In the interval, at **12.55 p.m.,** Time; Weather. **2.0,** Programme for Children. **3.0,** Concert by the Niederlitz Bandonion Orchestra: March (Niederlitz); Kaiserwalzer (Joh. Strauss); Tango, Donna Vatra (Köpping); Schelmentanz (Niederlitz); Einig und treu (Niederlitz); Sérénade printanière (Lacombe); March (Kral). **3.35,** Reading of Animal Stories. **4.0,** See **Königsberg. 6.0,** The First Guest—Dialect Comedy (Behncken). **6.50,** Weather. **7.0** (from **Flensburg**), Recital by the Flensburg Travelling Choir: Conductor and Organist, Ilse Struck: Passacaglia in C minor (Bach); Es ist das Heil uns kommen her (Präetorius); Erhalt uns Herr, bei deinen Wort (Praetorius). **7.30,** Sports Report. **7.40,** See **Leipzig. 8.0,** See **Cologne.** In the interval, at **10.0,** News. **10.30,** See **Berlin (Deutschlandsender).**

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Keotwijk,** 50 kW., from **3.40 p.m.—8.40 to 9.40 a.m.,** Programme of the Workers' Radio Society (V.A.R.A.). **8.40,** Records. **8.44,** Announcements. **8.45,** Horticultural Talk. **9.15,** Organ Recital by Jong. **9.40 to 11.40,** Programme of the Liberal Protestant Radio Society (V.P.R.O.). **9.40,** Organ Recital and Service from the Mennonite Church, Amsterdam. **11.40 to 4.40 p.m.,** Programme of the General Broadcasting Company (A.V.R.O.). **11.40,** Talk. **12.10 p.m.,** Concert by Kovacs Lajos and his Orchestra. In the interval: Records. **1.40,** Book Review. **2.10,** Choral Concert by the Caecilia Male Voice Choir. Conductor: Van Leeuwen. Temple Song (Budelman); Tota Pulchra (van Leeuwen); Records; Psalm No. 94 (Muus); Springsong (Loots). **2.40,** Concert by the Residence Orchestra, relayed from the Kurhaus, Scheveningen. Conductor: Ignaz Neumark. Soloists: Rijneke (Pianoforte) and Brill ('Cello). Overture, Rosamunde (Schubert); Pianoforte Concerto in F minor (Chopin); Records; 'Cello Concerto in A minor (Saint-Saëns); Suite No. 1 from Carmen (Bizet). **4.10,** Records. **4.40 to 7.40,** V.A.R.A. Programme. **4.40,** Orchestral Concert. **5.40,** Sports Talk. **6.0,** Concert by the V.A.R.A. Orchestra. **6.40,** Recitations **6.55,** Concert (contd.). **7.40** till Close Down, A.V.R.O. Programme. **7.40,** Time; News. **7.55,** Orchestral Concert from the Kurhaus Scheveningen. Conductor: Schuricht, Soloist: Vasa Prihoda (Violin). Overture, Meeresstille und glückliche Fahrt (Mendelssohn); Violin Concerto in D (Mozart). **8.40,** News. **8.55,** Concert by the A.V.R.O. Orchestra. Conductor: Treep. Soloist: Hélène Cals (Soprano). **10.40,** Records. **11.40,** Time; Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. (until **6.40 p.m.**); 20 kW. from **6.40 p.m.—8.10 a.m.,** Religious Programme of the Catholic Radio Society (K.R.O.). **9.10 to 11.55,** Programme of the Christian Radio Society (N.C.R.V.). **9.10,** Records: Sacred Music. **9.30,** Service from the Groote Kerk, Rotterdam. After the Service, Records. **11.55 to 4.40 p.m.,** K.R.O. Programme. **11.55,** Concert by the K.R.O. Boys. Conductor: Lustenhouwer. In the Interval at **12.40,** Talk. **1.50,** Literary Talk. **2.10,** Concert from the Seinpost Theatre, Scheveningen. The St. Caecilia Choirs of Amsterdam and The Hague and De Veen's Ensemble. Soloists: Helene Ludolph Geysen (Soprano), Perlot (Baritone), and de Veen, Jun. (Pianoforte). **4.10,** Programme for Invalids. **4.40 to 7.25,** N.C.R.V. Programme. **4.40,** Records. **5.30,** Service from Oude-Bildtzijl. **7.25** till Close Down, K.R.O. Programme. **7.25,** Records. **7.30,** Religious Address. **7.55,** Concert by a Catholic Boys' Choir. Conductor: van Elferen. Kyrie eleison (Casciolini); O Gloriosa Virginum (de Lassus); Jesu Rex Admirabilis (Palestrina); Verbum Caro (Lassus); Confitemini Domino (Constantini). **8.15,** Records. **8.25,** Concert by the K.R.O. Orchestra. Conductor: van 't Woud. Soloist: Wies Defresne (Soprano). Overture, Anacreon (Cherubini); Three Italian Songs; Piedmontese Dances (Sinigaglia); Toréador et Andalouse (Rubinstein). **8.55,** News. **9.0,** Concert by a Sailors' Choir. Conductor: van Elferen. **9.20,** Records. **9.30,** Concert by the K.R.O. Orchestra. Conductor: van 't Woud. Dutch Dances (Röntgen); Armoe (van Dalen); Avond (van Dalen); Overture, Nakiris Hochzeit (Lincke); Selection from The Daughter of the Regiment (Donizetti). **9.55,** News. **10.20,** Choral Epilogue. **10.40** (approx.), Close Down.

INNSBRUCK.—Relays **Vienna.**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres;** and **Skamlebaek, 49.5 metres.**—**7.57 a.m.,** Weather. **8.0,** Gym. **8.30,** Weather. **9.0 to 9.30,** Talk. **10.0,** Service from Copenhagen Cathedral. **11.30,** Weather; News. **12 Noon,** Time; Town Hall Chimes; Weather. **12.5 p.m.,** Concert by Carl Rydahl's Instrumental Ensemble: March (Fucik); Overture, Die Felsenmühle (Reissiger); Waltz, Wiener Bürger (Ziehrer); Lullaby (Fini Henriques); Valse triste (Sibelius); Selection from The Little Dutch Girl (Kálmán); Minuet (Dolfi); Hungarian Comedy Overture (Kéler-Béla). **1.0,** Talk in English. **1.20,** Talk in German: The Collapse of the Central European Powers in 1918. **1.40,** French Poetry. **2.0,** Service from **Christiansborg. 3.30,** Choral Concert; Conductor, Thoms. **4.0,** Open-air Concert; Conductor, Hye-Knudsen; Soloist, Eigil Mortensen (Saxophone). **5.50,** Programme for Children. **6.20,** Talk: Japan's Daily Press. **6.50,** Weather; Announcements. **7.0,** News; Sports Results. **7.15,** Time. **7.30,** Political Review. **8.0,** Town Hall Chimes. **8.5,** Gluck and Wagner Concert: The Station Orchestra; Conductor, Mahler. Part 1: Gluck: Overture, Alcestis; Aria from Iphigenia; Ballet Music from Paris and Helen. Part 2: Wagner: Prelude and Aria from Lohengrin; Siegfried Idylls; Entry of the Guests into the Wartburg, from Tannhäuser. **8.50,** The Hansen Family—Sketch (Locher). **9.5,** Violin Recital by Alfred Jensen: Air (Veracini); Serenade in G (Arensky); Dance (Aulin). **9.20,** Talk. **10.5,** News. **10.15,** Concert by the Station Orchestra; Conductor, Mahler; Soloist, Henry Musck (Oboe): Overture, William Tell (Rossini); Waltz and Spanish Dance from Donna Diana (Reznicek); Oboe Concerto (Goossens); Hungarian Rhapsody No. 4 in D (Liszt). **11.0,** Dance Music from the Wivex. **12 Midnight,** Time; Town Hall Chimes. **12.5 a.m. (Monday),** Dance Music (contd.). **12.30** (approx.), Close Down.

KIEL.—Relays **Hamburg. KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—**6.15 a.m.,** See **Hamburg. 8.20,** Report for Farmers. **9.0,** Service. **10.50,** Programme for Children. **11.0,** Weather; Programme Announcements. **11.5,** Programme for Children. **11.20** (from **Danzig**), Literary and Musical Programme. **12 Noon,** See **Leipzig. 2.0 p.m.,** Chess Lesson. **2.30** (from **Danzig**), Talk: Genealogy. **2.50,** Talk with Records: Masurian Folk Songs. **3.20,** Sports Notes. **3.30,** Ansorge Recital by Erika Tumm (Pianoforte): Traumbilder; Ballad. **4.0,** Concert by the Opera House Orchestra, relayed from the Tiergarten; Conductor, Brückner. In the interval at **5.0,** Talk. **6.0** (from **Danzig**), Reading (Hölderlin). **6.20,** Recital by Gerda Heuer (Soprano): Seven Chinese Songs (Röntgen); Songs (Knorr), (a) Menschenbeifall, (b) Letzter Wille, (c) Nachtgesang, (d) Windstill ist's. **6.45,** Rhenish Folk Legends. **7.10,** Concert by the Königsberg String Quartet. **7.40,** See **Leipzig. 8.0,** See **Cologne. 10.0,** News; Sports Report. **10.50,** See **Berlin (Funkstunde).**

KOSICE.—Relays **Prague. LAUSANNE.**—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.**—**6.15 to 8.15 a.m.,** See **Hamburg. 8.30,** Organ Recital by Franz Neumann, from Annaberg. **9.0 to 9.45,** Service. **10.0 to 10.30,** Talk: The German Reich. **12 Noon,** Military Band Concert. March (Schweichert); Overture, Il Guarany (Gomez); Air from La Bohême (Puccini); March (Mühlberger); March (Poliak); Auf zug der Liliputanergarde (Staub); March (Rust); March (Meissner). **1.0 p.m.** (from **Dresden**), Concert by the Dresden Philharmonic Orchestra. Conductor, Schestak. Overture, A Life for the Czar (Glinka); Russian Dance (Bullerian); Norwegian Melodies (Grieg); Waltz, Manola (Waldteufel); Elegie (Suk); Potpourri, Minutenspiele (Fétras); March (Schmeling). **2.0,** Weather; Time. **2.5,** Programme Announcements. **2.30,** Talk: The Peasant and Nationality. **2.55,** Schubert Concert. The Station Choir. Conductor, Werlé. Soloist, Fritz Marr (Pianoforte). Ecossaises; Schmücket die Locken; Die Nachtigall; German Dances; Geist der Liebe; Naturgenuss; Ländler; Das Dörfchen; Der Gondelfahrer; Two Scherzi; March. **3.5,** Programme for Young People. **4.0,** See **Cologne. 5.30,** A Humorous Story. **5.55,** Concert of Operetta Music by the Station Orchestra. **7.25,** Topical Talk. **7.40,** Report: The World Cycling Championship. **8.0,** See **Cologne.** In the interval, Election Results. **10.0,** News; Sports Notes. **10.50,** See **Berlin (Funkstunde).**

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 150 kW.—**7.45 a.m.,** Records. **8.0,** News in French; Record; News in German; Record; Pigeon Flying Notes. **11.30,** Record; Religious Address; Record. **11.50,** News in French and German. **12 Noon,** Light Music. **12.30 to 1.0 p.m.,** Programme arranged by the International Broadcasting Company (Ireland), Ltd. Dance Music. **1.30,** Light Music. **2.0,** Variety Programme. **2.45,** Dance Music. **4.0,** Records. **5.0,** Variety Programme. **8.0,** Popular Programme. **8.30,** Racing Results; News in French and German. **9.0,** Variety Programme. **10.0,** Light Music. **10.30,** Dance Music.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**9.0 a.m.,** News. **10.0,** Announcements. **10.30,** Interval. **2.0 p.m.,** Chimes; Light Music. **2.30,** Sextet Concert. **3.0,** Amusement Guide; Light Music. **3.30,** Sextet Concert. **4.0,** Light Music. **4.30,** Sextet Concert. **5.0,** Interval. **6.0,** Chimes; Light Music. **7.0,** Violin Recital. **8.0** (approx.), Concert on Spanish Instruments: Polonaise (Bach); Capricho arabe (Tárrega); Muñeira (Montes); Turkish March (Mozart); Fantasia morisca (Chapi); Moment musical (Schubert); Negra sombra (Montes); Gigantes y cabezudos (Caballero). **8.30,** Dance Music. **10.0,** Chimes; Sextet Concert. In the Interval, Talk. **11.0** (approx.), Song Recital by Obregon. **11.30,** Concert by the Municipal Band. Conductor, Villa. **1.0 a.m. (Monday),** Chimes. **2.0 to 3.0,** Programme in English, arranged by the International Bradcasting Company of London. Dance Music. **3.0,** I.B.C. Goodnight Melody and Close Down.

MADRID

EAQ, 10,000 kc/s, 30 metres; 20 kW.—**11.15 p.m.,** News. **11.30,** Spanish Music; Programme from **Madrid (EAJ7). 12 Midnight** till Close Down, Programme in English, arranged by the International Broadcasting Company of London. **12 Midnight,** Spanish Music. **12.30 a.m. (Monday),** I.B.C. Goodnight Melody and Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.**—**9.40 to 9.55 a.m.,** News. **10.0,** See **Rome. 11.0,** Mass from the Church of the Annunciation, Florence. **12.0 to 12.15 p.m.,** Bible Reading. **12.30,** Records. **1.0,** Time; News. **1.5 to 2.15,** Records. **4.15,** Records; Sports Notes. **5.15,** Light Music. **6.15,** Weather. **6.20 to 6.30,** Sports Notes. **7.30,** Time; News; Dopolavoro Notes. **7.40,** Sports Notes; Records. **8.45,** Concert. **11.0,** News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**11.30 a.m.,** Announcements; Bible Reading. **12 Noon,** Time Signal; Weather. **12.3 p.m.,** Band Concert. **12.30,** Orchestra. **12.55,** News. **1.5,** Orchestra (contd.). **1.25,** Guessing Competition. **1.30,** Dance Music. **2.0,** Interval. **5.0,** Announcements; Concert relayed from the Kursaal. **5.30,** Music of French Switzerland. **6.0,** Programme for Children. **6.15,** Orchestral Concert. **6.30,** Programme for Boys. **6.45,** Sports Notes. **7.0,** Programme for Women. **7.15,** Organ Recital by Schlatter: Prelude and Sicilienne from the Sonata in F minor (Martini); Concerto (Walther); Ave Maria (Bossi); Choral No. 3 in A minor (Franck). **7.45,** News. **7.55,** Sports Results. **8.0,** Concert by the Radio Orchestra; Conductor, Casella; Soloist, Eva Cattaneo (Soprano): Overture, Richard III (Humphries); Songs, (a) Charlie is my darling (arr. Clutsam), (b) Drink to me only with thine eyes (Quilter); Selection from The Mikado (Sullivan); Songs, (a) It was a Lover and his Lass (Keel), (b) Cherry Ripe (Cyril Scott); Miniature Suite (Coates); Songs, (a) Linden Lea (Vaughan Williams), (b) The Blackbird's Song (Cyril Scott); Petite Suite de Concert (Coleridge-Taylor); Song, Minnetonka (Lieurance); Potpourri of British Folk Melodies, Britelodia (Humphries). **9.30,** Concert: Gavotte (Emma); Minuet (Negri); Serenata (Scarano); A la tzigana (Monti); Pavane (Galimberti); Melody (Denza); Festa del villaggio (Billi); Dance (Galimberti). **10.0,** Sports Notes. **10.15** (approx.), Close Down.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.30 a.m.,** See **Prague. 10.5,** Song Recital by Nina Robby, Vera Repková, **10.30,** See **Brno. 11.10,** See **Bratislava. 12 Noon,** See **Prague. 1.55 to 2.0 p.m.,** See **Brno. 4.0,** Variety Programme; Part 1: Two Robbers—Comedy in One Act; Part 2: Recitations by Neruda; Part 3: Concert by the Station Orchestra: Overture, The Tinker (Skroup); Waltzes (Smetana); Poems; Czech Suite (Dvorák); Love Songs (Blodek); Künstlerleben (Joh. Strauss); Lincke Potpourri; Polka (Tichy); Gallop (Leopold). **5.55,** See **Prague. 8.10,** See **Brno. 8.40,** See **Prague. 11.30** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.,** News. **5.30,** Fanfare. **5.45,** Gym. **6.15,** Announcements. **7.30,** Records. **9.0,** Musical Programme. **9.55,** Time. **10.0,** News. **10.15,** Concert. **11.15,** Talk in Swedish: Discussion on Socialist and Capitalist Competition. **2.45 p.m.,** News. **3.15,** Programme for Children. **3.55,** Time Signal. **4.0,** News. **5.30,** Red Army Programme. **6.30,** Programme for Collective Farm Workers. **8.0,** Musical Programme. **9.0,** Weekly Review and Letter-Box in German. **9.55,** Chimes. **10.5,** Weekly Review and Letter-Box in English. **11.5,** Talk in Swedish: Politics in the U.S.S.R.

MOTALA.—Relays **Stockholm. MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nürnberg, 1,267 kc/s, 236.8 metres;** and **Kaiserslautern, 1,195 kc/s, 251 metres.**—**6.15 a.m.,** See **Hamburg. 8.15,** Wireless Notes. **8.45,** Violin and Pianoforte Recital by Kolber and Bergner: Sonata in D (Handel); Sonata (Debussy). **9.30,** Roman Catholic Service. **10.10,** Chimes. **10.15,** Sunday Reading. **10.40,** Flowers and Leaves—Literary and Musical Sequence (Jansen). **11.20,** New Lyrics of Heinrich Anacker, Friedrich Bevern and Andreas Weinberger. **11.40,** Harvest Thanksgiving (on Records). **12 Noon,** Military Band Concert from the Feldherrnhalle. **1.0 p.m.,** See **Leipzig. 2.0,** News. **2.10,** Talk for Farmers. **2.30,** Music Talk with Records. **3.20,** Play for Children (Steck). **4.0,** Orchestral Concert; Conductor, Kloss: Overture, Don Pasquale (Mozart); Lyric Suite (Grieg); Russian Waltz Potpourri (Leopold); Scenes from Hanneles Himmelfahrt (Schmidt); Ballet (Lassen); Veif Intermezzo from Mona Liza (Schillings); Ziguenerweisen (Sarasate); Kiss Serenade and Piece (de Micheli). **5.30,** Talk. **5.50,** Soprano Song Recital by Berta Taubert-Metzmacher. Part 1: Wolf: Frühling über's Jahr; Gleich und gleich; Als ich auf dem Euphrat schiffte; Nixe Binsefuss. Part 2: Pfitzner: Immer leiser wird mein Schlummer; Unter den Linden; Sonst. **6.50,** Weather; Sports Report. **7.0** (from **Nürnberg**), Franken, du mein Heimatland—

AUG. 19th SUNDAY *continued*

Sequence for Orchestra, Chamber Choir, Baritone and Speaking Choir (Kärl Schäfer). **8.0,** See **Cologne. 10.0,** News. **10.40,** Light Music. **12 Midnight,** Close Down.

NAPLES.—Relays **Rome. NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jelöy, 6,990 kc/s, 42.92 metres.—4.0 p.m.,** Sacred Music from a Church. **5.0,** Recitations. **5.30,** Harp Recital by Elsa Lindemann: Sonata in B Flat (Nademann); Arabesque (Debussy); Lolita la danseuse (Tournier); Les enfants de la crèche de Noël (Tournier). **5.50,** Service from a Church. **7.15,** Weather; News. **7.30,** Time. **7.31,** Concert by the Station Orchestra; Conductor, Kramm; Soloist, Erna Berger (Soprano): Overture, Tannhäuser (Wagner); Suite from Alceste (Gluck); Spanish Caprice (Rimsky-Korsakov). **8.40,** Talk. **9.10,** Pianoforte Recital by Lövdal: Fantasia in E Minor (Mozart); Two Pieces (Schumann): (a) Warum?, (b) Aufschwung; Three Preludes, Nocturne and Waltz (Chopin). **9.40,** News. **10.0,** Topical Talk. **10.15,** Wind Instrument Band Concert. **11.0,** Dance Records.

OSTERSUND.—Relays **Stockholm.**

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 a.m.,** News. **8.30,** Organ Recital of Light Music by John Girard. **9.30,** Programme for Children. **10.0,** Sports Review. **10.15,** Records of Italian Music. **11.0,** Dance Music by the Dervaux Jazz Band. **12.15 p.m.,** Concert by the Locatelli Orchestra. **1.0,** News. **5.45,** Talk. **6.15,** Talk. **6.30,** News. **7.45,** Announcements. **7.53,** Medical Talk. **8.0,** Records. **8.30,** La vie de Bohême—Play in Five Acts (Bannière-Murger). **10.20** (approx.), News. **10.30,** Dance Music.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**10.0 a.m.,** Press Review. **10.20,** Announcements. **10.25,** Records. **11.50,** Recitations. **12.5 p.m.,** Variety Items. **12.15,** Records. **12.45,** News. **12.58,** Records. **1.20,** Interval. **1.30,** Records. **2.0,** Interval. **5.30 to 6.30,** Programme in English by the International Broadcasting Company of London. **5.30,** Dance Music. **6.0,** That Cruise!—Concert. **6.50,** Roman Catholic Address. **7.20,** News. **7.25,** Sports Notes. **7.35,** Records. **7.50,** Concert. **8.0,** Interval. **8.10,** A Sound Film. **10.20,** News. **10.30** till Close Down, Programme in English by the I.B.C. **10.30,** Concert—Episode VI: A Night Out in London. **10.45,** Dance Music. **11.0,** Old Favourites. **11.30,** I.B.C. Good-night Melody and Close Down.

PARIS

RADIO-PARIS, 182 kc/s, 1,648 metres; 75 kW.—**7.0 a.m.,** Records. **7.15,** Press Review; Weather. **7.45,** Gym. **8.0,** Records. **10.15,** Concert relayed from **Vichy. 11.30,** Organ Recital by Mme. Marthe Bracquemond; Four Chorals (Brahms); Andante and Scherzo from the Fourth Symphony (Widor); Bach Prelude and Fugue on the name Bach (Liszt). **12. Noon,** Religious Address. **12.20 p.m.,** Sacred Music on Records. **12.30,** Bilboquet. **12.45,** Records. **1.0,** Concert by the Victor Pascal Orchestra. **3.0,** Programme for Children. **4.0,** Records. **5.0,** Dramatic Programme; Pierrot Posthume—Comedy (Gautier); Rivaux d'eux-mêmes—Comedy (Pegault-Lebrun). **6.0,** Concert by the Lucien Goldy Orchestra. **7.0,** Radio-Paris Circus. **7.30,** Topical Talk. **8.0,** Songs (Odette Bergeal and Ramella). **8.30,** Press Review; Weather. **8.54,** Italian Caprice (Tchaikovsky), on Records. **9.0,** Rigoletto—Opera (Verdi), relayed from **Vichy.**

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres;** and **25.27 metres.—3.0 p.m.,** Southernaires. **3.30,** Samovar Serenade. **3.52,** Christian Science Services. **5.15,** Gould and Shefter. **5.30,** Radio City Concert. **6.30,** Sunday Forum. **7.0,** South Sea Islanders. **7.30,** Concert Artists. **8.0,** To be announced. **9.30,** Vespers—Shadyside Church. **10.30,** Radio Explorers' Club. **10.45,** To be announced. **11.0,** Those Three Girls. **11.15,** Baseball Résumé. **11.30,** Baltimore Municipal Band. **12 Midnight,** Silken Strings. **12.30 a.m. (Monday),** Musical Art Programme. **1.0 to 6.0,** Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.30 a.m.,** Gym; Music; News. **7.0,** Promenade Concert by the Karlsbad Municipal Orchestra, from **Karlsbad.** Choral: Overture, Chorus and Dance from Aida (Verdi); Carnival Overture (Glickh); Serenade (Renée); Selection from The Two Widows (Smetana-Horák); Overture to Banditenstreiche (Suppé); Waltz on Motives from Giuditta (Lehár); Idyll, Mill in the Forest (Eilenberg); Potpourri of Popular Tunes (Recktenwald); March (Ecker). **8.30,** Organ Recital by Dr. Al. Michl from St. Salvator's Church. **9.0,** Social Talk for Workers. **9.15,** Trio Concert. **9.40,** The Loch Ness Monster—Variety Programme. **10.5,** Cossack Songs by a Russian Vocal Octet. **10.30,** See **Brno. 11.0,** See **Bratislava. 12 Noon,** Chimes. **12.5 p.m.,** News. **12.15,** Czech Folk Songs of the Sixteenth, Seventeenth, Eighteenth and Nineteenth Centuries by the Station Orchestra and Soloists. **1.30,** Programme for Farmers: Harvest Home. **1.45,** Social Notes. **1.55,** Interval. **4.0,** See **Moravská-Ostrava. 5.55,** German Transmission: Light Music by German Composers of Bohemia, by the Station Orchestra. Conductor: Gustav Wiese. **6.55,** News in German. **7.0,** News. **7.5,** Military Band Concert. Conductor: Jan Uhlir. March (Leopold); Overture, Martha (Flotow); Gavotte (Oberthor); Smetana Potpourri (Potuznik); Polka (Modr); March (Uhliz); Ballet Suite, The Swan Lake (Tchaikovsky); March from The Bartered Bride (Smetana). **7.55,** Travelogue. **8.10,** See **Brno. 8.40,** Concert by a 'Cello Quartet. Abendlied (Schumann); Serenade (Kaan); Folk Tune (Grieg); Little Butterflies (Caix d'Hervelois); Allegro spirituoso (Senaillé). **9.0,** Time; News. **9.10,** Act I of Madame Butterfly (Puccini), on Records. Conductor: Melajoli. **10.0,** Time; News; Sports Notes. **10.20,** Record. **10.25,** News; Sports Notes in German. **10.30,** Dance Music. **11.30** (approx.), Close Down.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan (No. 2), 1,348 kc/s, 222.6 metres; Turin (No. 2), 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.—9.40 a.m.,** Announcements. **10.0,** Programme for Farmers. **11.0,** See **Milan. 12 to 12.15 p.m.,** Bible Reading. **12.30,** Records. **1.5 to 2.15,** See **Milan;** in the interval, at **2.0,** Time; News. **4.15,** Talk. **4.30,** Records; Sports Notes. **5.0,** Vocal and Instrumental Concert. **6.0,** Popular Music and Dance Music. **6.15,** Weather **7.30,** Sports Notes; Announcements. **8.0,** Time; News; Records. **9.0.** Rigoletto—Opera (Verdi), relayed from **Vichy. 10.0** (approx.), Light Music. **11.0,** News.

RUYSSELEDE

10,330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.,** News in French. **8.0,** See **Brussels No. 1. 9.0,** News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by **2XAF** on **31.48 metres,** and by **W2XAD** on **19.56 metres.—7.0 p.m.,** Talkie Picture Time; Sketch. **7.30,** Orchestral Concert. Conductor: Max Dolin. **11.45,** Irene Beasley (Songs), **12 Midnight,** Variety Programme. **1.0 to 4.30 a.m. (Monday),** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW.; and **Geneva, 401 kc/s, 748 metres.—9.55 a.m.** (from **Geneva**), Chimes. **10.0** (from **Geneva**), Protestant Service. **11.0** (from **Geneva**). Military Band Concert. **12 Noon** (from **Geneva**), Records. **12.30 p.m.,** News. **12.40** (from **Geneva**), Records. **2.0,** Interval. **4.0** (from **Geneva**), Concert by the Station Orchestra. **4.45,** Records. **5.15,** Concert (contd.). **6.0,** Interval. **6.30** (from **Geneva**), Records. **7.0** (from **Geneva**), Religious Address. **7.30** (from **Geneva**), Sports Talk. **7.59,** Weather. **8.0** (from **Geneva**), Song Recital by Pierre Zennaro. **8.20** (from **Geneva**), Talk. **8.40** (from **Geneva**), Concert by the Station Orchestra; Conductor, Echenard; Soloist, Zennaro (Songs). **9.15,** News. **9.20,** Concert (contd.). **10.0** (from **Geneva**), Sports Results. **10.15** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.—9.30 a.m.,** Talk for Farmers. **10.0,** Records. **11.0,** Service. **12.45 p.m.,** Weather. **3.0** (from **Göteborg**), Concert: Overture, Russlan and Ludmilla (Glinka); Waltz Fantasia (Glinka); Melody (Krein); Two Slav Dances (Dvorák); Elegy (Glasounov); Potpourri of Tchaikovsky Music (Urbach). **4.0** (from **Boden**), Programme for Children. **4.30,** Choral Concert relayed from **Falun,**

AUG. 19th SUNDAY *continued*

1,086 kc/s, 276.2 metres. 5.0, Weather. 5.5, Talk. 5.30, Sports Report. 6.0, Evensong. 7.15, News. 7.35, Play (Norlind). 9.0, Orchestral Concert; Conductor, Grevillius: Soloist, Ralf (Songs): Overture, Phèdre (Massenet); Songs, (a) Ballad from Rigoletto (Verdi), (b) Aria from Tosca (Puccini), (c) Aria from I Pagliacci (Leoncavallo); Waltz from Der Rosenkavalier (R. Strauss); Wagner Songs, (a) Aria from Lohengrin, (b) Two Arias from The Mastersingers; Hungarian Rhapsody No. 1 (Liszt). 9.45, News. 10.0, Light Music; Conductor, Grevillius. 11.0 (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—9.30 a.m., Records. 10.45, Protestant Service. 11.30, Roman Catholic Service in German. 12 Noon, Records; News. 12.15 p.m., Orchestral Concert relayed from **Rennes, 1,040 kc/s, 288.5 metres.** 1.0, Time; News. 1.15, Concert from **Rennes** (contd.). 2.0, Records. 3.30, Concert relayed from the Casino, Vichy. Conductor: Brouillac. 4.45, Talk by the Bishop of Assam: The Present Situation in India. 5.0, Orchestral Concert. Conductor: Roskam. Selection from Lucia di Lammermoor (Donizetti); Nachtlied (Schumann); Liebesgram (Schumann); Overture, Allessandro Stradella (Flotow); Ballet Music (Scassola); Intermezzo (Sumkay); Dynamidenwalzer (Jos. Strauss); Hochzeitszug in Liliput (Translateur). 6.0, Medical Talk. 6.15, Sports Talk. 6.30, Concert of Light Music by the Station Orchestra. Conductor: Roskam. March (Heymann); The Wedding of the Winds (Hall); Two Pieces for Strings (Dubois); Slow Foxtrot (Long-Canfield); Selection from Der Frauenfresser (Eysler); Tango (Schwarz); Scherzo for Violin and Orchestra (Lederer); Loin de toi (Hollaender); Intermezzo (d'Ambrosio); Sittin' on a Backyard Fence (Kahal-Fain); Piccadilly March (Benoit). 7.30, Time; News. 7.45, Records. 8.0, Press Review in German and French; Lottery Results; News. 8.30, Records. 9.0, Rigoletto—Opera (Verdi), relayed from **Vichy.** Conductor: Paul Bastide. 12 **Midnight,** Close Down.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—6.15 a.m., See **Hamburg.** 8.15, Time; News. 8.25, Gym. 8.40, Announcements. 9.0, Protestant Service from **Karlsruhe.** 9.45, Concert by the Station Orchestra; Conductor, Hahn; Soloist, Theo Herrmann (Bass): The Brandenburg Concerto (Bach); Four Songs (Brahms). 10.30, Recital by a Male Voice Choir: Wie schön bist du, freundliche Stille (Schumann); Nun leb wohl, du kleine Gasse (Silcher); Die linden Lüfte sind erwacht (Schubert); Lasst ziehen uns im Morgengraun (Gellert); Sänger müssen jubilieren (Klumpp); Nacht der Heimat möcht ich wieder (Kromer); Es war ein Knabe gezogen (Kamm). 11.0, Viennese Music; Elemer von John (Bass) and Erich Herrmann (Pianoforte). Part 1: Anton Roitz; Ein Lied; Sommerklage; Einsamer Wanderer; Sommernacht; Wer weiss, wo? Part 2: Franz Ippisch; Dunkler Falter; Herbst; Einsiedel; Bitte; Augenblicke; Gebet. 11.30, Fire in Music: Records for Fire Brigade Week. 12 Noon, See **Munich.** 1.0 p.m., Topical Programme. 1.15, Marches and Songs. 2.0 to 6.0, See **Cologne.** 6.0, The Sea and the Forest—Concert by the Station Choir and Soloists. 7.0, March Records. 7.25, Sports Report. 7.40, See **Leipzig.** 8.0 to 10.0, See **Cologne.** 10.0, Report: The International Light Athletics Championships, Germany v. Switzerland. 10.20, News. 10.50, See **Berlin (Funkstunde).** 12 **Midnight,** Serenade. 2.0 a.m. **(Monday),** Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—11.0 a.m., Dance Refrains. 11.30, Chansonnettes; Orchestral Music. 12 Noon, Sound Film Music. 12.15 p.m., Orchestral Music. 12.30, Roman Catholic Service. 1.0, News. 1.5, Songs. 1.15, Orchestral Music. 1.30, Operetta Arias. 1.45, Protestant Service. 2.0, News. 6.0, News. 6.15, Opera Arias. Werther (Massenet); Sophie Arnoult (Pierné); La Bohème (Puccini); and Rigoletto (Verdi). 6.30, Military Music. 6.45, Chansonnettes; Light Music. 7.0, Orchestral Music: The Skaters' Waltz (Waldteufel); Valse de rêve (Vreuls); Valse bleue (Margis); Glow-worm Idyll (Siede) Rêve idéal (Fucik). 7.15, Duets. 7.30, News. 7.45, Sound Film Music. 8.15, 'Cello Recital: Toccata (Frescobaldi); French Serenade (Leoncavallo); Sarabande from Suite No. 1 in G (Bach); Walter's Prize Song from The Mastersingers (Wagner); Spanish Dance (Granados). 8.30, Songs. 9.0, Concert Version of The Barber of Seville—Opera (Rossini). 10.0, Au caveau de dix heures—a Radio Fantasy. 10.15, News. 10.30, Orchestral Music: Tout le monde en parle (Loyaud); Rose France (Loyraud): La Paloma (Yradier); In a Persian Market (Ketelbey); A Birthday Serenade (Lincke). 11.0, Operetta Songs. 11.15, Military Music. 11.30, Sound-Film Music. 11.50, Operetta Music. 12 **Midnight,** News. 12.5 a.m. **(Monday),** Opera Music: Aria from L'Africaine (Meyerbeer); Kermesse from Faust (Gounod).. 12.15, Orchestral Music. 12.30 (approx.), Close Down.

TRONDHEIM.—Relays **Oslo** **TURIN.**—Relays **Milan.**

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz,** and **Salzburg, 1,294 kc/s, 231.8 metres.**—8.15 a.m., Fanfare; Time; Weather. 8.20, Gym. 8.40, Hints for the Week. 8.55, Service from St. Peter's, Salzburg. 10.0, Records. 11.0, Reading. 11.20, Records: Overture, Oberon (Weber); Violin Concerto in D, Op. 61 (Beethoven); Eine kleine Nachtmusik (Mozart). 12.30 p.m., Concert by the Vienna Symphony Orchestra. Conductor: Schönherr. Soloist: Karl Rosner (Violin). Overture, The Merry Wives of Windsor (Nicolai); In lanschiger Nacht (Ziehrer); Violin Solo: Grotesque (Rosner); Suite, In the Land of the Rising Sun (Yoshitomo); Sur la mer lointaine (Moreau); Hungarian Rhapsody No. 2 (Liszt); Selection from Schön ist die Welt (Lehár); Scenes from The Bayadere (Kálmán); Overture, Im Reiche des Indra (Lincke); March (Fucik). 2.35, Time; Announcements. 2.45, Talk for Farmers. 3.5, Book Review. 3.30, Quartet in E Flat for Pianoforte and Strings, Op. 47 (Schumann). 4.0, Talk with Records: Siam. 4.30, Orchestral Concert. Conductor: Pauscher. Prelude to Theodor Körner (Schmidt-Boelke); Schubert Potpourri (Fétras); Overture, Masaniello (Auber); Wagner Potpourri (Urbach); Overture, The Water-Carrier (Cherubini); Grieg Potpourri (Urbach); Overture, Norma (Bellini); Selection from Faust (Gounod-Tavan); Overture (Meyerbeer). 6.15, Travelogue: From Bruck to Judenburg. 6.40, Wilhelm Szabo reads from his own Works. Introductory Talk by Dr. Bietak. 7.10, Time; Announcements. 7.20, Popular Music. 8.0, Motto. 8.5, Concert by the Vienna Symphony Orchestra. Conductor: Nilius. Soloist: Rudolf Malcher (Violin); Overture, Rosamunde (Schubert); Symphony No. 7 in C (Schubert); Pieces (Beethoven): (a) Zapfenstreich, (b) Romance in F for Violin, Op. 50, (c) Minuet, (d) Contredanse; Adagio (Mozart); Violin Solo: Minuet from the Divertimento in D (Mozart); Pieces (Strauss): (a) Overture, Indigo, (b) Persian March, (c) Waltz, Roses from the South. 10.0, Concert by the Wireless Symphony Orchestra. Conductor: Schönherr. Overture, Orpheus in the Underworld (Offenbach); Wiener Bohême (Toifl); Selection from Die Fledermaus (Joh. Strauss); Three Pieces (Kálmán); Aus Marinekreisen (Jaksch); Musikalischer Zapfenstreich (Fahrbach); March (Lehár). In the Interval at 10.30, News.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—8.30 a.m., Hymn. 8.35, Records. 8.38, Gym. 8.53, Records. 9.5, News. 9.10, Records. 9.20, Notes for Housewives. 9.25, Records. 10.0, Programme Announcements. 10.5, Divine Service from **Poznan, 868 kc/s, 345.6 metres;** Sacred Music on Records. 11.57, Time. 12 Noon, Fanfare. 12.3 p.m., Weather. 12.10, Concert by the Symphony Orchestra; Conductor: Oziminski; Soloist: Bakman (Violin); Potpourri (Mynarski); Violin Concerto in E (Bach). 1.0, Music Talk. 1.10, Concert of Light Music by the Station Orchestra; Conductor: Oziminski; On the Vistula (Hellmesberger); Le Moulin (Gillet); Waltz, Wine, Woman and Song (Strauss); Ballet Music from Faust (Gounod). 1.45, Travelogue from **Cracow, 986 kc/s, 304.3 metres.** 2.0, Records. 2.30, Musical Programme. 3.0, Notes for Farmers. 3.15, Records. 3.25, Exchange. 3.35, Records. 3.45, Talk: Agriculture in Denmark. 4.0, Concert of Light Music by the Seredynski Orchestra; Soloist: Dlonski (Baritone), relayed from **Lwow, 795 kc/s, 377.4 metres.** 5.0, Theatre Review. 5.10, Poznan-Warsaw Inter-relay; Soloists Concert by Gertrude Konatkowska (Pianoforte) and Ed Bender (Bass); Scherzo in F sharp (d'Albert); Rhapsody in F sharp minor (Dohnanyi); Der Doppelgänger (Schubert); Chanson langoureuse (Melcer); Song (Friemann); Toccata (Ravel); Old Vienna (Castelnuovo); Olaf's Dance (Pick-Magiagalli). 6.0, Theatre Notes. 6.15, Jazz Records. 6.45, Literary Talk: The Declaration of the Great War. 7.0, Announcements. 7.15, Concert of Light Music by the Station Orchestra; Conductor: Górzynski; March (Blankenburg); Overture, Gri-Gri (Lincke); Waltz (Jacobi); Selection from The Little Dutch Girl (Kálmán); Oriental Scene (Rust); Mazurka (Wronski); 8.0, Great Thoughts. 8.2, News. 8.12, Soprano and Tenor Song Recital by Mme. Fabry (Soprano) and Bregy (Tenor). 8.50, News. 9.0, Fanfare from Gydnia. 9.2, Humorous Programme from **Lwow.** 10.0, Technical Letter Box. 10.15, Sports Notes. 10.30, Records. 11.0, Weather. 11.5, Dance Music, relayed from the Bristol Hotel.

ZURICH.—Relays **Beromünster.**

MONDAY
AUGUST THE TWENTIETH

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.—1.30 to 2.30 p.m.,** Time; Exchange; Weather; Records. **6.0,** Programme for Children. **6.45,** News. **7.0,** Irish Lesson. **7.15,** Talk by D. J. Smyth: Dogs. **7.30,** Time. **7.31,** Gaelic Music by the Station Ensemble. **7.50,** Irish and Anglo-Irish Songs by Sean Rodgers (Tenor). **8.5,** Irish Music by Stella Seaver (Piano Accordion). **8.20,** Music by the Station Ensemble. **8.45,** The Ugly Duckling—presented by the Emer Comedy Company. **9.15,** Edie O'Dwyer (Soprano). **9.30,** Round Tower Ceilidhe Band. **10.0,** Variety Programme. **10.30,** Time; News; Weather. **10.40,** The Wickham Sisters (Variety). **11.0** (approx.), Close Down.

BASLE.—Relays **Beromünster.**

BELGRADE

686 kc/s, 437.3 metres; 2.5 kW.—**10.45 a.m.,** Announcements. **10.50,** Water Level. **11.0,** Records. **11.59,** Time; Chimes. **12.5 p.m.,** Concert by the Station Orchestra. **12.45 p.m.,** Exchange; Announcements. **1.10,** Orchestral Concert (contd.). **1.30,** News; Time. **5.55,** Time; Announcements. **6.0,** Popular Music on Records. **6.30,** Sonata, Op. 57 in F minor—Appassionata (Beethoven), by Djordje Stojkow (Pianoforte). **7.0,** Talk. **7.30,** Concert by the Station Orchestra. March (Frajt); Pieces (Mokranjac); Rustic Dance No. 2 (Golemovic); In a Chinese Temple Garden (Ketelbey); Selection from Mignon (Thomas). **8.20,** Announcements. **8.30,** Madame Butterfly—Opera (Puccini) on Records. In the Interval at **10.0,** Time; News. **11.30,** Close Down.

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.20,** See **Hamburg. 7.0,** News. **7.25,** See **Hamburg. 8.0,** Interval. **8.45,** Gym. for Women. **9.0,** Interval. **9.40,** Talk for Housewives. **10.0,** News. **10.10,** Talk: Peter Rosegger—an Austrian Poet. **10.50,** Gym. **11.15,** Weather. **11.30,** Interval. **11.55,** Weather. **12 Noon,** See **Cologne. 12.55 p.m.,** Time. **1.0,** German Dances and Songs on Records. **1.45,** News. **2.0,** Interval. **2.45,** Greetings; Programme Announcements. **3.0,** Weather; Exchange. **3.15,** Talk: Embroidery. **3.40,** Programme for Young People. **4.0,** See **Cologne. 5.0,** Records. **5.30,** Review of Osten Krüger's Book, Die Befreiung des deutschen Arbeiters. **5.45,** Talk: People and their Gardens. **6.5,** Recital of Low German Songs by Carla Spletter. **6.25,** Dorf an der Ostsee—Sketch. **6.55,** Poem; Weather. **7.0,** Songs and Customs of the Mediæval Trade Guilds. **7.45,** News. **8.0,** See **Berlin (Funkstunde).** In the Interval at **10.0,** News; Sports Notes, and at **10.20,** Talk. **12 Midnight,** Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Hymn; Gym. **6.15,** Weather; Meditation. **6.20,** See **Hamburg. 7.0,** News. **7.25** (approx.), See **Hamburg. 8.0 to 8.20,** Gym. **8.30,** Records; Announcements. **9.45,** Notes for Housewives. **10.0,** Weather; News. **10.10,** Market Prices. **10.25,** Interval. **11.25,** Exchange. **11.30,** Interval. **12 Noon,** Announcements. **12.25 p.m.,** Concert from **Hamburg. 1.0,** News. **1.15,** Records. **2.0,** Weather; News. **2.15 to 4.0,** Concert from **Königsberg. 4.0,** Orchestral Concert; Conductor, Hess: Polonaise from Eugene Onegin (Tchaikovsky); Czardas from Der Geist des Wojewoden (Grossman); Three Bavarian Dances (Pachernegg); Quadrille Waldmeister (Joh. Strauss); Waltz (Waldteufel); Hungarian Dances Nos. 2 and 10 (Brahms); Overture, Lucullus (Meyer-Helmund). **5.0,** Concert by the Band of the American Legion, relayed from the Radio Exhibition. **6.0,** Announcements. **6.5,** Sports Report for Young People. **6.25,** Violin and Pianoforte Recital by Marianne Tunder and Karl Weiss; Violin and Pianoforte Sonata in D, Op 16 (Zilcher); Violin and Pianoforte Sonata in D, Op. 16 (Schoeck). **7.20,** An Interview with Georg Enders. **7.35,** Echoes of the Day. **7.50,** News. **8.0,** Gala Variety Programme in connection with the Competition for Radio Announcers; The Augmented Station Orchestra; The Small Station Orchestra and Soloists. In the Interval at **10.20,** Weather; News; Sports Notes. **12 Midnight,** Records. **1.0 a.m.** (approx.), Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, to 539.6 metres; 60 kW.—**6.15 a.m.** Gym. **6.30,** Interval. **12 Noon,** French Ballet Music. **12.29 p.m.,** Time Signal from Neuchâtel Observatory. **12.30,** News. **12.40,** Concert of Light Music. **1.25,** Time; Weather; Exchange. **3.30,** Light Music on Records. **3.59,** Time Signal from Neuchâtel Observatory. **4.0,** Concert of Classical Viennese Music. **5.0,** Records. **5.10,** Light Music. **6.0,** Programme for Children. **6.30,** Wagner Records. **7.0,** Time; Weather. **7.1,** Hints for Sunday. **7.5,** Records. **7.20,** English Lesson. **7.50,** Concert by the Concordia Choral Society. **8.30,** Light Music. **9.0,** News. **9.10,** Harvest—Literary Sequence (Bringolf), **10.15** (approx.), Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Programme Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian. **10.30,** See **Moravská-Ostrava. 11.0,** Water Level. **11.5,** See **Brno. 12 Noon,** See **Prague. 12.5 p.m.,** Notes for Farmers. **12.10 p.m.,** Local News in Slovak. **12.15,** Records. **12.20,** See **Prague. 1.40,** News in Hungarian and German. **1.50,** See **Prague. 2.0 to 2.5,** Exchange. **3.15 to 4.20,** See **Prague. 5.40,** Educational Talk. **5.50,** Records. **6.0,** Talk. **6.10,** Hints for Housewives. **6.15,** Hungarian Transmission: Reading; Romanian Folk Dances for Violin (Bartok); Talk. **6.55,** See **Prague. 7.40,** History Talk. **7.55,** See **Brno. 8.10,** See **Moravská-Ostrava. 8.40,** See **Prague. 10.45,** News in Hungarian. **11.0** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.—5.0 a.m.,** Song; Motto. **5.10,** Records. **6.0,** Time; Weather; Gym. **6.25,** See **Cologne.** In the Interval at **6.50,** News. **8.0,** Cookery Hints. **8.10,** March Records. **8.40,** Gym. for Women. **9.0,** Time; News. **10.10,** A Play for Schools. **10.40,** Interval. **11.30,** Time; News. **11.45,** Talk for Farmers. **12 Noon,** Announcements. **12.25 p.m.,** Concert from **Hamburg. 1.0,** Weather. **1.5,** Song Records. **1.30,** Time; News. **1.45,** Dance, Sound-Film and Operetta Records. **2.20,** Exchange. **2.25** Announcements; Records. **2.50,** Market Prices. **3.10,** Book Review. **3.30** (from **Gleiwitz**), Running Commentary of the Seventh Centenary Celebrations from Tost. **4.0 to 6.0,** See **Berlin (Funkstunde).** In the interval at **5.30,** Weather; Prices. **6.0,** Talk: The German Language. **6.25,** Programme to be announced. **6.40,** Talk. **6.50,** Programme Announcements; Weather. **7.0,** Talk. **7.20,** Song Recital. **7.50,** Press Review. **8.0,** See **Berlin (Funkstunde).** In the interval from **10.20 to 10.45,** News. **12 Midnight,** Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 10.30,** See **Moravská-Ostrava. 11.0,** Record. **11.5,** Orchestral Concert. **12 Noon,** See **Prague. 1.30,** Labour Exchange; Social Notes. **1.40,** See **Prague. 2.0 to 2.5,** Programme for Farmers. **3.15 to 4.20,** See **Prague. 5.40,** See **Bratislava. 5.50,** Two German Talks. **6.25,** Accordion Recital by J. Hanák. **6.45,** Talk for Workers. **6.55,** See **Prague. 7.10,** Jazz Records. **7.40,** See **Prague. 7.55,** Song Recital by Ledererová (Coloratura Soprano). Tales from the Vienna Woods (Joh. Strauss); Aria from Mirella (Gounod); Il Bacio (Arditi). **8.10,** See **Moravská-Ostrava. 8.40 to 11.0,** See **Prague. 11.0** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Records. **1.0 p.m.,** News. **1.10,** Orchestral Concert of French Music; Soloist: Lily Delcampe (Songs); Marche lorraine (Ganne); Overture, Le roi l'a dit (Delibes); Waltz, Aimer toujours (Paradis); Aria from Mirella (Gounod); Selection from La fille de Madame Angot (Lecocq); Jewel Song from Faust (Gounod); Suite, La Féria (Lacôme). **2.0,** Interval. **4.55,** News. **5.0,** Dance Music, relayed from the Continental Palace Hotel, Blankenberghe. **6.0,** Talk: Contemporary Belgian Literature in Holland. **6.15,** Records; Selection from Lakmé (Delibes); Overture, Nebuchadnezzar (Verdi). **7.15,** Talk: The Aerial Manœuvres. **7.30,** Theatre and Film Review. **8.0,** Overture, Iphigenia in Aulis (Gluck), on Records. **8.45,** Concert relayed from **Vichy. 11.15** (approx.), News. **11.25** (approx.), Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish.—**11.57 a.m.,** Weather. **12 Noon,** Orchestral Concert. Soloist: Mme. Louise Derville (Songs); Overture, Les Saltimbanques (Ganne); Selection, Les cloches de Corneville (Planquette); Viennese Operetta Potpourri (Robrecht); Three Songs: (a) Vilja's Song from The Merry Widow (Lehár), (b) Marie-Louise (Musel), (c) Song from White Horse Inn (Stolz-Benatzky); A la Morenita (Sykes); Caprice (Ledieu); Bourrées d'Auvergne (Tremolo). **1.0 p.m.,** News. **1.10,** Records. **2.0,** Interval. **4.55,** Announcements. **5.0,** Concert by the Radio Orchestra. Soloist: Mme. Weyler (Songs). Overture, Egmont (Beethoven); Song, Ah Perfido (Beethoven); Ballet Music from Rosamunde (Schubert); Tonkin Ballad (Michielsen); Three Romantic Waltzes (Chabrier). **5.45,** Programme for Children. **6.30,** Orchestral Concert. Dawn on the Landes (Tchesnokov); Russian Dance (Tchaikovsky); Moorish Song (Turina); Gopak (Mussorgsky); Hungaria (Montagne); Carmencita (Manfred); A Napoli (Leleu); Chinese Sketch (Leemans); En balade (Evrard); Oriental Dance (Douliez). **7.15,** Talk: The Anti-Aircraft Defence of Brussels. **7.30,** Review. **8.0,** Orchestral Concert. Cinema Airs (Riéti); Symphonie de chambre (Karel Albert). **8.45,** Talk: Football. **9.0,** Orchestral Concert (contd.). Soloist: Mme. Weyler (Songs). Musiquette (Poot); Concerto dans le goût théâtral (Couperin); Songs (Tinel); La création du monde (Milhaud). **10.0,** News. **10.10,** Dance Records. **11.0** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15,** Time; Weather; News. **1.40,** Records. **6.0,** Time; Weather. **6.5,** Concert by the Station Orchestra. Overture, The Bohemian Girl (Balfe); Waltz (Stolz); Abendlied (Schumann); Träumerei (Schumann); Chansonnette (Friml); Serenade (Tarenghi); Chant sans paroles (Tchaikovsky); Selection from Andrea Chénier (Giordano). **7.0, Talk. 7.15,** Concert (contd.). Selection from Frühling im Wiener Wald (Ascher); Russian Songs and Dances (Selinsky); Souvenir (Hebert); Humoresque (Dvorák); Rêve angélique (Rubinstein); Piece (Gade); Tango (Niemann). **8.0,** Talk. **8.15,** String Quartet in F (Dvorák). **8.45,** Wireless Notes. **9.0,** Song Recital by J. Manolesco. Lolita (Buzzi-Peccia); Ideale (Tosti); Je t'aime (Leon); Romanian Folk Song (Montzia); Berceuse (Borgovan); Romance (Daia). **9.30,** Violin Recital by Nina Alexandresco. Concerto in A Minor, Op. 22 (Viotti); Malaguena (Albéniz-Kreisler). **10.0,** News. **10.10,** Programme relayed from the Restaurant Les Carpathes.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**8.0 a.m.,** Report of the St. Stephan's Day Procession from the Burg. **9.0,** Pontifical High Mass. **11.15,** News. **12.30 p.m.,** Report of the Changing of the Guard, followed by Military Band Concert. **3.0,** Talk: Hungarian History. **3.30,** Choral Concert. **4.30,** Talk. **5.0,** Concert by the Bura Cigány Band. **6.0,** Reading. **6.30,** Song Recital. **7.10,** King Stephan—Play (Sik). **9.10,** News. **9.30,** Concert by the Opera House Orchestra; Conductor, Fridl: Overture, King Stephan (Beethoven); Festklänge (Liszt); Hungarian Sketches (Volkmann); Festival Overture (Erkel). **11.0,** Concert by the Toll Cigány Band from the Café Baross.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Greeting; Records. **6.5,** Gym. **6.25,** Orchestral Concert from **Aachen. 6.50,** Greeting; Time; News. **7.5,** Orchestral Concert (contd.). **8.0,** Time; Weather; Water Level. **8.5,** Gym. for Women. **8.20,** Cookery Hints. **8.30,** Interval. **10.0,** Time; News. **10.10,** Recital by Johanna Voss (Soprano) and Walter Beissel (Pianoforte): Die junge Nonne (Schubert); Ballad in G minor for Pianoforte, Op. 118 (Brahms); Im Abendrot (Schubert); Variations on the Russian Dance from the Ballet, Das Waldmädchen (Beethoven). **10.30,** Talks: (a) Sports, (b) Mediaeval Superstitions, (c) The History of Highways. **11.30,** Announcements; Records. **12 Noon to 2.0 p.m.,** Orchestral Concert for the Berlin Radio Exhibition; Conductor, Eysoldt: Overture, The Nuremberg Doll (Adam); Singen, Lachen, Tanzen (Ziehrer); Two Suites (de Micheli); Two Pieces (Niemann): (a) Der gelbe Tango, (b) Die Werfthämmer Overture to Prince Methusalah (Strauss); Two Pieces (Schubert): (a) Scherzo, (b) Moment musical; Hungarian Rhapsody No. 6 (Liszt); Rose Marie (Krome); Glocken-Ständchen (Köckert); Rheinischer Sang (Hanemann); March, Im grünen Wald (Otten). In the interval at **12.50,** News; Greetings. **2.0** News. **2.15,** Records. **2.45,** Exchange; Meat Market Prices. **3.15,** Legal Talk. **3.30,** Exchange. **3.50,** Topical Talk. **4.0,** Concert by the Fröhliche Fünf; Soloists, Karl Delseit and Hans Haass (Pianofortes): Rustle of Spring (Sinding); Novellette (Gade); Valse des Fleurs (Tchaikovsky); Two Pianofortes: Old Norwegian Romance with Variations Op. 51 (Grieg); Tom der Reimer (Loewe); Liebesfeier (Weingartner); Spanish Serenade (Metra); Berceuse de Jocelyn (Godard); Piece (Ketelbey); Concert Piece, Lorelei (Nesvadba); Swedish March (Heineke). **5.0,** Reading: Die Nacht der Pferde (Gurk). **5.15,** Symphony No. 5 in C minor (Tchaikovsky) on Records. **6.0,** Gym. for Young People. **6.20,** Italian Lesson. **6.40,** Topical Talk. **6.50,** Exchange; Sports Report. **7.0,** Weekly Review. **7.30,** Records. **7.45,** News. **8.0** till Close Down. See **Berlin (Funkstunde). 12 Midnight,** Close Down.

COPENHAGEN.—Relays **Kalundborg, ODRK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

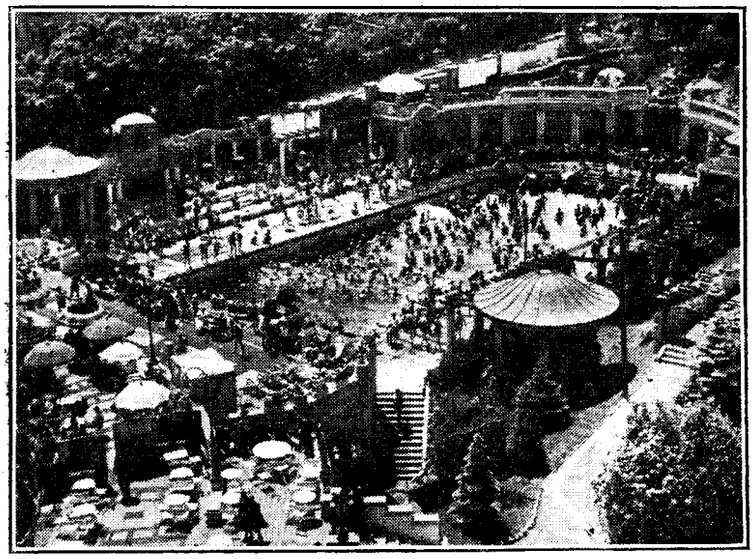
FECAMP

1,456 kc/s, 206 metres; 10 kW.—**11.30 a.m., to 12 Noon,** Programme in English arranged by the International Broadcasting Company of London. **11.39,** Happy Half-Hour. Military Band Music. **12 Noon to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English by the I.B.C. **4.30,** Chichester, Bognor, Hastings and Eastbourne Concert. Part I.—Landscapes; Part II.—Dance Music. **5.30,** Southend Concert; Light Orchestral Music. **6.0 to 11.0,** Programme in French. **11.0** till Close Down, Programme in English by the I.B.C. **11.0,** Talkie Time; Tunes from the Talkies and Shows. **11.30,** In the Club this Week. **12 Midnight,** Club Concert for Felixstowe Listeners; Dance Music. **12.30 a.m. (Tuesday),** I.B.C. Time Signal. **12.31,** Dance Music. **1.0,** I.B.C. Good-night Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.15,** Gym. **6.40,** Time; News. **6.50,** Weather. **6.55,** Military Band Concert. **8.10,** Weather. **8.15 to 8.35,** Gym. **10.0,** News. **11.0,** Concert. **11.40,** Programme Announcements; Exchange; Weather. **11.50,** Announcements. **12 Noon,** Orchestral Concert; Conductor, Gustav Schumacher: Overture, Raymond (Thomas);



BUDAPEST EN FETE. To-day—the feast of St. Stephan—is honoured by a public holiday in Budapest and special broadcast programmes. The picture shows a typical holiday scene at Budapest swimming bath, which is famous for its artificial waves.

Scandinavian Suite (Juel Frederiksen); Waltz, Vibrationen (Strauss); Swedish Suite (German); Overture, Le Roi d'Yvetot (Adam); Ballet Suite (Armandola); Waltz, Hofballtänze (Lanner). **1.0 p.m.**, Time; News. **1.10**, Announcements. **1.20**, Richard Strauss Records: Extracts from Feuersnot and Salomé. **1.50**, Time; News. **2.0**, Pianoforte Records. **2.40**, Wolf and Brahms Recital by Margarethe Heyer (Soprano) and Herbert Hesse (Baritone). **3.30**, Weather. **3.35**, Industrial Review. **3.50**, Time; Exchange. **4.0**, See **Berlin (Funkstunde)**. **5.30**, Talk. **5.45**, Songs by Heimpel (Bass). **6.0**, Musical Programme by Young People relayed from **Trier**. **6.25**, See **Stuttgart**. **6.45**, Weather; Exchange; Programme Announcements; Time. **6.50**, Topical Talk. **7.0**, In Old Freiburg—Picture from the Town's Past, relayed from **Freiburg**. **7.30**, Local Review. **7.40**, Light Music relayed from **Trier**. **8.0**, See **Berlin (Funkstunde)**. **12 Midnight**, Records: The Barber of Bagdad—Operetta (Cornelius). **1.0 a.m. (Tuesday)**, Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg,** and **Hanover, 1,330 kc/s, 225.6 metres.**—**5.45 a.m.**, Time; Weather; Talk for Farmers. **6.0**, Gym. **6.15**, Time; Weather. **6.20**, Concert by the Walter Hoffmann Band. **7.0**, Time; News. **7.10**, Talk. **7.25**, Concert (contd.). **8.0**, Weather; Talk for Housewives. **8.10**, Announcements; Records. **10.50**, News. **11.0**, Programme for Schools on Records: Camping Songs. **11.30** (from **Hanover**), Concert by the Hanover Symphony Orchestra, from the Hanover Castle; Conductor, Sosen: Overture, Der Templer und die Jüdin (Marschner arr. Pfitzner); Violin Solo (Borregaard); Old Breslau Dance (Koschinsky); Overture to Die Frau Meisterin (Suppé); Amoretten Tänze (Gungl); Paraphrase on the Song, O let me dream (Sullivan); Country Gardens (Grainger). In the interval at **12 Noon**—**12.25 p.m.**, Market Prices; Weather; Shipping Notes; Talk for Fruitgrowers. **1.0**, Exchange; Market Prices. **1.15**, Weather. **1.20**, Musical Programme. **2.15**, News. **2.30**, Records. **3.0**, Exchange. **3.40**, Shipping and Aviation Notes. **4.0**, See **Berlin (Funkstunde)**. **5.30**, Programme for Young People (on Records). **6.0**, Variety. **6.45**, Exchange. **6.55**, Weather. **7.0**, The brave Women of Oberscheden—Historical Sequence (Walter). **8.0**, See **Berlin (Funkstunde)**. In the interval at **10.20**, News. **12 Midnight**, Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**), Transmitted on **Kootwijk**, 50 kW., from **3.40 p.m.**—**7.40** to **9.40 a.m.**, Programme of the Workers' Radio Society (V.A.R.A.); Records. **9.40**, Religious Programme by the Liberal Protestant Radio Society (V.P.R.O.). **9.55** till Close Down, V.A.R.A. Programme. **9.55**, Recitation. **10.15**, Concert by the V.A.R.A. Small Ensemble. Conductor: Bakels. **10.40**, Recitations. **10.55**, Concert (contd.). **11.40**, Orchestral Concert. Conductor: Wins. Listen to the Music (Monckton); Mon rêve (Waldteufel); Stenka Rasin (Kubat); Aux pe'tits pas (Südessi); Rund um die Wolga (Borchert); Records; Two Hungarian Dances (Brahms); Andalusia (Popy); Gipsy Melodies (Borganov); Russian Dance (Tchaikovsky); Records; In the Blue Pavilion (Armandola); Tanzen möcht' ich (Kálmán); Setesky (Lebert); Launisches Glück (Strauss-Bürger); Canzonetta (Frimi-Cortock); Dort wo die Walder grün (Brodsky). **1.40 p.m.**, Interval. **1.55**, Records. **2.10**, Talk for Women. **2.40**, Records. **3.25**, Interval. **3.40**, Records. **4.10**, Programme for Children. **4.40**, Orchestral Concert. Conductor: Horst. Soloist: de Booy (Songs). Piece (Fenstad); My dancing lady (Fields-Hugh); Mademoiselle (Nesbitt); Fräulein Barbara (May); Du bist die Frau für mich (Sorge); Ein nettes kleines Fräulein (Schwarz); Kleine Frau, was nun? (Meisel); Liebes Fräulein (Granichstaedten); Pardon, Madame (Abraham); Kleine entzückende Frau (Brodsky). **5.20**, Organ Recital by Jong. Chinese Street Serenade (Siede); Skaters' Waltz (Waldteufel); Selection from Carmen (Bizet); Londonderry Air (Morris). **5.40**, Orchestral Concert (contd.): Capullos de flores (Ghirlanda); Coffee in the Morning (Warren); Build a little Home (Warren); Adieu (Candel); Dark Clouds (Samuels); Don't say Good-night (Warren); Komm doch ein bischen nach Madrid (Doelle); Wenn die kleinen Veilchen blühen (Stolz-Dostal). In the interval at **6.10**, Organ Recital (contd.). **6.40**, Song Recital by Snoeks (Tenor); Records. **7.20**, Talk. **7.40**, Announcements. **7.43**, Records. **8.15**, Organ Recital by Steyn. Overture, Le fils du mandarin (Cui); Sefira (Siede); Baiser d'adieu (Spitalny); Berlin wackelt (Morena). **8.40**, Dramatic Programme. **8.55**, Concert by the V.A.R.A. Orchestra. Conductor: de Groot. Overture, Sakuntala (Goldmark); Soirée d'été (Waldteufel); Piece (Dargmynski);

AUG. 20th MONDAY *continued*

Ballet Suite from Coppélia (Délibes). **9.40**, News. **9.55**, Orchestral Concert (contd.): Marche lorraine (Ganne); Selection from The Flower of Hawaii (Abraham); Goldkäferchens Brautwerbung (Armandola); Die Glocken von Prag (Fucik); Granny's Photo Album (Greer); Selection from Countess Maritza (Kálmán). **10.40**, Records. **11.40** (approx.), Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. (until **6.40 p.m.**); 20 kW. from **6.40 p.m.**—Programme of the Christian Radio Society (N.C.R.V.). **7.40**, Bible Reading; Meditation. **7.55**, Records. **9.10**, Interval. **10.10**, Religious Programme. **10.40**, Reading. **11.10**, Records. **11.40**, Police Notes. **11.55**, Records. **12.10 p.m.**, Organ Recital by Jan Zwart. **1.40**, Song Recital by Mlle. Marie zur Haar (Soprano). Aria from Figaro (Mozart); Frühlingslaube (Schubert); Ganymede (Schubert); Aufträge (Schumann); Records; Feldeinsamkeit (Brahms); O, wüsst ich doch den Weg zurück (Brahms); Auf dem See (Brahms). **2.15**, Talk on Horticulture. **2.55**, Song Recital (contd.). Hallelujah (Mozart); Verschwiegene Liebe (Wolf); Nachtzauber (Wolf); Records; Zitronenfalter im April (Wolf); Verborgenheit (Wolf); Les Cloches (Debussy); Romance (Debussy). **3.25**, Interval. **3.40**, Bible Reading, with Songs and Organ. **4.40**, Records. **5.10**, Organ Recital by Daaf Lincy. March (Linden); Ideale (Tosti); O Frühling wie bist du so schön (Lincke); In a Monastery Garden (Ketelbey); Selection from Il Trovatore (Verdi); L'Absence (Linden); Bells across the Meadow (Ketelbey); Walzerflut (Fetras); Mattinata (Leoncavallo); Husaren-Attacke (Oscheit). **6.10**, Records. **6.40**, Police and Church Notes. **7.40**, Addresses and Songs by the Salvation Army at The Hague. **9.10**, Orchestral Concert. Conductor: Manks. Overture, Semiramis (Rossini); Selection from Romeo and Juliet (Gounod); Selection from Loreley (Nesvadba); Strauss Potpourri (Korngold); Norwegian Artists' Carnival (Svendsen); Selection from The Mastersingers (Wagner). In the interval at **9.40** (approx.), Press Review. **10.40 to 11.40**, Records. **11.40** (approx.), Close Down.

INNSBRUCK.—Relays **Vienna.**

JUAN LES PINS

1,249 kc/s, 240.2 metres; 2 kW.—**12.30 p.m.**, Amusement Guide; Orchestral Concert. **1.0**, News. **1.15**, Concert. **3.0**, News. **3.10**, Sports Notes. **3.20**, Press Review; Concert: By the Blue Hawaiian Waters (Ketelbey); In a Chinese Temple Garden (Ketelbey); Two Songs (Strauss). **9.0**, News; Weather. **9.15**, Un homme modèle—One-Act Play (Carré).

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres,** and **Skamlebaek, 49.5 metres.**—**7.0 a.m.**, Gym. **7.27**, Weather. **8.30**, Service from Copenhagen Cathedral. **11.0**, Weather. **11.10**, Fish Prices. **12 Noon**, Chimes; Weather. **12.5 p.m.**, Concert by the Bendix String Ensemble, relayed from the Wivex. **2.0**, Interval. **2.20**, Records. **2.50**. Talk for Housewives. **3.0**, Concert by Prell's Instrumental Ensemble. Soloist: Asta Lindelöw (Songs). Introduction (Christensen); Two American Sketches (Griselle); Viennese Waltz (Benatzky); Canzonetta (Friml); Three Shades of Blue (Grofe); Hungarian Melody (Krüger); Swedish Folk Songs; Foxtrot-Intermezzo (Hanschmann); Waltz (Rybicki); Serenade (Rauls); Selection from The New Moon (Romberg); An Old Clock (Melborn); I'm thru' with Love (Livingstone - Malneck); Valsette (Bazant); Feverish-Piano (Escobar). **5.30**, Exchange. **5.42**, A Poem. **5.45**, Talk: Rambles in Denmark. **6.15**, English Lesson. **6.45**, Weather; Wireless Notes. **7.0**, News. **7.15**, Time. **7.30**, Discussion: Society and Unemployment. **8.10**, Russian Folk Song Recital by Lubov Kusnezova. **8.30**, The Transplanted Flower—Play in Eight Scenes (Jens Heiring). **9.30**, Danish Song Recital by Paul Knudsen. **9.50**, Talk. **10.0**, News. **10.15**, Quintet in D for Two Violins, Two Violas and 'Cello (Mozart). **10.45**, Dance Music, relayed from the Lodberg. In the interval, at **12 Midnight**, Chimes. **12.30 a.m. (Tuesday)**, Close Down.

KAUNAS

155 kc/s, 1,935 metres; 7 kW.—**12 Noon**, Time; News. **6.30 p.m.**, Light Music. **7.0**, Medical Talk. **7.20**, Records. **7.30**, Time; News. **8.10**, Records. **8.35**, Talk. **8.55**, Sports Notes. **9.0**, Concert of Hungarian Music with Addresses. **10.30** (approx.), Close Down.

KIEL.—Relays **Hamburg. KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—**5.0 a.m.**, Records. **5.50**, Weather. **6.0**, Gym. **6.20**, See **Hamburg**. **7.0**, News. **7.25**, See **Hamburg**. **8.0**, Prayers. **8.30**, Gym. for Women. **9.0**, Interval. **9.5** (from **Danzig**), Broadcast for Schools. **10.10**, Song Recital by Charlotte Bonsa-Piratzky. **10.40**, News. **10.50**, Weather. **11.30**, See **Hamburg**. In the interval at **12 Noon**, Announcements. **1.1 p.m.**, Time; Weather. **1.5** (from **Danzig**), Records. **1.20**, News. **1.30**, Records. **2.0**, Concert for the Radio Exhibition, Berlin. The Small Station Orchestra. Conductor: Wilcken. Festival Overture (Lortzing); East Prussian Fisher Dances (Brust); Waltz (Joh. Strauss); Russian Suite (Bullerian); Serenade (Schmalstich); Max und Moritz (Zimmer); Suite der Freude (Scheinpflug); Waltz (Löhr); Overture, Lachendes Leben (Rust); March (Wilcken). **4.0**, Reading: The Diary of an East Prussian Pastor's Wife. **4.20**, Concert from **Berlin (Funkstunde)**. In the interval at **4.40**, Report from the East German Fair. **5.0**, See **Berlin (Funkstunde)**. **5.50** (from **Danzig**), Talk: The Vistula Valley. **6.15**, Market Prices. **6.20**, Programme for Young People. **6.40**, Report from a Hitler Youth Camp. **7.5**, Weather. **7.10**, Concert by the Opera House Orchestra from the Zoological Gardens. Conductor: Brückner. Soloist: Irma Drummer (Contralto). Overture, Manfred (Schumann); Three Songs (Schumann): (a) Litanei, (b) Tod und das Mädchen, (c) Dem Unendlichen; Variations on a Theme of Haydn (Brahms); Two Songs (Wolf): (a) Gebet, (b) Weylas Gesang. **8.0** till Close Down, See **Berlin (Funkstunde)**. In the interval at **10.0**, News. **12 Midnight** (approx.), Close Down.

KOSICE.—Relays **Prague. LAUSANNE.**—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.**—**5.50 a.m.**, Notes for Farmers. **6.0**, Gym. **6.25**, Concert from **Cologne**. **6.50**, News. **8.0**, Gym. **8.20**, Records. **9.0**, Interval. **9.30**, Records. **9.55**, Weather; Water Level. **10.0**, Concert by the Station Orchestra; Conductor, Steffen: Overture, Titus (Mozart); Extracts from Der Waffenschmied (Lortzing); Two Gipsy Dances (Heidingsfeld); Five Pieces (Kretschmer), (a) Morgengruss, (b) Rosmarin am Webe, (c) Auf der Wiese, (d) Abendruhe, (e) Buntes Treiben; Strauss Potpourri (Ed. Strauss); Overture, The Italian Girl in Algiers (Rossini); Hungarian Rhapsody in F minor, No. 14 (Liszt); Prelude to Act III from Der Prinz wider Willen (Lohse); Extracts from Die schöne Galathee (Suppé); Waltz (Lanner); Character Piece (Lincke); March (Richter). **12 Noon**, News; Time. **12.10 p.m.**, Weather. **12.20**, Notes for Farmers. **12.30**, Concert from **Cologne**. In the interval at **1.15**, News; Time. **2.0**, News. **2.15 to 2.25**, Talk: The Zoppot Open-air Opera. **3.0**, Talk. **3.20**, Programme for Young People. Exchange. **4.0**, See **Berlin (Funkstunde)**. **5.10**, Talk: Heinrich Braun. **5.30**, Guitar Solos. **5.50**, Exchange; Weather; Time. **6.0**, Talk: Gumbinnen, 1914. **6.20**, Three Humorous Sketches. **7.35**, Talk: The Saxon Alchemists of the Sixteenth and Seventeenth Centuries. **7.55**, Educational Notes. **8.0** till Close Down, See **Berlin (Funkstunde)**. In the interval at **10.20**, News. **12 Midnight**, Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 150 kW.—**7.45 a.m.**, Records. **8.0**, News in French; Record; News in German; Record. **12 Noon**, Records. **12.30 p.m.**, News in French; Record; News in German. **12.45**, Records. **1.0**, Exchange. **1.5**, Records. **1.30**, Exchange. **1.35**, Records. **2.0**, Exchange. **3.45**, Exchange. **6.30** till Close Down, Italian Evening. **6.30**, Variety Programme. **7.30**, Racing Results. **7.35**, Recital of Opera Arias by Suzanne Storga. **8.0**, News in French; Record; News in German; Record. **8.35**, Exchange; Records. **8.50**, Pianoforte Recital by Carl Delseit. Waldstein Sonate (Beethoven); Ballad in F minor (Chopin); Polonaise in E (Liszt). **9.30**, Orchestral Concert relayed from Mondorf-les-Bains. Conductor: Dubois-Sylva. Overture, Le Roi d'Ys (Lalo); Selection from Tiefland (Albert); Potpourri of Viennese Waltzes (Robrecht); Potpourri (Dostal) Radetzky March (Strauss). **10.30**, Dance Records.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**2.0 p.m.**, Chimes; Weather; Announcements; Light Music. **2.30**, Sextet Concert. **3.0**, Amusement Guide; Exchange; Light Music. **3.30**, Sextet Concert. **4.0**, Light Music. **4.30**, Sextet Concert. **5.0**, Interval. **6.0**, Chimes; Light Music. **7.0**, Announcements; 'Cello Recital: Arioso (Bach); Träumerei (Schumann); Nocturne No. 2 (Chopin); Spanish Suite (Falla); Minuet (Boccherini); Melody (Rubinstein); Piece (Popper). **7.30**, Exchange; Cante Flamenco Recital, followed by Orchestral Concert; Andalusian Airs (arr. Tresa); La Paloma (Yradier); Ballet Music from Sylvia (Delibes); Mazurka (Soutullo-Vert); Una noche in Catatayud (Luna). **8.30**, News; Sextet Concert. **9.15**, Sports and Bullfighting Notes; Sextet Concert (contd.). **10.0**, Chimes; Extract from La Bohême—Opera (Puccini), on Records. **11.0**, News; Extract from La Bohême (Puccini) (contd.). **12.45 a.m. (Tuesday)**, News. **1.0**, Chimes; Close Down.

MADRID

EAQ, 10,000 kc/s, 30 metres; 20 kW.—**11.15 p.m.**, News. **11.30**, Spanish Music; News. **12 Midnight**, Catalan Programme. **12.45 a.m. (Tuesday)**, Light Music. **1.0 a.m.**, Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres**; and **Florence, 610 kc/s, 491.8 metres.**—**7.30 a.m.**, Gym. **7.45**, Time; News. **8.0**, Interval. **11.30**, Variety Music on Records. **12.30 p.m.**, Records. **12.45**, News. **1.0**, Concert by the Chesi-Zanardelli-Cassone Trio; in the interval, at **1.30**, Records; Exchange. **2.15**, Exchange. **4.35**, News. **4.45**, Programme for Children. **5.10**, Dance Music by the Tavazza Dance Band. **5.55**, News. **6.0 to 6.10**, Notes for Farmers; Corn Prices. **7.0**, News; Announcements. **7.15**, News in Foreign Languages. **8.0**, Time; News; Records. **8.30**, Government Announcements. **8.45**, Request Concert. **9.45**, Talk. **10.0**, Chamber Music by the Station Quartet; Two Pieces for Pianoforte, Violin and 'Cello (Corelli-Kreisler); Quartet in D minor (Haydn); after the Concert, Records. **11.0**, News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**12 Noon**, Announcements; Records. **12.29 p.m.**, Time Signal from Neuchâtel Observatory; Weather. **12.33**, Dance Music. **12.55**, News. **1.5**, Dance Music. **1.15**, Cookery Hints. **1.30**, Interval. **3.59**, Time Signal from Neuchâtel Observatory. **4.0**, See **Beromünster**. **6.0**, Interval. **7.44**, Announcements. **7.45**, News. **8.0**, Sports Talk. **8.15**, Falstaff—Opera in Three Acts (Verdi) (on Records). In the interval at **8.55**, Announcements. **10.50** (approx.), Close Down.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.0 to 7.15 a.m.**, See **Prague**. **10.0**, See **Prague**. **10.30**, Concert by a Country Band. Conductor: Palkovsky. **11.0**, See **Brno**. **12 Noon to 2.0 p.m.**, See **Prague**. **3.15 to 4.20**, See **Prague**. **5.40**, See **Bratislava**. **5.50**, Records. **6.0**, Report. **6.5**, Talk. **6.20**, German Transmission: Talk for Workers; Legal Talk; Songs to the Lute; Records. **6.55**, See **Prague**. **7.10**, Song Recital by Sobesky (Baritone). **7.30**, Concert from **Prague**. **7.40**, See **Prague**. **7.55**, See **Brno**. **8.10**, Dance Music by the Station Orchestra. Conductor: Musil. **8.40**, See **Prague**. **10.45**, Records. **11.0** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.**, News. **5.30**, Fanfare. **5.45**, Gym. **6.15**, Programme Announcements. **7.30**, Records. **9.0**, Musical Programme. **9.55**, Time Signal. **10.0**, Programme for Workers. **10.15**, Concert for Collective Farm Workers. **11.13**, Talk for Collective Farm Workers. **2.45 p.m.**, News. **3.15**, Programme for Children. **3.55**, Time Signal. **4.0**, News. **4.15**, Book Review. **4.30**, Communist Party Programme. **5.30**, Red Army Programme. **6.30**, Programme for Collective Farm Workers. **8.0**, Dance Records. **9.0**, Talk in German: Socialism and the Individual. **9.55**, Chimes. **10.5**, Talk in English: Soviet Aviation. **11.5**, Talks in Hungarian, (a) Soviet Aviation, (b) The Factory Worker and the Family.

MOTALA.—Relays **Stockholm. MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg,** and **Nürnberg, 1,267 kc/s, 236.8 metres**; and **Kaiserslautern, 1,195 kc/s, 251 metres.**—**6.30 a.m.**, Gym. **6.45**, Motto; Records. **7.15**, Time; News. **7.25**, Orchestral Concert; Conductor, Planer. **9.50**, Gym. for Women. **11.5**, Weekly Report for Farmers. **12 Noon**, Records. **1.15 p.m.**, Time; News. **1.25**, Orchestral Concert; Conductor, Kloss. **2.0**, News; Programme Announcements; Exchange. **2.20**, Sea Shanties with Commentary. **2.50**, Programme for Children. **3.10**, Pianoforte Sonata in A sharp (Beethoven), by Julius Müller. **3.30**, (from **Nürnberg**), Reading. **3.50**, Weather; Talk for Farmers. **4.0**, Concert by the Small Station Orchestra; Conductor, Kloss. **5.30**, Talk: The Fighting in Lorraine in August, 1914. **5.50**, Lieder Programme by Elémer von John (Baritone); Three Sonnets Op. 41 (Pfitzner): Five Goethe Lieder (Wolf). **6.10**, Literary Talk: The Six Books of the month. **6.30** Records. **6.50**, Time; Weather; Talk for Farmers. **7.0**, The Bridge—Sketch (Franziss). **8.0**, See **Berlin (Funkstunde)**. In the interval at **10.0**, News. **12 Midnight**, Close Down.

NAPLES.—Relays **Rome. NOTODDEN.**—Relays **Oslo.**

AUG. 20th MONDAY continued

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jelöy, 6,990 kc/s, 42.92 meters.**—**11.15 a.m.,** Divine Service. **11.50,** Exchange. **12.45 p.m.,** News. **12.55,** Nauen Time Signal. **1.0 to 2.0,** Records. In the intervals, Weather; Report for Farmers; Exchange. **5.30,** Orchestral Concert. **6.30,** Talk. **7.0,** Book Review. **7.15,** Weather; News. **7.30,** Time. **7.31,** Accordion Recital by Hansen. **7.50,** Recitations. **8.20,** String Quartet in G Minor (Grieg). **9.10,** Review of Foreign Affairs. **9.40,** Weather; News. **10.0,** Topical Talk. **10.15,** Records. **10.45** (approx.), Close Down.

ÖSTERSUND.—Relays **Stockholm.**

PALERMO

565 kc/s, 531 metres; 4 kW.—**12.45 p.m.,** News. **1.0 to 2.0,** Concert. In the interval at **1.30,** Time; News; Weather. **5.30,** Records. **6.0 to 6.30,** Balilla Programme. **8.0,** Announcements; News; Programme for Farmers. **8.20,** Records. In the interval at **8.30,** Time; News. **8.45,** Chamber Music. Soloists: G. Di Dio (Clarinet), E. Castagna (Bassoon), Marchi (Horn), Porcelli (Violin), Profet (Viola), Ruggeri ('Cello), and Caggegi (Contrabass): Septet (Beethoven); Meditando for Contrabass and Pianoforte (Marangoni); Two Violin Solos: (a) Reverie (Vieuxtemps), (b) Serenata (Chiti); Quartet for Oboe, Clarinet, Bassoon, and Horn (Rossini). After the Concert, Records. **11.0,** News.

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 a.m.,** News. **10.30,** See **Strasbourg. 12 Noon,** Tourist Report. **12.15 p.m.,** Concert by the National Orchestra; Conductor, Roger Désormière; Soloist, Mlle. Secondi (Songs). In the Interval at **1.0,** News. **2.0,** Records. **3.30,** Orchestral Concert relayed from Vichy: Overture, Pyramus and Thysbe (Trémisot); Adorazione (Fillipucci); Petite Suite (Debussy); Paysage triste de la Brière (Ladmirault); Les amoureux inquiets (Ladmirault); Selection from Grisélidis (Massenet); Kaiserwalzer (Strauss). **5.30,** Talk. **5.45,** Medical Talk. **6.0,** Economic Review; Talk on Economics. **6.30,** News. **7.45,** Talk on Aviation. **7.53,** Assurance Societies' Reports. **8.0,** Records. **8.30,** Concert by Madeleine Grey (Songs), Dagmar Gérar (Recitations), Emile Passani (Pianoforte), Roland Charmy (Violin) and Simone Gouat (Pianoforte). **10.20** (approx.), News. **10.30,** Dance Music.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.10 a.m.,** Fanfare; Records. In the intervals, at **7.20** and **8.20,** News. **8.45,** Cookery Notes. **12 Noon,** Exchange. **12.5 p.m.,** Concert by the Station Orchestra. Overture, Le Pré aux Clercs (Hérold); Basque Rhapsody (Pierné); Ballet Music (Infante); Nocturne from La Navarraise (Massenet); Minuet (Boccherini); Sicilienne from Armide (Glück); Jota (Sarasate); Selection from Mirella (Gounod); Two Waltzes (Brahms); Russian Fantasia (Krein); The Rose (Myddleton); Ballet égyptien (Luigini); Waltz Suite from The Chocolate Soldier (O. Straus). In the intervals, at **12.25 p.m.,** News, and at **1.5** and **1.30,** Exchange. **2.0,** Exchange. **3.15,** Exchange. **3.45,** Exchange. **4.50,** Exchange. **6.45,** Exchange. **6.49,** Records. **7.10,** News. **7.30,** Records: Johann Strauss Waltzes. **7.53,** Songs by Jean Sorbier. **8.0,** Interval. **8.10,** Records. **8.40,** Exchange. **8.50,** L'Anniversaire de Gustave—Sketch with Songs. **9.30,** Interval. **9.40,** Concert by Pouschine's Cigany Band. **10.5,** Dance Records. **10.26,** News; Exchange. **10.30** till Close Down, Programme in English, arranged by the International Broadcasting Company of London. **10.30,** Dixieland—Concert. **11.0,** Good-night Melody and Close Down.

PARIS

RADIO-PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.,** Gym. **7.0,** Records. **7.15,** Press Review; Weather. **7.45,** Gym. **8.0,** Records. **10.15,** Concert relayed from **Vichy. 12 Noon,** Concert by the Pascal Orchestra. In the interval, at **1.20 p.m.,** Exchange; News; Weather. **3.45 to 3.50,** Exchange. **4.30,** Organ and Pianoforte Recital by Marcel Dupré and Marguerite Dupré, relayed from the American Conservatoire, Fontainebleau: Prelude and Fugue in C (Bach); Four Chorals (Dupré); Concerto in G minor (Handel); Ballad for Pianoforte (Dupré); Symphonic Piece (Franck); Variations on the Gothic Symphony (Widor); Improvisations. **6.20,** Weather; Notes for Farmers; Exchange; Racing Results. **6.45,** Records. **7.0,** Literary Readings. **7.30,** Topical Talk. **8.0,** L'été de la Saint Martin—Comedy (Meilhac and Halévy). **8.30,** Press Review; Weather. **8.45,** Concert relayed from **Vichy.**

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres** and **25.27 metres.**—**3.0 p.m.,** Harvest of Song. **3.15,** Sammy Fuller. **3.30,** To-day's Children. **3.45,** News; Cooking School. **4.0,** Uncle Tom and Betty. **4.15,** Platt and Nierman. **4.30,** Melody Mixers. **5.0,** Honey Dean. **5.15,** Fields and Hall. **5.30,** Vic and Sade. **5.45,** Hotel William Penny Orchestra. **6.0,** Market Reports. **6.15,** Hon. Archie and Frank. **6.30,** Farm and Home Hour. **7.30,** KDKA Home Forum. **8.0,** Radio Guild. **9.0,** Betty and Bob. **9.15,** Stanley Metcalfe (Tenor). **9.30,** Market Reports. **9.45,** Chicago Symphony Orchestra. **10.15,** KDKA Kiddies' Klub. **10.30,** To be announced. **10.45,** Orphan Annie. **11.0,** Time; Temperature; Weather. **11.14,** Baseball Résumé. **11.30,** Comedy Stars of Hollywood. **11.45,** Lowell Thomas. **12 Midnight,** Dan and Sylvia. **12.10 a.m. (Tuesday),** News. **12.15,** Victor Merry-Makers. **12.30,** Nancy Martin. **12.45,** Frank Buck. **1.0 to 6.0,** Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 a.m.,** Gym.; Music; News. **7.15 a.m.,** Interval. **10.0,** Record; News. **10.20,** News in German. **10.25,** Record. **10.30,** See **Moravská-Ostrava. 11.0,** Record. **11.5,** See **Brno. 12 Noon,** Time; Market Prices; Weather. **12.5,** Report for Farmers. **12.10,** Records. **12.20,** News. **12.30,** Dance Music by Kostal's Orchestra. **1.0,** Time. **1.30,** Labour Exchange. **1.40,** Records. **1.50,** Exchange. **1.55,** Exchange and Weather in German. **3.15,** Extracts from Dragoons were riding—Musical Play (Jankovec), by the Tyl Theatre Orchestra. Conductor: The Composer. **4.15 to 4.20,** Exchange; Weather. **5.40,** See **Bratislava. 5.50,** Records. **6.0,** Announcements. **6.5,** Notes for Farmers. **6.10,** Records. **6.20,** Talks. **6.55,** News in German. **7.0,** Time; News. **7.10,** Recital of Popular Songs by J. Budil. **7.40,** Talk. **7.55,** See **Brno. 8.10,** See **Moravská-Ostrava. 8.40,** Scene from The Case of Vivian Ware—Play (Kenneth Ellis). **9.25,** Sonata for 'Cello and Pianoforte, Op. 15 (Jirák) by Heran and Maxián. **10.0,** Time; News. **10.15,** Records. **10.45,** Topical Talk in German. **11.0** (approx.), Close Down.

REYKJAVIK

208 kc/s, 1,442 metres; 16 kW.—**12 Noon,** Weather. **2.15 p.m.,** Variety Programme. **5.0,** Weather. **9.10,** Weather. **9.25,** Music. **9.50,** Announcements. **10.0,** Time; Popular Music by the Station Orchestra. **10.30,** Reading. **11.0,** News. **11.30,** Song Recital.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan No. 2, 1,348 kc/s, 222.6 metres; Turin No. 2, 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.**—**7.30 a.m.,** Gym. **7.45,** Time; News. **8.0,** Interval. **12.30 p.m.,** Records. **1.0,** See **Milan.** In the interval at **1.30,** Time; News. **4.30,** Programme for Boys. **4.50,** News. **5.0,** Vocal and Instrumental Concert by Umberto Spironello (Violin), Elvira Primo (Pianoforte), Noemi Raimondi (Soprano), and Giacomo Mancini (Tenor). Sonata in F, Op. 8, for Violin and Pianoforte (Grieg); Soprano Solos: (a) Wiegenlied (Brahms), (b) Mattino d'aprille (di Pietro), (c) L'usignuolo (Alaleona). Violin Solo: La fille aux cheveux de lin (Debussy); Tenor Arias from Le educande di Sorrento (Usiglio), The Queen of Sheba (Goldmark), and Luisa Miller (Verdi). **5.55,** Weather; Corn Prices. **6.10,** Interval. **7.0,** News. **7.15,** Weather; News in Foreign Languages. **8.0,** Time; News. **8.10,** Records. **8.30,** Government Announcements. **8.45,** See **Milan. 9.45,** Talk by Sam Benelli. **10.0,** Dance Music. **11.0,** News.

RUYSSELEDE

10,330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.,** News in French. **8.0,** Concert Version, Les Cloches de Corneville—Operetta (Planquette). **9.0,** News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SAN SEBASTIAN

1,258 kc/s, 238.5 metres; 0.6 kW.—**2.0 to 3.0 a.m. (Tuesday),** Programme in English arranged by the International Broadcasting Company of London. **2.0,** Waterways—Concert. **2.30,** Light Orchestral Concert. **3.0,** I.B.C. Good-night Melody and Close Down.

SCHENECTADY

WGY, 790 kc/s, 379.5 metres. 50 kW. Relayed at intervals by **W2XAF** on **31.48 metres,** and by **W2XAD** on **19.56 metres.**—**7.0 p.m.,** Dreams come True. **7.15,** Health Hunters, Sketch. **7.30,** Women's Radio Review; Talks; Orchestra. **11.35,** Stock Reports. **12 Midnight,** Comments on Current Events. **12.30 a.m. (Tuesday),** Concert. **1.0 to 3.0,** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW.; and **Geneva, 401 kc/s, 748 metres.**—**12.29 p.m.,** Time Signal from Neutchâtel Observatory. **12.30,** News. **12.40** (from **Geneva**), Records. **1.0** (from **Geneva**), Exchange. **1.5** (from **Geneva**), Records. **2.0,** Interval. **3.59,** Time Signal from Neutchâtel Observatory. **4.0 to 6.0,** See **Beromünster. 6.0** (from **Geneva**), Monologues. **6.30** (from **Geneva**), Talk: Palmistry. **7.0** (from **Geneva**), Talk. **7.30** (from **Geneva**), Wireless Notes. **7.59,** Weather. **8.0** (from **Geneva**), Duets by Mademoiselle Fleury and her Partner. **8.20** (from **Geneva**), Weekly Review. **8.30,** Concert by the Station Orchestra; Conductor, Echenard: Symphony (Vankall); Concerto for Four Violins (Vivaldi); Pavane and Chaconne (Purcell). **9.0,** News. **9.10** (from **Geneva**), Post-War Songs. **10.0** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.**—**7.45 a.m.,** Service. **8.0,** Weather. **12.30 p.m.,** Weather. **12.45,** Exchange. **12.55,** Time. **1.0** (from **Göteborg**), Concert of Light Music. **2.0,** Reading. **2.30 to 3.0,** Records. **5.0,** Weather. **5.5,** Song Recital by Marianne Gauffin. **5.25,** Talk. **5.55,** Records. **6.55,** Talk. **7.15,** News. **7.30,** Concert of Light Music: Conductor: Kallin; Overture, Il Guarany (Gomez); Waltz, Winterstürme (Fucik); Dance Suite (Friman); Romance (Svendsen); Potpourri (Kahrman); March (Sousa). **8.30,** Talk: The Rays of the Sun. **9.0,** Soloist Concert: Marianne Mörner (Songs) and Nielsen (Violin); Three Pieces (Trunk): (a) Die Stadt, (b) In meiner Heimat, (c) Das Hemd; Three Songs (Mraczek); Sonatina in G (Dvorák); Traet (Söderman); Den röde vite Rose (Söderman); Ved Huset (Alfvén); Blikket (Alfvén); Two Songs: (a) Alt Vandrer Maanen (Sjögren), (b) Du (Eriksson). **9.45,** News. **10.0,** Concert of Light Music: Overture (Offenbach); Waltz, Mein Lebenslauf ist Lieb und hast (Joh. Strauss); Minuet (Dukstulsky); Spanish Serenade (Glasunov); Dance (Gachet); Musette (Offenbach; Liebeswalzer (Reger); Piece (Weninger); Dance (Wesslander); Selection from Der Teufelsreiter (Kálmán). **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.30 a.m.,** Concert by the Station Orchestra. Conductor: de Villers. Overture, Ruy Blas (Mendelssohn); Selection from Tannhäuser (Wagner); Oriental Fantasy, Yishma El (Jalowicz); Caucasian Sketches (Ippolitov-Ivanov); Two Arabesques (Debussy); Ballet de Siang-Sin (Hüe); Marche grecque (Ganne). **12 Noon,** Records. **12.45 p.m.,** News. **1.0,** Time; Exchange. **7.0,** Literary Talk: Passerat. **7.15,** Talk in German: The Franciscan Church at Saverne. **7.30,** Time; News. **7.45,** Records. **8.0,** Press Review in German; Lottery Results; News. **8.30,** Programme of One-Act Operettas: (a) Ca c'est l'Bouquet (Zucca), (b) La méprise romanesque (Schwab), (c) Un conte . . . à dormir debout (Poncin). In the interval, at **9.30** (approx.), News. **10.30,** Dance Music, relayed from the Caveau de l'Aubette. **12 Midnight,** Close Down.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.45 a.m.,** Motto; Time; Weather. **5.50,** Gym. **6.15,** Records. **6.40,** Time; News. **6.55,** Records. **7.25,** See **Munich. 8.10,** Weather. **8.15,** Gym. **8.35,** Interval. **9.0 to 9.15,** Talk for Women. **10.0,** News. **10.10,** Recital by Helene Scheel (Soprano) and Eberhard Schrempf (Baritone); Three Songs: (a) Wenn ich ein Vöglein wär, (b) Sommerruh, (c) Herbstlied; Five Songs (Wezel): (a) Waldsank, (b) Rosenzeit, (c) Nur einmal möcht' ich dir noch sagen, (d) Abendlied, (e) Selig. **10.40,** Violin and Pianoforte Recital by Melanie Wolff and Erich Herrmann; Sonata in D (Nardini); Nocturne (Chopin-Sarasate); Waltz (Brahms); La Capricciosa (Ries). **11.10,** Records. **11.25,** Post Office Concert. **11.55,** Weather. **12 Noon,** Announcements. **12.25,** See **Hamburg. 1.0,** Time; Local News. **1.5,** News. **1.20,** See **Frankfurt. 1.50,** Time; News. **2.0 to 2.30,** See **Frankfurt. 4.0,** See **Berlin. 5.30,** Talk: What is Happiness? **5.45,** Records: Serenades. **6.0,** Readings. **6.25,** French Lesson. **6.45,** A Fruit Paradise—Pictures from **Baden. 7.30,** Local News. **7.40,** Time; Weather; Report for Farmers. **8.0,** See **Berlin (Funkstunde).** In the interval at **10.20,** Time; News. **12 Midnight,** See **Frankfurt. 1.0 a.m. (Tuesday),** Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.,** Dance Refrains. **8.30,** News. **8.35,** Chansonnettes; Orchestral Music. **12 Noon,** Opera Arias. **12.15 p.m.,** Orchestral Music. **12.30,** News. **12.45,** Request Music. **1.0,** News. **1.5,** Sound Film Music. **1.15,** Orchestral Music. **1.30,** Operetta Arias. **1.45,** Military Music. **2.0,** News. **6.0,** News. **6.15,** Songs. **6.30,** Operetta Music; Selection from Le jour et la nuit (Lecocq); Aria from Viktoria and her Hussar (Abraham); Aria from Un soir de réveillon (Moretti). **6.45,** Opera Arias; Arias from The Damnation of Faust (Berlioz); The Valkyrie (Wagner); The Mastersingers (Wagner); and Hamlet (Thomas). **7.0,** Orchestral Music. **7.15,** Chansonnettes. **7.30,** News. **7.45,** Bal musette. **8.15,** Orchestral Music; Danse macabre (Saint-Saëns); The Brandenburg Concerto No. 3 in G (Bach). **8.30,** Folk Music. **9.0,** Concert Version of Ciboulette—Operetta (Hahn). **9.30,** Orchestral Music. **10.0,** Songs. **10.15,** News. **10.30,** Soloist Programme. **11.0,** Economic and Social Notes. **11.5,** Balalaika Music and Russian Songs. **11.15,** Argentine Tangos. **11.30,** Operetta Arias. **11.50,** Military Music. **12 Midnight,** News. **12.5 a.m. (Tuesday),** Au caveau de minuit—a Radio Fantasy. **12.15,** Opera Music; Selection from I Pagliacci (Leoncavallo); Entr'acte from Carmen (Bizet). **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo. TURIN.**—Relays **Milan.**

VATICAN CITY

15,120 kc/s, 19.84 metres; 20 kW. **(Morning); 5,970 kc/s, 50.26 metres (Evening).**—**11.0 to 11.15 a.m.,** Religious Information in Italian. **8.0 to 8.15 p.m.,** Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz** and **Salzburg, 1,294 kc/s, 231.8 metres.**—**9.0 a.m.,** News. **9.20,** Market Prices. **9.30,** Weather. **10.50,** Water-Level. **11.30,** Records. **11.55,** Weather. **12 Noon,** Records. **1.0 p.m.,** Time; News. **1.10,** Records. **2.0,** Announcements. **3.30,** Time; Exchange. **3.50,** Programme for Women. **4.10,** News. **4.15,** Talk; Films. **4.40,** Reading for Young People. **5.5,** Recital by Grete Nowak (Pianoforte) and Bagnovini (Tenor); Lotus Land (Cyril Scott); Arabesque (Debussy); Fire Dance (Falla); Arias from The Love Philtre (Donizetti); Werther (Massenet); and A Masked Ball (Verdi); M'ama non m'ama (Mascagni). **5.35,** Talk: Vienna. **5.55,** Books of Reference for the Week's Talks. **6.0,** Records: Overture, Iphigenia in Aulis (Gluck); 'Cello Sonata in F (Marcello); 'Cello Sonata in A (Boccherini); Brandenburg Concerto No. 6 (Bach); Sonata in D (Buxtehude). **6.40,** Talk: Count Metternich. **7.10,** Talk: Alpine Fauna. **7.35,** Time; Announcements. **7.45,** Time. **8.0,** Ludwig Gruber Concert: The Vienna Symphony Orchestra and the Papi Wichart Quartet. Soloists: Leopoldine Lauth (Soprano), Waldemar and Janisch (Songs); The Composer at the Pianoforte; Marching Hymn; Two Viennese Songs; Extracts from Die Fiakermilli; Overture to Schmetterlingszauber; Autogramme; Potpourri with Songs; Two Songs; Waltz; Two Old Viennese Songs; Four Viennese Songs; March. **9.0,** Report of the St. Stephan's Day Celebrations in Budapest. In the Interval at **10.30,** News. **10.45,** Introduction, Variations and Fugue on an Original Theme, Op. 73 (Reger) by Mihatsch (Organ). **11.45,** Records: Caprice viennois (Kreisler); Berceuse, Op. 57 (Chopin); Aria from Figaro (Mozart); Caro mio ben (Giordani); Navarra and Sevilla (Albéniz); Aria from The Barber of Seville (Rossini); Arlequin (Popper); Aria from La Bohème (Puccini); Eili, Eili (Prihoda); Clair de lune (Debussy); Lolita (Buzzi-Peccia); Perpetuum mobile (Weber); Andalusian Romance (Sarasate); Waltz, Op. 42 (Chopin); Tambourin chinois (Kreisler); Tango, Op. 165, No. 2 (Albéniz); Capriccio (Brahms). **1.0 a.m. (Tuesday),** Close Down.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.,** Hymn. **6.35,** Records. **6.38,** Gym. **6.53,** Records. **7.5,** News. **7.10,** Records. **7.20,** Hints for Housewives. **7.25 to 7.40,** Announcements. **11.57,** Time. **12 Noon,** Fanfare from St. Mary's Church, Cracow. **12.3 p.m.,** Weather. **12.5,** Press Review. **12.10,** Dance Music from Ciechocinek. **1.0,** News. **1.5,** Records. **2.0,** Announcements. **2.5,** Economic Notes. **2.15,** Interval. **4.0,** Musical Programme. **4.45,** Records. **5.0,** Programme for Children from **Lwów, 795 kc/s, 377.4 metres. 5.15,** Concert of Chamber Music, from **Cracow, 986 kc/s, 304.3 metres;** Sonata for Pianoforte, Flute, Oboe and Bassoon (Rietti); Trio for Pianoforte, Oboe and Bassoon (Poulenc). **5.45,** Mezzo-Soprano Songs; Solos by Wanda Madey. **6.0,** Talk for Women. **6.15,** Records: Animals in Music. **6.45,** Talk. **6.55,** Art Notes. **7.0,** Announcements. **7.15,** Programme for Soldiers. **7.40,** March Records. **7.50,** Sports Notes. **8.0,** Great Thoughts. **8.2,** Reading. **8.12,** Concert by the Station Orchestra; Conductor, Gorzynski: March (Lindemann); Spanish Waltz (Lincke); Spanish Legend (Rust); Polka (Strauss); Mazurka (Pianowski); in the intervals, Vibraphone Solos from **Katowice, 734 kc/s, 408 metres. 8.50,** News. **9.0,** Fanfare from Gdynia. **9.2,** Letter Box. **9.12,** Concert by the Station Orchestra; Conductor: Oziminski; Soloist: Marie Bojar (Songs); Overture, Les Girondistes (Litolff); Arias from Andrea Chenier (Giordano) and Tannhäuser (Wagner); Voix du souvenir (Noskowski); Aria from A Masked Ball (Verdi); Marche française (Saint-Saëns). **10.0,** Reading. **10.15,** Light Music and Dance Music from the Bristol Hotel.

ZURICH.—Relays **Beromünster.**

TUESDAY

AUGUST THE TWENTY-FIRST

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.**—**1.30 to 2.30 p.m.,** Time; Exchange; Weather; Records. **6.0,** Programme for Children. **6.45,** News. **7.0,** Maire: Irish Reading. **7.15,** Talk. **7.30,** Time. **7.31,** Music by the Station Ensemble. **8.0,** Simon Whyte (Tenor). **8.15,** Mrs. O'C. Miley (Pianoforte). **8.30,** Songs of the Irish Counties, by John Brennan. **9.0,** Music by the Station Ensemble. **9.20,** Anglo-Irish Songs by Eileen Hayden. **9.35,** Accordion Solos by Luke McGan. **9.45,** Peter J. Doyle (Traditional Fiddle). **10.0,** Variety Programme. **10.30,** Time; News; Weather. **10.40,** Records. **11.0** (approx.), Close Down.

BASLE.—Relays **Beromünster.**

BELGRADE

686 kc/s, 437.3 metres; 2.5 kW.—**10.45 a.m.,** Announcements. **10.50,** Water Level. **11.0,** Concert by the Station Orchestra. **11.59,** Time; Chimes. **12.5 p.m.,** Concert by the Ratni drugovi Wind Instrument Orchestra. In the interval, at **12.45,** Exchange; Announcements. **1.30,** News; Time. **5.55,** Time; Announcements. **6.0,** Programme for Women. **6.30,** Song Recital by Mme. Schechmatowa. **7.0,** Announcements. **7.10,** Popular Music on Records. **7.30,** Quartet (Haydn). **8.0,** Talk. **8.20,** Song Recital by Stanoje Jankovic. **8.50,** A Play. **9.30,** Concert by the Station Orchestra: Overture, Orpheus in the Underworld (Offenbach); Selection from The Czarevitch (Lehár). **10.0,** Time; News. **10.15,** Popular Songs and Orchestral Music. **10.45,** Dance Records. **11.30,** Close Down.

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.25,** See **Leipzig.** In the Interval, News. **8.0,** Interval. **8.45,** Gym. **9.0,** Interval. **10.0,** News. **10.10,** Frederick the Great—Sequence (Brand and Edith Heinrich). **10.50,** Programme for Children. **11.15 to 11.30,** Weather. **11.55,** Weather. **12 Noon,** See **Leipzig. 12.55 p.m.,** Time. **1.0,** Records: Arias from The Magic Flute (Mozart), Don Giovanni (Mozart), Figaro (Mozart), Mignon (Thomas), Martha (Flotow), The Barber of Seville (Rossini), La Bohème (Puccini), Cavalleria rusticana (Mascagni), Samson and Delilah (Saint-Saëns), Rigoletto (Verdi), and Tosca (Puccini), followed by Weather. **1.45,** News. **2.0,** Interval. **2.45,** Greetings; Programme Announcements. **3.0,** Weather; Exchange. **3.15,** Flower Songs. **3.40,** Talk. **4.0,** Concert by the Station Orchestra from the Radio Exhibition Garden; Conductor, Hildebrandt: Overture, Oberon (Weber); Ballet Suite from the Sleeping Beauty (Tchaikovsky); Intermezzo, The Blue Bird (Spiess); Two Slav Dances (Dvorák); Overture, The Thieving Magpie (Rossini); Spanish Caprice (Rimsky-Korsakov); Ballet Music from Der Improvisator (d'Albert). In the interval at **4.50,** Topical Talk. **5.30,** Sports Talk for Young People. **5.45,** Talk: Television. **6.10,** Stromwandern—A Musical Sketch (Gruelich). **6.40,** Political Press Review; Weather. **7.0,** Heidezauber—Sequence of Poems and Songs (Willmann). **8.0,** Motto; News. **8.10,** Variety Programme from the Seeschlösschen Pichelsberge. **10.0,** News. **10.20,** See **Munich. 10.45,** Weather. **11.0,** Concert by the American Legion Band from the Sportpalast. **12 Midnight** (approx.), Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Hymn; Gym. **6.15,** Weather; Meditation. **6.20,** Orchestral Concert. **7.0,** News. **7.10,** Concert (contd.). **8.0 to 8.20,** Gym. **8.30,** Announcements; Records. **9.30,** Programme for Housewives. **9.45,** Programme for Children. **10.0,** News. **10.10,** Market Prices. **11.25 to 11.30,** Exchange. **12 Noon.** Concert by the Walter Fenske Orchestra. In the interval at **12.30 p.m.,** Weather. **1.0,** News. **1.15,** Records. **2.0,** News. **2.15,** See **Hamburg.** In the interval at **3.0,** Exchange. **4.0,** See **Berlin (Deutschlandsender). 6.0,** Announcements. **6.5,** Talk for Young People. **6.25,** Talk on Goebbels' Book, Vom Kaiserhof zur Reichskanzlei. **6.40,** Kilpinen Song Recital by Lore Schepers (Contralto). **7.0,** Peasants at the Microphone. **7.35,** Echoes of the Day. **7.50,** News. **8.0,** Provincial Concert for the Radio Exhibition; The Combined Hamburg, Königsberg and Berlin Station Orchestras; Conductors, Böttcher, Reisner and Hainisch; Peasant Orchestras and the Hans Bund Dance Band; Folk Songs and Dances. In the interval at **10.20,** News. **12 Midnight,** Dance Music. **1.0 a.m. (Wednesday),** Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**6.15 to 6.30 a.m.,** Gym. **12 Noon,** Records. **12.29 p.m.,** Time Signal from Neuchâtel Observatory. **12.30,** News. **12.40,** Records. **1.25 to 1.35** (approx.), Time; Weather; Exchange. **3.30,** Light Music. **3.59,** Time Signal from Neuchâtel Observatory. **4.0 to 6.0,** See **Sottens. 6.0,** Records. **6.30,** Programme for Young People. **7.0,** Time; Weather. **7.1,** Labour Exchange. **7.15,** Records. **7.30,** History Talk. **8.5,** Sacred Concert: The Berne Wind Instrument Orchestra; Soloist, Ernst Graf (Organ). **9.15,** News. **9.25,** Suites—Concert by the Radio Orchestra; Conductor, Gilbert. **10.5,** Sketch. **10.15** (approx.), Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Programme Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian. **10.30,** Records from **Prague. 11.0,** Water Level. **11.5,** See **Prague. 12.10 p.m.,** Local News in Slovak. **12.15,** Records. **12.20,** See **Prague. 1.40,** News in German and Hungarian. **1.50 to 2.0,** See **Prague. 3.15,** See **Moravská-Ostrava. 4.15 to 4.20,** See **Prague. 5.40,** Records. **5.50,** See **Prague. 6.0,** Records. **6.10,** Hints for Housewives. **6.15,** Hungarian Transmission: Literary Programme; Talk. **6.55,** See **Prague. 7.40,** See **Moravská-Ostrava. 7.55,** See **Brno. 8.45,** See **Prague. 10.45,** News in Hungarian. **11.0** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.**—**5.0 a.m.,** Hymn; Motto. **5.10,** Records. In the interval at **5.40,** Time; Weather. **6.0,** Time; Weather; Gym. **6.25,** Orchestral Concert from **Leipzig. 7.0,** News. **7.15,** Concert (contd.). **8.0,** Cookery Hints. **8.10,** Records. **9.0,** News. **9.20 to 9.50,** Music for Schools. **10.0,** Concert for the Radio Exhibition; Station Orchestra; Conductor, Prade; Soloist, Dittrich (Violin): Festival Overture (Lortzing); Old Norwegian Romance (Grieg); Violin Concerto in D (Paganini); The Nutcracker Suite (Tchaikovsky); Invitation to the Dance (Weber); Overture, Der Freischütz (Weber). **12 Noon,** News. **12.20 p.m.,** Readings. **1.0,** Records. **1.30,** News. **1.45,** Records. **2.20,** Exchange. **2.25,** Post Office Propaganda; Records. **2.50,** Market Prices. **3.10,** Pianoforte Recital by Bruno Sowa: Sonata in B flat Op. 22 (Beethoven); Jeux d'eaux à la Ville d'Este (Liszt). **3.40,** Reading. **4.0,** Orchestra Concert; Conductor, Peter: March (Kockert); Overture, Raymond (Thomas); Waltz, Etincelles (Waldteufel); Serenata a Toscanini (Murzilli); Extracts from The Magic Flute (Mozart); Spanish Rhapsody (Richardy); Waltz Potpourri (Robrecht); On the Gulf of Naples (Eilenberg); Overture, Hokus Pokus (Leuschner). **5.30,** Weather; Market Prices. **5.35,** Programme for Women. **5.55** (from **Gleiwitz**), Talk: The New Prussian Game Laws. **6.15,** Mandoline Concert; Conductor, Erne Gildner-Redlinger: Glow-worm Idyll (Lincke); Waltz, Profani Orientali (Bellenghi); Japanese Lantern Dance (Yoshitomo); Serenata della sera (Rossi); Waltz, Dream of Love after the Ball (Czibulka); March (Meissner-Schmiedecke). **6.50,** Announcements; Notes for Farmers. **7.0,** See **Leipzig. 7.30,** The Wood-Carvers of Bad Landeck—Three Generations of Artists at the Microphone. **8.0,** News. **8.10,** Light Music and Dance Music. **10.10,** Talk for Short Wave Amateurs. **10.20,** News. **10.45** (from **Gleiwitz**), Military Band Concert; Conductor, Cyganek: March (Maier); Overture, Le Maçon (Auber); Waltz (Richardy); Ein Morgen in Sanssouci (Kockert); Miezekätzchens Nachtparade (Watslaff); Selection from Die Puppenfee (Bayer); Waltz, Lustige Brüder (Vollstedt); Hungarian Dance No. 5 (Brahms); March (Hellmann). **12 Midnight** (approx.), Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 1.30 p.m.,** Talk for Workers. **1.40 to 2.0,** See **Prague. 3.15,** See **Moravská-Ostrava. 4.15 to 4.20,** See **Prague. 5.40,** Notes for Housewives. **5.55,** Records. **6.20 to 6.55,** German Transmission. **6.55,** See **Prague. 7.40,** See **Moravská-Ostrava. 7.55,** Brass Band Concert. **8.45 to 11.0,** See **Prague. 11.0** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Records. **12.40 p.m.,** Violin Recital by Gaston Marien: Concerto in E (Vieuxtemps); Havanaise (Saint-Saëns). **1.0,** News. **1.10,** Orchestral Concert of Barcarolles and Romances: Gondoles vénitiennes (Leemans); Romance (Svendsen); On the Banks of the Neva (Eilenberg); Romance in F from the Concerto for Flute and Harp (Mozart); Barcarolle from Tales of Hoffmann (Offenbach); Songs without Words, Nos. 12 and 14 (Mendelssohn); Gondoliers (Meyer-Helmund); Salut d'amour (Elgar); Gondollied (Strauss); Romance, Sous les tilleuls (Félix); Italian Barcarolle (Czibulka). **2.0,** Interval. **4.55,** Announcements. **5.0,** Concert of Strauss Waltzes by the Radio Orchestra: Frühlingsträume; Künstlerleben; The Blue Danube. **5.30,** Programme for Children. **6.5,** Literary Review. **6.15,** Records. **6.30,** Recital by Sluszny (Pianoforte); Pousele ('Cello) and Verbist (Clarinet): Sonata for Pianoforte and 'Cello (Grieg); Clarinet: (a) Adagio and Rondo (Mozart), (b) Andante appassionato (Stekke). **7.15,** Weekly Review. **7.30,** Art Review; Notes for Women. **8.0,** Concert by the Symphony Orchestra. Soloist: Léon Roy ('Cello). Overture, A Life for the Czar (Glinka); 'Cello Concerto (Schumann); Selection from The Fair of Sorotchinsk (Mussorgsky); Suite from Tsar Saltan (Rimsky-Korsakov). **9.0,** Talk: Commercial Credit. **9.15,** Boy Scout Report. **9.45,** Concert by the Symphony Orchestra: Symphonic Pictures, Les chants de la mer (Gaubert); Pavane pour une infante défunte (Ravel); Valse noble (Ravel). **10.0,** News. **10.10,** Request Records. **10.55,** Christus vincit (Liszt). **11.0** (approx.), Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish.—**11.57 a.m.,** Weather. **12 Noon,** Orchestral Concert. Soloist: Douliez (Pianoforte). Romanian March (Ganne); Festival Overture (Leutner); Waltz (Ströbl); Selection from Passionnément (Messager); Pianoforte Solo, Trois divertissements (Kálmán); Overture, Die schöne Galathee (Suppé). **1.0 p.m.,** News. **1.10,** Records. **2.0,** Interval. **4.55,** Announcements. **5.0,** Liszt Concert by the Symphony Orchestra: Hungarian March; Preludes; Liebestraum; Tarantella; Venezia e Napoli. **5.45,** Programme for Children. **6.30,** Orchestral Concert: Overture, The Black Domino (Auber); Selection from J'adore ça (Christiné); Waltz, Moonlight on the Alster (Fétras); Largo for 'Cello (Handel); Delibes Potpourri (Urbach); African Suite (Lacôme). **7.15,** Talk. **7.30,** Talk for Women. **8.0,** A Sunbeam—Variety Programme by Anny Prins (Comedienne); the Animato Double Male Voice Quartet, the Kin-el-Huys Banjo Trio, and the Radio Orchestra. **10.0,** News. **10.10,** Dance Records. **11.0,** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15,** Time; Weather; News. **1.40,** Records. **6.0,** Time; Weather. **6.5,** Concert by the Sibiceano Orchestra. **7.30,** Talk. **7.45,** Records. **8.0,** Talk. **8.15,** Symphony Concert by the Station Orchestra. Conductor: Nottara. Overture, The Magic Flute (Mozart); Symphonic Poem, Tabor (Smetana); Chamber Symphony (Stéfanesco). **9.0,** Wireless Notes. **9.15,** Symphony Concert (contd.); Serenade (Wolff-Ferrari) The Swan of Tuonela (Sibelius); Capriccio brillante (Glinka). **10.0,** News. **10.30,** Records.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym.; Records. **9.45,** News. **10.0,** Talk; Records. **12 Noon,** Chimes. **12.5 p.m.,** Concert. **1.30,** Police Band Concert. **4.0,** Programme for Women. **5.0,** Song Recital by Lajos Kertész. **5.40,** Talk. **6.10,** Concert by the Budapest Chamber Orchestra. **7.15,** Talk. **7.45,** Concert by the Budapest Concert Orchestra; Conductor, Miklos Lukacs: Overture, Coriolanus (Beethoven); Selection from A Midsummer Night's Dream (Mendelssohn); Suite, Jeux d'enfants (Debussy); Kleine Suite (Lukacs); Piece (Liadov). **9.0,** News. **9.50,** Concert by the Veres Cigány Band; Soloist, Paul Kálmár (Songs). **10.15,** Weather. **10.20,** 'Cello Recital by Miklos Zsamboki. **11.0,** Dance Music by the Nogrady Jazz Band.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Hymn; Records. **6.5,** Gym. **6.25,** See **Leipzig.** In the interval at **6.50,** Hymn; News. **8.0,** Time; Weather. **8.5 to 8.20,** Gym. for Women. **10.0,** Time; News. **10.10,** Recital by Rood (Baritone), Gertrud Kisselbach (Violin) and Haass (Pianoforte). **10.40,** Radio Report: An Old Osnabrück Custom. **11.0,** Light Music. **11.20,** Talk: Sterilising by Hot Air. **11.30,** Post Office Concert. **12 Noon,** Operetta Records. **12.45 p.m.,** Announcements; Greetings. **1.0,** Concert by the Munchen-Gladbach Philharmonic Orchestra; Conductor, Keitel: Overture, Der Freischütz (Weber); Extracts from Iolanthe (Tchaikovsky); Two Bavarian Ländler (Pöll); In den Bergen Transsylvaniens (Dreyer); March (Blankenburg). **1.45,** Announcements. **1.55** (approx.), Concert (contd.): Overture, The Thieving Magpie (Rossini); Suite (Noack); Waltz (Lincke); Birthday Serenade (Lincke); Das Grab auf der Heide (Heiser); March (Blankenburg). **2.45,** Interval. **3.15,** Talk: Danzig. **3.30,** Exchange. **3.45,** Talk: The Care of Infants. **4.0,** See **Stuttgart. 5.0,** Talk: Rhineland Customs and Legends. **5.15,** Recital of Spanish Music by Dauner (Violin), Immisch ('Cello), Grape (Pianoforte) and Marga Bäuml (Guitar): Two Pieces for Violin and Pianoforte: (a) Minuet (Porpora), (b) Malagueña (Albéniz); Two Pieces for Guitar: (a) Bolero (Arcas), (b) Fueño (Tarrenga); Two Pieces for 'Cello and Pianoforte: (a) Serenade (Lalo), (b) Spanish Dance (Granados). **5.45,** Book Review. **6.0,** Talk for Girls. **6.20,** Talk: Electricity. **6.40,** To-day's News. **6.50,** Exchange; Sports Notes. **7.0,** Alte Götter—Trilogy (Behrens-Totenohl) with Music by W. Maler. **8.0,** Announcements. **8.10,** Variety Items by Margret Flecken (Mezzosoprano), Remaben (Baritone), the Six Merry Singers, a Quartet, and Hartmann (Pianoforte). **8.40,** Recitation. **9.0,** Concert by the Station Orchestra; Conductor, Hartmann; Overture, Tiberius (Delmas-Popy); Turkish Sequence (Gauwin); Waltz, Fantasia in B minor (Glinka); Ein Abend in Toledo (Schmeling); Extracts from La Traviata (Verdi); Piece (Bocceri); Bubis Tanzliedchen (Buder); Extract from Die Puppenfee (Bayer). **10.0,** Time; News. **10.20,** See **Munich. 10.45,** Chess Lesson. **10.55** (approx.), Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**11.30 a.m. to 12 Noon,** Programme in English, arranged by the International Broadcasting Company of London. **11.30,** Happy Half-hour: Dance Music. **12.0 to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English by the I.B.C.: Torquay; Exeter, Plymouth, and Devonport Concert. Part I: My Song goes round the World. Part II: Dance Music. Part III: Mandoline Band. **5.45,** Dance Music. **6.0 to 11.0,** Programme in French. **11.0** till Close Down, Programme in English by the I.B.C. **11.0,** Concert of Gramophone Records. **11.30,** Light Music, arranged by the I.B.C. (Ireland), Ltd. **12 Midnight,** Club Concert for Bury St. Edmunds Listeners: Dance Music. **12.30 a.m. (Wednesday),** I.B.C. Time Signal. **12.31,** Dance Music. **1.0,** I.B.C. Goodnight Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.40,** Time; Announcements. **6.50,** Weather. **6.55,** Orchestral Concert from Bad Hersfeld; Conductor, Petsch. **8.10,** Water-Level; Weather. **8.15 to 8.35,** Gym. **10.0,** News. **10.45,** Hints for Housewives. **11.0,** Announcements; Records. **11.40,** Programme Announcements; Exchange; Weather. **11.50,** Social Notes. **12 Noon,** Concert on Gramophone Records. **1.0, p.m.,** Time; News. **1.20,** Concert (contd.). **1.50,** Time; News. **2.0,** Concert (contd.). **2.40,** Programme for Women. **3.30,** Weather. **3.35,** Economic Review. **3.50,** Time; Exchange. **4.0,** See **Stuttgart. 5.30,** Talk: Chemical Cleaning. **5.45,** Concert of Schrammel Music. **6.0,** Discussion: German Railways. **6.15,** Industrial Report. **6.25,** Italian Lesson. **6.45,** Weather; Exchange; Announcements; Time. **6.50,** Topical Talk. **7.0,** Concert. **8.0,** Time; News. **8.10,** Variety Programme. **10.20,** Time; News. **10.35,** Sports Notes. **10.45,** See **Munich. 11.10,** Serenade from Baden-Baden. **12 Midnight,** Dance Music. **1.0 a.m., (Wednesday),** Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW.—Relayed by **Bremen, Flensburg** and **Hanover, 1,330 kc/s, 225.6 metres.**—**5.45 a.m.,** Time; Weather; Notes for Farmers. **6.0,** Gym. **6.15,** Time; Weather. **6.20,** See **Berlin (Funkstunde). 7.0,** News. **7.10,** See **Berlin (Funkstunde). 8.0,** Weather; Notes for Housewives. **8.10,** Announcements; Records. **10.50,** News. **11.0,** Musical Programme for Schools. **11.45,** Records. **12 Noon,** Hints for Housewives. **12.5 p.m.,** Time; Weather; Shipping Notes. **12.15,** Orchestral Concert from **Berlin (Funkstunde). 1.0,** Exchange. **1.15,** Weather. **1.20,** Light Music. **2.15,** Orchestral Concert, In the interval, Exchange. **3.40,** Shipping and Aviation Notes. **4.0,** See **Stuttgart. 5.30,** Book Review. **6.0,** Topical Talks. **6.45,** Exchange. **6.55,** Weather. **7.0,** Report from the Hitler Youth Camp at Murnau. **7.40,** Violin Recital by Isabella Schmitz: Romance (Anton); Variations (Siegl). **8.0,** See **Berlin (Funkstunde).** In the interval at **10.20,** News. **12 Midnight** (approx.), Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Kootwijk,** 50 kW. from **3.40 p.m.**—Programme of the General Broadcasting Society, (A.V.R.O.).—**7.40 a.m.,** Time; Records. **9.40,** Time; Service. **9.55,** Records. **10.10,** Concert by the A.V.R.O. Orchestra; Conductor, Treep: Suite, The

AUG. 21st TUESDAY continued

Three Bears (Coates); The Flight of the Bumble Bee (Rimsky-Korsakov); Spanish Serenade (Glazunov); Russian Mazurka (Glinka); March of the Giants (Finck). **10.40,** Talk. **11.10,** Concert by the A.V.R.O. Orchestra (contd.): March, Vimy Ridge (Bidgood); Overture, Masaniello (Auber); Selection from The Geisha (Jones); Styrian Dances (Lanner); 'Neath African Skies (Jessel); Orientzauber (Dicker); Moonlight on the Alster (Fètras); March (Rosey). **12.10 p.m.,** Records. **1.10,** Concert of Light Music by the Kovacs Lajos Orchestra. **2.10,** Reading. **2.40,** Recital by Piet van Egmond (Organ), and Henk Viskil (Songs). **3.40,** Interval. **3.55,** Records. **4.10,** Concert by the A.V.R.O. Children's Choir, conducted by Hamel. **4.40,** Programme for Children. **5.10,** Concert of Light Music relayed from **Nijmegen.** **6.10,** Talk. **6.40,** Records. **7.40,** Time. **7.41,** Concert by the Kovacs Lajos Orchestra and the A.V.R.O. Girls. **8.40,** Variety Items by Clinge Doorenbos. **8.55,** Concert by the A.V.R.O. Orchestra; Conductor, Nico Treep, Soloist, Wilhelm Strienz (Bass): Overture, The Secret Marriage (Cimarosa); Arias from Figaro and The Magic Flute (Mozart); Douce rêverie (Tchaikovsky); Petite valse (Tchaikovsky); Records; Concert Waltz (Moszkowsky); Aria from Don Carlos (Verdi); Aria from The Merry Wives of Windsor (Nicolai); Invitation to the Dance (Weber); Records; Norwegian Rhapsody (Svendsen); Arias from Der Waffenschmied and Czar and Carpenter (Lortzing); Songs of Paradise (King); Knights of the King (Ketelbey). **10.40,** News. **10.50,** Concert of Light Music by the Bela Kiss Orchestra relayed from the Restaurant Haeck, The Hague. **11.40,** Time; Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. (until **6.40 p.m.**); 20 kW. from **6.40 p.m.** Programme of the Catholic Radio Society K.R.O.—**7.40 a.m,** Records. **8.55,** Interval. **9.40,** Records. **10.10,** Concert. **10.40,** Records. **11.10,** Religious Programme. **11.40,** Police Notes **11.55,** Records. **1.25 p.m.,** Interval. **1.40,** Programme for Women. **2.40,** Records. **3.10,** Recitations. **3.25,** Pianoforte Recital by Mlle Free Focke: Partita in C minor (Bach). **3.40,** H.I.R.O. Programme. **4.50,** Records. **4.55,** Song Recital by Mlle. Annie Brugmans. **5.10,** Pianoforte Recital (contd.): Four Pieces (Chopin): (a) Valse, No. 1 Op. 34, (b) Mazurka No 2 Op. 68, (c) Mazurka No. 3 Op. 50, (d) Bolero Op. 19. **5.25,** Records. **5.40,** Talk. **5.55,** Concert by the K.R.O. Boys; Conductor, Lustenhouwer: March (Schootemeyer); Selections from Katz im Sack (Eisemann); Ein Walzer für dich (Meisel); Selection from The Merry Widow (Lehár); Dornröschens Brautfahrt (Rhode); Selection from The Bird Fancier (Zeller); I wanna know all about you (Jerome). **6.40,** Police Notes. **6.55,** Technical Talk. **7.15,** Concert (contd.): Salamanca (Glombig); Nach Wien (Robrecht); Potpourri (Robrecht); Waltz, Les Sirènes (Waldteufel); Piece (Roland); Finale. **8.0,** Records. **8.10,** News. **8.15,** Concert by the K.R.O. Orchestra; Conductor, Pella Symphony in C (Mozart); Three Concert Pieces (Reti); Adagietto from Symphony No. 5 (Mahler). **9.5,** Talk. **9.25,** Concert (contd.): Overture, The Merry Wives of Windsor (Nicolai); Siegfried-Idyll (Wagner); Polovtsian Dances from Prince Igor (Borodin); Tales from the Vienna Woods (Strauss). **10.10,** News. **10.15,** Concert by the K.R.O. Boys; Conductor, Lustenhouwer. **10.55,** Records. **11.10,** Concert (contd.). **11.40,** Close Down.

INNSBRUCK.—Relays **Vienna.**

JUAN LES PINS

1,249 kc/s, 240.2 metres; 2 kW.—**12.30 p.m.,** Amusement Guide; Concert. **1.0,** News. **1.15,** Orchestral Concert. **3.0,** Amusement Guide; Exchange; News. **3.10,** Talk for Farmers. **3.20,** Topical Talk. **3.30,** Concert: Selection from La Bohème (Puccini); Aria from Lakmé (Delibes); Berceuse (Charpentier). **3.45,** News; Weather. **9.0,** Concert relayed from the Casino, Monte Carlo. Conductor: Scotto. Overture, Egmont (Beethoven); Pathetic Symphony (Tchaikovsky); Gavotte and Bourrée (Bach); Ballet Music from Ascanio (Saint-Saëns).

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres;** and **Skamlebaek, 49.5 metres.**—**7.0 a.m.,** Gym. **7.27,** Weather. **8.30,** Service from Copenhagen Cathedral. **11.0,** Weather. **11.10,** Fish Prices. **12 Noon,** Chimes; Weather. **12.5 p.m.,** Concert by Andersen's String Ensemble, relayed from the Bellevue Strand Hotel. **2.0,** Interval. **3.0,** Concert of Danish Music by the Station Orchestra. Conductor: Reesen. Soloist: Karen Marke (Pianoforte). Overture, Soldiers in Heligoland (Emil Hartmann); Two Dances (Rosenberg); Danish Folk Melody (Tarp); Valse caprice (Gyldmark); Suite (Riisiger); Pianoforte Solos: Andante cantabile and Toccata di bravura (Scarlatti); Three Pianoforte Pieces (Couperin): (a) Les moissonneurs, (b) Les barricades mystérieuses, (c) Les petits moulins à vent; March from The Mother (Nielsen); Extracts from Mascarade (Nielsen); Hartmann and Gade Potpourri (Bohlmann); Three Danish Folk Melodies for Strings (arranged Gröndahl); Gallop, Bouquet royal (Lumbye). **5.0,** Reading for Children. **5.30,** Exchange. **5.42,** A Poem. **5.45,** Talk: Sacred Relics. **6.15,** German Lesson. **6.45,** Weather; Wireless Notes. **7.0,** News. **7.15,** Time. **7.16,** Talk: Travelling in Former Times. **7.30,** Talk: International Colonial Problems. **8.0,** Time. **8.1,** Concert of Czech Music by the Station Orchestra. Conductor: Launy Gröndahl. From the Fields and Groves of Bohemia (Smetana); Slovak Suite (Novak); Selection, Bohemian Woods (Heruda); Two Pieces from Bohemian Songs and Dances (Weinberger). **9.0,** A Visit to a Film Studio. **9.30,** Violin Records. **9.45,** Reading. **10.10,** News. **10.25,** Programme for Belgian Tourists on s.s. Leopoldville's Scandinavian Cruise. **11.0,** Dance Music relayed from the Ritz. In the interval at **12 Midnight,** Chimes. **12.30 a.m. (Wednesday),** Close Down.

KIEL.—Relays **Hamburg.** **KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—**5.0 a.m.,** Records. **5.50,** Weather. **6.0,** Gym. **6.20,** See **Berlin (Funkstunde).** **7.0,** News. **7.10** (approx.), See **Berlin (Funkstunde).** **8.0,** Prayers. **8.30,** Gym. for Women. **9.0,** English for Schools: Representative Englishmen. **10.40,** News. **11.5,** Talk: The East Prussian Peasant at Home. **11.30,** Records. **12 Noon,** See **Berlin (Funkstunde).** In the interval at **12.30 p.m.,** Announcements. **1.1,** Time; Weather. **1.5,** Records. **1.20,** News; Records. **2.0,** News; Records. **2.30,** Exchange. **3.0,** Market Prices. **3.10,** Talk for Women. **3.20,** Recital of Folk Songs to the Lute by Elbe. **3.45,** Reading. **4.5,** Concert by the Danzig State Theatre Orchestra from the Kurgarten. Zoppot: Overture, Indra (Flotow); Extracts from Hérodiade (Massenet); Two Pieces from the Jugend-album (Schumann); Waltz from The Arabian Nights (Joh. Strauss); Fantasia in F Minor (Schubert); Chinese Suite (Percy); Intermezzo from I Pagliacci (Leoncavallo); Delibes Potpourri (Fétras); Hungarian Rhapsody No. 4 (Liszt). In the interval at **5.0,** Report on the East German Fair. **5.50,** A Visit to a Foundry. **6.15,** Market Prices. **6:25,** Dialogue for Young People. **6.55,** Weather. **7.0,** History Talk. **7.30,** Telemann-Variationen (Reger), by Riebensahm (Pianoforte). **8.0,** See **Berlin (Funkstunde).** In the interval at **10.0,** News. **12 Midnight** (approx.), Close Down.

KOSICE.—Relays **Prague.** **LAUSANNE.**—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.**—**5.50 a.m.,** Notes for Farmers. **6.0,** Gym. **6.25,** Orchestral Concert from **Dessau.** In the interval at **7.0,** News. **8.0,** Gym. **8.20,** Records. **9.0 to 9.20,** Programme for Women. **9.40,** Exchange. **9.45,** Announcements. **9.55,** Weather; Water-level. **10.10,** Programme for Schools. **11.0,** Post Office Propaganda; Records. **11.30,** News; Time. **11.40,** Weather. **11.50,** Notes for Farmers. **12 Noon,** Orchestral Concert; Conductor, Luh: Overture, Die Afrikareise (Suppé); Extracts from Der Opernball (Heuberger); First Suite (de Micheli); Hungarian Rhapsody (Reindel); German Forest Idyll (Niemann); Isa Waltz (Gfaller). **1.0 p.m.,** News; Time. **1.10,** Records of German Opera Music. **2.0 to 2.15,** News; Exchange; Weather. **3.0,** Talk: Halle. **3.15,** Book Review. **3.35,** Exchange. **4.0,** Orchestral Concert; Conductor, Schröder: A Comedy Overture (Czernik); Two Pieces (Nicodé); Extracts from Hansel and Gretel (Humperdinck); Serenade for Strings (Hofmann); Waltz, Aquarellen (Jos. Strauss); Overture, Le Premier Jour de Bonheur (Auber). **5.20,** Programme for Young People. **5.50,** Exchange; Weather; Time. **6.0,** Reading. **6.20,** Concert by a Mandoline Orchestra; Conductor, Rabback: March (Volmert); Song, Stolzentels am Rhein (Meissler); Hochzeitsständchen (Klose); Grandmother's Story (Gruber-Ritter); At the Spinning-wheel (Ritter); A Dream (Ritter); March (Laukien). **7.0,** The Good Man Thinks of Himself Last—Sketch (Lange), on Records. **7.30,** Talk: Modern Turkey. **8.0,** News. **8.10,** Dance and Light Music by the EmDe Orchestra, the Five Parodists; Soloist, Ignatjeff (Balalaika). In the interval at **10.20 to 10.50,** News; Sports Notes. **12 Midnight** (approx.), Close Down.

LINZ.—Relays **Vienna.**

LJUBLJANA

527 kc/s, 569.3 metres; 5 kW.—**12.15 p.m.,** Records. **12.45,** News. **1.0,** Weather; Records. **7.0,** Programme for Children. **7.30,** Talk. **8.0,** Song and Organ Recital. **9.0,** Concert by the Station Orchestra. **10.10,** Weather; News. **10.30 to 11.0,** Programme in English arranged by the International Broadcasting Company of London. **10.30,** Concert.

LUXEMBOURG

230 kc/s, 1,304 metres; 150 kW.—**7.45 a.m.,** Records. **8.0,** News in French; Record; News in German; Record. **12 Noon,** Records. **12.30 p.m.,** News in French; Record; News in German. **12.45,** Records. **1.0,** Exchange. **1.5,** Records. In the interval at **1.30,** Exchange. **2.0,** Exchange. **3.45,** Exchange **6.30,** till Close Down, Belgian Evening. **6.30,** Variety Programme. **7.30,** Racing Results. **7.35,** Records. **8.0,** News in French and German. **8.20,** Records. **8.35,** Exchange. **8.40,** Flute Recital by Edmond Dehosse. Koncertstück (Terschak); Nocturne (Catherine); Der Vogel als Prophet (Schumann); Hungarian Pastoral (Doppler). **9.15,** Concert by the Concordia Band. Conductor: Mertzig. March from Carmen (Bizet); Overture, Titus (Mozart); Waltz from The Merry Widow (Lehár); Hungarian Dance No. 6 (Brahms). **9.45,** Concert in A op. 6 (Grieg) on Records. **10.20,** Dance Records.

LYONS

LA DOUA, 648 kc/s, 463 metres; 15 kW.—**8.0 a.m.,** News. **10.30,** Concert, relayed from **Toulouse (P.T.T.), 776 kc/s, 386.6 metres. 12 Noon,** Concert by the Station Orchestra. In the intervals at **12.15 p.m.,** Music Report, and **1.0,** News. **2.30,** Military Band Concert: Pasodoble (Ghilanda); Waltz (Lehár); Suite from Le roi s'amuse (Delibes); Foxtrot (Lehár); Piece for 'Cello (Nouguès); Character Piece (Fauchey); Selection from Ta Bouche (Yvain); Humoresque (Dvorák); Czardas (Gung'l); Invitation to the Waltz (Weber). **6.30,** News. **7.30,** Local News. **7.40,** Variety. **8.0,** Legal Talk. **8.10,** Medical Talk. **8.30,** See **Paris (Ecole Supérieure).** After the Programme, News.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**9.0 a.m.,** News. **10.0,** Exchange; Announcements. **10.30,** Interval. **2.0 p.m.,** Chimes; Time; Weather; Light Music. **2.30,** Sextet Concert. **3.0,** Amusement Guide; Exchange; Light Music. **3.30,** Sextet Concert. **4.0,** Light Music. **4.15,** Sextet Concert. **4.50,** News. **5.0,** Interval. **6.0,** Chimes; Light Music. **7.0,** Announcements; Hygiene Talk. **7.30,** Exchange. **7.35** (approx.), Concert, Part I, Russian Opera Music; Extracts from Eugene Onegin (Tchaikovsky); Sadko (Rimsky-Korsakov); Prince Igor (Borodin); Le Coq d'or (Rimsky-Korsakov); The Tale of Tsar Saltana (Rimsky-Korsakov); Part II, Musical Comedy Music; Selection from Gigantes y Cabezudos (Caballero); Pan y toros (Barbieri); La generala (Vives); El asombro de Damasco (Luna); and Los Claveles (Serrano). **8.15,** Hunting and Fishing Notes. **8.30,** News. **8.45** (approx.), Concert, Part I, Pianoforte Recital: The Hunt (Paganini-Liszt); Andante capriccioso (Paganini-Liszt); Moment musical (Schubert); Impromptu in B flat (Schubert); Evocación (Albéniz); Rondo (Poulenc); Polonaise in A flat (Chopin); Part II, Songs; Part III, Orchestral Music; Prelude to Maruxa (Vives); Piece (Steinke); Navarra (Albéniz); Petite Suite (Debussy); Waltz, The Blue Danube (Joh. Strauss); March from The Prophet (Meyerbeer). **9.50,** Sports Notes. **10.0,** Chimes; Time; Talk: Madrid. **10.30,** Adelina Nájera (Songs). **11.0,** News; Sextet Concert; Theatre Notes; Flamenco Songs. **12.45 a.m. (Wednesday);** News. **1.0,** Chimes. **2.0 till Close Down,** Programme in English arranged by the International Broadcasting Company of London. **2.0,** Dance Music. **3.0,** I.B.C., Goodnight Melody and Close Down.

MADRID

EAQ, 10,000 kc/s, 30 metres; 20 kW.—**11.15 p.m.,** News. **11.30,** Orchestral Concert. **11.45,** News. **12 Midnight,** Spanish Music. **12.45 a.m. (Wednesday),** Light Music. **1.0** till Close Down, Programme in English arranged by the International Broadcasting Company of London. **1.0,** Military Band Music. **1.30,** I.B.C. Goodnight Melody and Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.**—**7.30 a.m.,** Gym. **7.45,** Time; News. **8.0,** Interval. **11.30,** Concert by the Malatesta Chamber Orchestra. **12.30 p.m.,** Records. **12.45,** News. **1.0,** Time; News. **1.5,** Popular Music. **1.30,** Records. **1.45,** Popular Music. **2.15 to 2.25,** Records; Exchange. **4.20,** News. **4.30,** Balilla Programme. **5.0,** Records. **5.10,** Concert by the Doreno Orchestra. **5.55,** Weather. **6.0 to 6.10,** Notes for Farmers; Wheat Market Report. **7.0,** Announcements. **7.15,** News in Foreign Languages. **8.0,** Time; News; Records. **8.30,** Government Notes. **8.45,** Hundert Years Comedy of Beretta; Dance Music. **11.0,** News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**12 Noon,** Announcements; Concert: Overture, Romeo and Juliet (Bellini); Selection from Manon (Massenet); Barcarolle (Henselt). **12.29 p.m.,** Time Signal from Neuchâtel Observatory; Weather. **12.33,** Concert (contd.): Ballet Music from Rosamunde (Schubert); Mendelssohn Potpourri (arr. Fétras). **12.55,** News. **1.5,** Records. **1.30,** Interval. **3.59,** Time Signal from Neuchâtel Observatory. **4.0,** See **Sottens.** **6.0,** Interval. **7.44,** Announcements. **7.45,** News. **8.0,** Concert of Operetta Music by the Radio Orchestra: Selections from The Gipsy Baron (Strauss), The Rose of Stamboul (Fall) and Boccaccio (Suppé). **8.45,** Dances by Bianchi (Songs) and Walzer (Accordion). **9.30,** Dance Music. **10.0** (approx.), Close Down.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.0 to 7.15 a.m.,** See **Prague.** **10.0,** See **Prague.** **12 Noon,** Talk for Farmers. **12.10 to 2.0 p.m.,** See **Prague.** **3.15,** Concert by the Station Orchestra; Conductor, Divis: Overture, Masaniello (Auber); Waltz from Der Schleier der Pierette (Dohnányi); Selection from The Bartered Bride (Smetana, arr. Kovarovic); Russian Romance (Friml); Slav Dance No. 8 (Dvorák). **4.15 to 4.20,** See **Prague.** **5.40,** Talk. **5.50,** Talk: A Journalist in Norway. **6.0,** Report. **6.5,** Records. **6.20,** See **Brno.** **6.55,** See **Prague.** **7.40,** Reading. **7.55,** See **Brno.** **8.45,** See **Prague.** **10.45,** Records. **11.0** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.,** News. **5.30,** Fanfare. **5.45,** Gym. **6.15,** Programme Announcements. **7.30,** Records. **9.0,** Musical Programme. **9.55,** Time Signal. **10.0,** News. **10.15,** Musical Programme. **2.45 p.m.,** News. **3.15,** Programme for Children. **3.55,** Time Signal. **4.0,** News. **5.30,** Red Army Programme: Talks. **6.30,** Programme for Collective Farm Workers. **8.0,** Literary Programme. **9.0,** Talk in German by Fritz Langer. **9.55,** Chimes. **10.5,** Talk in French and Dutch: Soviet Aviation.

MOTALA.—Relays **Stockholm.** **MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nurnberg, 1,267 kc/s, 236.8 metres;** and **Kaiserslautern, 1,195 kc/s, 251 metres.**—**6.30 a.m.,** Gym. **6.45,** Motto; Records. **7.15,** Time; Weather; News. **7.25,** Concert by the Philhamonic Orchestra, from **Mannheim. 9.50,** Programme for Housewives. **10.55,** Market Prices. **11.5,** Notes for Farmers. **11.15,** Time; News. **11.30,** Post Office Propaganda; Records. **12 Noon,** Concert by the Small Symphony Orchestra; Conductor, Fritz: Overture, Mignon (Thomas); Three Pieces from Sigurd Jorsalfar (Grieg); Waltz, Die Werber (Lanner); Fantasia on Carmen (Bizet); Albumblatt (Wagner); Overture, Alessandro Stradella (Flotow). **1.15 p.m.,** Time; News. **1.25,** Records. **2.0,** News; Announcements; Exchange. **2.20,** Recital by Bley (Baritone), Hilde Garden (Soprano), and Biebl (Pianoforte): Five Songs, Op. 38, for Baritone (Huber); Pianoforte Pieces (Biebl); Six Lieder for Soprano (Sachse). **2.50,** Programme for Women: Talks; A Sketch. **3.30** (from **Nürnberg**), Military Talk. **3.50,** Weather; Notes for Farmers. **4.0,** Concert by the Small Station Orchestra; Conductor, Kloss: Carnival Overture (Dvorák); Polonaise and Rondo (Weber); Extracts from Das Wunder (Humperdinck); Swabian Peasant Waltz (Krome); Hirten-Idyll (Köhler); Strauss Potpourri; Serenade (d'Ambrosio); Paraphrase on Hungarian Folk Songs (Padouk). **5.30,** Talk: Bad Dürkheim. **5.50,** Bach Lute Music by Wörsching; Prelude; Bourrée in E Minor; Gavotte in G Minor; Gigue in C Minor. **6.10,** Reading for Young People. **6.30,** Records. **6.50,** Time; Weather; Notes for Farmers. **7.0,** See **Leipzig. 7.30,** Kleine Welt—Literary and Musical Sequence. **8.0,** News. **8.10,** The Countryside—Musical Sequence; the Small Station Orchestra; Conductor, Kloss; Soloists, Schindler (Tenor), Elisabeth Waldenau (Contralto). **9.10** (from **Nürnberg**), Amberger Segen—A Sequence. **10.0,** Time; News; Exchange; Sports Notes. **10.20,** Monthly Political Review. **10.45,** Chamber Music by Martha Martensen (Soprano), Dorfmüller (Pianoforte), Härti and Walter (Violins), Haass and Trampler (Viola), Walter ('Cello); Three Songs for Soprano and Pianoforte (Wolf): (a) Um Mitternacht, (b) Waldmädchen, (c) Wo find ich Trhost; String Quintet (Brückner).

NAPLES.—Relays **Rome.** **NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jelöy, 6,990 kc/s, 42.92 metres.**—**11.15 a.m.,** Service. **11.50,** Exchange. **12.45 p.m.,** News. **12.55,** Nauen Time Signal. **1.0 to 2.0,** Records. In the intervals, Weather; Report for

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Farmers; Exchange. **5.30,** Records. **6.10,** Talk. **6.30,** Programme for Women. **7.0,** Announcements. **7.15,** Weather; News. **7.30,** Time. **7.31,** Concert by the Opera House Quartet: Quartet from Faust (Gounod); Duet from Don Giovanni (Mozart); Air from The Magic Flute (Mozart); Duet from Il Trovatore (Verdi). **8.0,** Talk. **8.30,** Concert by the Station Orchestra; Conductor, Kramm: Suite (Gjerström); Selection from The Wedding at Ulfasa (Södermann); Suite (Sibelius); Ballet Suite (Gyldmark). **9.20,** An Interview. **9.40,** Weather; News. **10.0,** Topical Talk. **10.15,** Concert (contd.): Mozartiana (Tchaikovsky); Suite (Coates). **11.0** (approx.), Close Down.

OSTERSUND.—Relays **Stockholm.**

PALERMO

565 kc/s, 531 metres; 4 kW.—**12.45 p.m.,** News. **1.0 to 2.0,** Light Music. In the interval at **1.30,** Time; News; Weather. **4.30,** Programme for Children's Holiday Camps and Hostels. **5.30,** Programme for Women. **5.40,** Records. **6.10,** Balilla Programme. **8.0,** Announcements; Tourist Notes; Programme for Farmers; News. **8.20,** Records. In the interval at **8.30,** Time; News. **8.45,** Martha—Opera in Four Acts (Flotow). Conductor: Tansini. In the intervals, Talks. **11.0,** News.

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 a.m.,** News. **10.30,** Concert relayed from **Toulouse, 776 kc/s, 386.6 metres. 12 Noon,** Tourist Report. **12.15 p.m.,** Concert relayed from **Limoges, 895 kc/s,** (contd.). **2.0,** Records. **4.0,** Concert relayed from **Paris (Radio Colonial), 19.56 metres. 335.2 metres. 1.0,** News. **1.15,** Concert **5.0,** Interval. **6.0,** Dramatic Programme; Scenes from Plays. **6.30,** News. **7.45,** Science Talk. **7.53,** Photography Lesson. **8.0,** Records. **8.30,** La Serva Padrona—Opera in Two Acts (Pergolesi); Isabelle et Pantalon—Opera in Two Acts (Manuel); The National Orchestra and Choirs; Conductor. Roger Desormière. After the Opera, News. **10.30,** Dance Music by Paul Dony and his Romany Band.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.15 a.m.,** Fanfare; Records. In the intervals at **7.30** and **8.20,** News. **8.45,** Cookery Notes. **12 Noon,** Exchange. **12.5 p.m.,** Records. **12.25,** News. **12.35,** Records. In the interval at **1.15,** Exchange. **1.30,** Exchange. **1.35,** Records. **2.0,** Exchange. **3.15,** Exchange. **3.45,** Exchange. **4.50,** Exchange. **6.25,** Religious Talk. **6.45,** Exchange. **6.49,** Records. **7.10,** News. **7.30,** Records. **8.0,** Interval. **8.10,** Variety Programme. **8.40,** Exchange. **8.55,** Rachmaninov Concert. Sonata for 'Cello and Pianoforte; Songs. **9.35,** Interval. **9.45,** Dance Records. **10.20,** News. **10.30** till Close Down, Programme in English arranged by the International Broadcasting Company of London. **10.30,** Tunes from the Talkies and Shows. **10.45,** Hawaii Concert.

PARIS

RADIO-PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.,** Gym. **7.0,** Records. **7.15,** Weather. **7.45,** Gym. **8.0,** Records. **12 Noon,** Symphony Concert. Conductor: Letombe. In the interval at **1.20 p.m.,** Exchange; Weather. **3.45 to 3.59,** Exchange. **6.20,** Weather; Notes for Farmers. **6.45,** Records. **7.0,** Talk: Matisse. **7.20,** British Press Review. **7.30,** Topical Talk. **8.0,** Les Pirates de la Savane—Play (Bourgeois-Dugué). In the Intervals at **8.30,** Press Review; Weather; and at **9.15,** Sports Notes. **10.30,** Dance Music by the Cazaux Band.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres** and **25.27 metres.—3.0 p.m.,** Edward MacHugh. **3.15,** Castles of Romance. **3.30,** To-day's Children. **3.45,** News; Cooking School. **4.0,** Honeymooners. **4.15,** Alice Joy. **4.30,** Melody Mixers. **5.0,** Pianoforte Recital. **5.15,** Fields and Hall. **5.30,** Vie and Sade. **5.45,** Hotel William Penn Orchestra. **6.0,** Market Reports. **6.15,** Hon. Archie and Frank. **6.30,** Farm and Home Hour. **7.30,** KDKA Home Forum. **8.0,** Sammy Fuller. **8.15,** Congress of Clubs. **8.30,** Music Magic. **9.0,** Betty and Bob. **9.15,** Singing Stranger. **9.30,** Market Reports. **9.45,** Chicago Symphony Orchestra. **10.15,** KDKA Kiddies' Klub. **10.30,** To be announced. **10.45,** Orphan Annie. **11.0,** Time; Temperature; Weather. **11.14,** Baseball Résumé. **11.30,** Twenty Fingers of Harmony. **11.45,** Lowell Thomas. **12 Midnight,** Dan and Sylvia. **12.10 a.m. (Wednesday),** News. **12.15,** Pittsburgh Varieties. **12.45,** Frank Buck. **1.0 to 6.0,** Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 to 7.15 a.m.,** Time; Gym; Music; News. **10.0,** Records. **10.5,** News. **10.20,** News in German. **10.25,** Records. **11.5,** Concert by an Orchestra of Unemployed Musicians. **11.55,** Programme for Farmers. **12 Noon,** Time; Talk on Fishing. **12.10 p.m.,** Records. **12.20,** News. **12.30,** Quartet Concert: Waltz, Tales from the Vienna Woods (Joh. Strauss); Fantasia on Dvorák's Symphony, From the New World (Leopold); Cradle Song (Kostal); Piece (Popper); Selection from Polenblut (Nedbal); Serenata (Toselli); Song (Straub). **1.30,** Industrial Review. **1.40,** Records. **1.50,** Exchange. **2.0,** Interval. **3.15,** See **Moravská-Ostrava. 4.15 to 4.20,** Exchange; Weather. **5.40,** Records. **5.45,** Talk for Housewives. **5.50,** Topical Talk for Workers. **6.0,** Records. **6.5,** Programme for Farmers. **6.15,** Records. **6.20,** German Transmission: Reading; Talk. **6.55,** News in German. **7.0,** Time; News. **7.10,** Concert by Jankovec (Accordion), Maracek and Kabát (Hawaiian Guitars). **7.40,** See **Moravská-Ostrava. 7.55,** See **Brno. 8.45,** Talk: Wyoming. **9.0,** Concert by the Station Orchestra; Conductor; Parik, Soloist: Langer (Pianoforte): Puppenspiel-Ouvertüre (Weinberger); Pianoforte and Orchestra: Variations on a Student Song (Aich); Elegy Op. 146 (Vackár); Suite (Blahník). **10.0,** Time; News. **10.15,** Dance Music for Two Pianofortes. **10.45,** News in English. **11.0** (approx.), Close Down.

REYKJAVIK

208 kc/s, 1,442 metres; 16 kW.—**12 Noon,** Weather. **2.15 p.m.,** Variety Programme. **5.0,** Weather. **9.10,** Weather. **9.50,** Announcements. **10.0,** Time; 'Cello Recital. **10.30,** Reading. **11.0,** News. **11.30,** Records; Dance Music. **12.30 a.m. Wednesday** (approx.), Close Down.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan No. 2, 1,348 kc/s, 222.6 metres; Turin No. 2, 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.—7.30 a.m.,** Gym. **7.45,** Time; News. **8.0,** Interval. **12.30 p.m.,** Records. **1.5,** See **Milan. 1.30,** Time; News; Exchange. **1.45,** See **Milan. 4.20,** News; Exchange. **4.30,** See **Milan. 5.0,** Records. **5.10,** See **Milan. 6.55,** Weather. **6.0,** Wheat Market Report. **7.0,** Announcements. **7.15,** News in Foreign Languages. **8.0,** Time; Announcements. **8.10,** Records. **8.30,** Government Notes. **8.45,** Recital by Brunetti (Pianoforte), Manno (Violin), Figheri ('Cello), Fortunato (Double Bass), Maria Senes (Songs). The Trout Quintet (Schubert); South American Songs. **9.30** (approx.), Sogno (ma forse no)—One-Act Play (Pirandello). **10.0,** Dance Music from the Albergo del Quirinale. **11.0,** News.

RUYSSELEDE

10,330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.,** News in French. **8.0,** See **Brussels No. 1. 9.0,** News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by **W2XAF** on **31.48 metres;** and by **W2XAD** on **19.56 metres.—7.0 p.m.,** Musical Programme. **7.15,** Mudcaves—Play. **7.30,** Woman's Radio Review; Talks; Orchestra. **11.35,** Stock Reports. **12 Midnight,** Concert by Leo Reisman's Orchestra, with Phil Duey. **12.30 a.m. (Wednesday),** Concert by Wayne King and his Orchestra. **1.0 to 3.0,** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW; and **Geneva, 401 kc/s, 748 metres.—12.29 p.m.,** Time. **12.30,** News. **12.40** (from **Geneva**), Records. **1.0** (from **Geneva**), Exchange. **1.5** (from **Geneva**), Records. **2.0,** Interval. **3.59,** Time. **4.0** (from **Geneva**), Concert by the Station Orchestra; Conductor, Echenard: Selection from Masaniello (Auber); Dances (Quilter); Berceuse and Scherzo (Gaubert; Selection from Eine Nacht in Venedig (Joh. Strauss); African Dances (Montague-Ring). **4.45,** Records. **5.15,** Old Dance Music. **6.0** (from **Geneva**), Programme for Women. **6.45** (from **Geneva**), Touring Club Notes. **7.0** (from **Geneva**), Talk: The 1934 Bayreuth Festival. **7.30** (from **Geneva**), Wireless Notes. **7.59,** Weather. **8.0** (from **Geneva**), Variety Programme. **9.0,** News. **9.10** (from **Geneva**), Post-war Songs. **10.0** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.—7.45 a.m.,** Service. **8.0,** Weather. **12.30 p.m.,** Weather. **12.45,** Exchange. **12.55,** Time. **1.0,** Quartet in A Minor (Schubert), Records. **1.30,** Talk. **2.0,** Concert of Light Music. **3.0,** Interval. **5.0,** Weather. **5.5,** A Microphone Visit. **5.25** (from **Sundsvall**), Reading. **5.45,** Records. **6.45,** Talk. **7.15,** Weather; News. **7.30,** Orchestral Concert; Conductor, Hellmann; Soloist, Paul (Pianoforte): Suite, King Christian II (Sibelius); Serenade for Strings (Elgar); Concerto in E Flat (Ireland); Irish Rhapsody (Stanford); In the interval, Reading. **9.15,** Talk. **9.45,** Weather; News. **10.0,** Variety Programme. **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10 a.m.,** Orchestral Concert relayed from **Toulouse (PTT), 776 kc/s, 386.6 metres. 12 Noon,** Military Band Records. **12.45 p.m.,** News. **1.0,** Time; Exchange. **1.5,** Concert by the Station Orchestra. Conductor: De Villers. Overture, Si j'étas roi (Adam); Waltz (Scassola; Two Slav Dances (Dvorák); Selection from The Count of Luxembourg (Lehár); Extracts from Sylvia (Delibes). **2.0,** Interval. **4.0,** Dance Music relayed from **Paris (Radio Colonial), 25.25 metres. 5.0,** Talk: European Industries in Algeria. **5.15,** Concert by the Station Orchestra. Conductor: Roskam. Overture, The Caliph of Bagdad (Boïeldieu); Ballet Suite (Popy); Selection from Polenblut (Nedbal); Polonaise in A (Chopin). **6.0,** Legal Talk in German. **6.15,** Topical Talk. **6.30,** Concert by the Station Orchestra. Conductor: de Villers. Suite Funambulesque (Messager); Gavotte for 'Cello and Orchestra (Hussonmorel); Selection from Le Caïd (Thomas); Ballet Music from Les Héretiques (Lévadé); Selection from Les Fantoccini (Lecocq). **7.30,** Time; News. **7.45,** Local Review. **8.0,** Press Review in German; Lottery Results; News. **8.30,** See **Paris (Ecole Supérieura). 10.30** (approx.), News.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.35 a.m.,** Notes for Farmers. **5.45,** Hymn; Motto; Time; Weather. **6.5,** Gym. **6.15,** Records. **6.40,** Time; Announcements. **6.55,** Concert by the Philharmonic Orchestra from **Mannheim,** Conductor, Becker. **8.10,** Weather. **8.15 to 8.35,** Gym. **10.0,** News. **10.10,** Otto Frickhöffer Songs by Paula Wagner. **10.40,** Three Pieces (Busoni) by Eucken (Pianoforte). **11.10,** Les Préludes (Liszt), on Records. **11.25,** Announcements; Records. **11.55,** Weather. **12 Noon,** Concert of Swabian Folk Music. An Accordion Band, a Zither Trio, and a Swabian Peasants' Choir and Orchestra. Conductor, Görlich. **2.0 to 2.30 p.m.,** Time; News. **3.10,** Stories for Children. **3.30,** Talk: Flowers. **4.0,** Concert by the Philharmonic Orchestra. Conductor, Wilhelm Walter. Soloist, Luzi Gorgus (Coloratura Soprano). Overture, Preciosa (Weber); Clog Dance from Czar and Carpenter (Lortzing); Aria from The Merry Wives of Windsor (Nicolai); March from Aïda (Verdi); Aria from Rigoletto (Verdi); Overture, Die schöne Galathée (Suppé); Waltz, Frühlingsstimmen (Joh. Strauss); Selection from Die Puppenfee (Bayer); Bavarian March (Scherzer). **5.30,** Song Recital by Elisabeth Jentsch (Soprano), Jautz (Tenor), and Jentsch (Baritone). **6.0,** Talk: The Cuckoo. **6.15 to 6.45,** See **Frankfurt. 6.45,** Time; Weather; Notes for Farmers. **7.0,** See **Berlin (Deutschlandsender). 8.0,** News. **8.10,** Playing with Fire—Play (Ehmer). **8.40,** European Marches (on Records). **9.40,** German History in Folk Songs—Sequence (Lilienfein). **10.20,** Time; News. **10.35,** Topical Talk. **10.45,** Local News. **11.0,** Monthly Political Review. **11.25,** Dance Music. **12 Midnight,** See **Frankfurt. 1.0 a.m. (Wednesday),** Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.,** Dance Refrains. **8.30,** News. **8.35,** Songs; Orchestral Music. **12 Noon,** Opera Arias. **12.15 p.m.,** Military Music. **12.30,** News. **12.45,** Request Music. **1.0,** News. **1.5,** Sound Film Music. **1.15,** Orchestral Music. **1.30,** Chansonnettes. **1.45,** Orchestral Music. **2.0,** News; Amusement Guide. **6.0,** News. **6.15,** Orchestral Music. **6.30,** Operetta Songs. **6.45,** Orchestral Music: Malagueña (Ravel); Minuet from the Toy Symphony (Haydn); Prelude (Rachmaninov); Bells across the Meadows (Ketelbey); Le dernier sommeil de la Vierge (Massenet). **7.0,** Opera Music: Duet from Manon (Massenet); Aria from Tosca (Puccini); Gopak (Mussorgsky); Arias from Le pré aux clercs (Hérold) and Les Brigands (Offenbach). **7.15,** Orchestral Music: Barcarolle (Leoncavallo); The Canary (Poliakin); Piece (Schaffer); Très jolie (Waldteufel). **7.30,** News. **7.45,** Sound Film Music. **8.15,** Violin Recital: Meditation from Thaïs (Massenet); Hebrew Melody (Achron); Gipsy Love Song; Serenade from Frasquita (Lehar); Hindu Song (Rimsky-Korsakov); Serenade (Drdla). **8.30,** Chansonnettes. **9.0,** Hunting Horn Music. **9.30,** Operetta Songs. **10.0,** Le caveau de dix heures—a Radio Fantasy. **10.15,** News. **10.30,** Orchestral Music. **11.0,** Opera Music: Serenade from The Barber of Seville (Rossini); Aria from Marouf (Rabaud); Arias from Mirella (Gounod); March from Tannhäuser (Wagner). **11.15,** Cinema Organ Solos. **11.30,** Songs. **11.50,** Opera Music: Overture, The Daughter of the Regiment (Donizetti); Overture, Mignon (Thomas); Selection from La dame blanche (Boieldieu). **12 Midnight,** News. **12.5 a.m. (Wednesday),** Tango Songs. **12.15,** Orchestral Music. **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo.** **TURIN.**—Relays **Milan.**

VATICAN CITY

15,120 kc/s, 19.84 metres; 10 kW. **(Morning); 5,970 kc/s, 50.26 metres (Evening).—11.0 to 11.15 a.m.,** Religious Information in English. **8.0 to 8.15 p.m.,** Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz** and **Salzburg, 1,294 kc/s, 231.8 metres.—9.0 a.m.,** News. **9.20,** Market Prices. **9.30,** Weather. **11.30,** Records. **11.55,** Weather. **12 Noon,** Concert by the Vienna Symphony Orchestra; Conductor, Schönherr; Soloist, Stumpf (Viola): Overture, The Black Domino (Auber); Orchestral Suite (Chaminade); Variations for Viola and Orchestra on the Austrian Folk Song, A Schüsserl und a Reinderl (Weber); Selection from I Pagliacci (Leoncavallo); Coronation March from Die Folkunger (Kutschmer). **1.0 p.m.,** Time; News. **1.10,** Concert (contd.): Waltz (Jos. Strauss); Extracts from Bruder Straubinger (Eysler); Selection from Der Zigeunerprimas (Kálmán); Waltz (Schachenhofer); Overture (Lincke). **2.0,** Announcements. **3.30,** Time; News. **3.50,** Programme for Women. **4.10,** News. **4.15,** Musical Programme for Children. **4.40,** Recital by Lissy Siedek (Violin) and Köstler (Tenor): Sonatina in D, Op. 137, No. 1 (Schubert); Aria from Rigoletto (Verdi); Aria from Tosca (Puccini); Song from The Czarevitch (Lehár); Mattinata (Leoncavallo), **5.10,** Talk: The Hungarian Exhibition at the Vienna Autumn Fair. **5.20,** Reading. **5.40,** Records of Spanish Music. **6.30,** Talk: Austrian Scenery. **6.55,** Astronomy. **7.10,** Time; News. **7.20,** Military Band Concert; Conductor, Wacek: March (Wacek); Overture, Die Felsenmühle (Reisinger); Song from Der Soldat der Marie (Ascher); Potpourri of Overtures (Wagner); March (Wacek); Extracts from Das Fürstenkind (Lehár); Waltz (Joh. Strauss); Potpourri (Komzak); Polka (Straus). **8.40,** Time; News. **9.0,** Concert of Polish Music by The Vienna Symphony Orchestra; Conductor, Mazurkiewicz; Soloist, Irena Dubiska (Violin); Suite from A Winter's Tale (Moniuszko); Prelude, Op. 29 (Rozycki); Violin Concerto in D, Op. 16 (Mlynarski); Concert Overture (Szymanowski); Symphonic Poem, Op. 12 (Karlowicz). **10.30,** News. **10.50,** Concert by the Vienna Chamber Orchestra; Conductor, Jascha: Overture, Djamileh (Bizet); Selection from Gianni Schicchi (Puccini); Slav Romance from Der Rastelbinder (Lehár); Selection from The Rose of Stamboul (Fall); Waltz from Die Fledermaus (Joh. Strauss); Song from the Singspiel, Ade, du liebes Elternhaus (Jascha); Potpourri (Fétras). **12 Midnight,** Records. **1.0 a.m. (Wednesday),** Close Down.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.,** Hymn. **6.35,** Records. **6.38,** Gym. **6.53,** Records. **7.5,** News. **7.10,** Records. **7.20,** Hints for Housewives. **7.25,** Announcements. **7.40,** Interval. **11.57,** Time. **12 Noon,** Fanfare from St. Mary's Church, Cracow. **12.5 p.m.,** News. **12.10,** Concert by the Nina Manska Orchestra: Waltz (Dvorák); Suite from Swan Lake (Tchaikovsky); Intermezzo (de Micheli); Poem (Drdla); Humoresque (Tchaikovsky); Alte Refrain (Kreisler); Paradise (Krakauer-Kreisler); Intermezzo (Siede); Waltz Fantasia (Glinka); Serenade (Becce); Norwegian Dances (Grieg); Canzonetta (Friml-Artok); Rococo Intermezzo (Schüffft); Two Waltzes (Brahms). In the interval at **1.0,** News; Programme for Children. **1.55,** Labour Exchange. **2.0,** Announcements. **2.5,** Economic Notes. **2.15,** Interval. **4.0,** Musical Programme from **Lwów, 795 kc/s, 377.4 metres. 5.0,** Letter Box. **5.15,** String Quartet in A minor, Op. 51 (Brahms). **6.0,** Talk: Architecture. **6.15,** Song Recital by Mossakowski: Arias from The Queen of Spades (Tchaikovsky), Zaza (Leoncavallo), Andrea Chenier (Giordano); To the Forest (Tchaikovsky); Two Songs (Moniuszko). **6.45,** Talk for Boy Scouts. **6.55,** Aviation Notes. **7.0,** Announcements. **7.15,** Pianoforte Recital by Mme. Jonas: Rondo in E flat (Hummel); Bagatelle (Beethoven); Impromptu in G (Schubert); Two Songs without Words (Mendelssohn); Cordoba (Albèniz); Pieces (Phillip): (a) Will o' the Wisp, (b) Valse-Caprice. **7.50,** Sports Notes. **8.0,** Great Thoughts. **8.2,** Poetry Reading from **Lwów. 8.12,** Song Records. **8.35,** Programme for Farmers. **8.45,** News. **9.0,** See **Vienna. 10.30,** Talk. **10.45,** Dance Records. **11.0,** Weather.

ZURICH.—Relays **Beromünster.**

WEDNESDAY
AUGUST THE TWENTY-SECOND

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.**—**1.30 to 2.30 p.m.,** Time; Exchange; Weather; Records. **6.0,** Programme for Children. **6.45,** News. **7.0,** Irish Lesson. **7.15,** German Lesson. **7.30,** Time. **7.31,** Concert by the Workers' Union of Ireland Band. **8.30,** Recital by P. J. Duffy and Mrs. E. Kirk (Songs). **9.0,** Recital by Mrs. Bowell (Pianoforte) and Bay Jellett (Violin). **9.30,** Vocal Recital by Gertrude Morimer. **9.45,** Michael J. McDonagh (Traditional Fiddle). **10.0,** Variety Programme. **10.30,** News. **10.40,** Mabel Constanduros (Entertainer). **11.0** (approx.), Close Down.

BASLE.—Relays **Beromünster.**

BELGRADE

686 kc/s, 437.3 metres; 2.5 kW.—**10.45 a.m.,** Announcements. **10.50,** Water Level. **11.0,** Records. **11.59,** Time; Chimes. **12.5 p.m.,** Concert by the Station Orchestra. **12.45,** Exchange; Announcements. **1.10,** Concert by the Station Orchestra. **1.30,** News; Time. **3.55,** Time; Announcements. **6.0,** Talk. **6.30,** Concert by the Station Orchestra; March (Andrejevitch); Piece (L. Dvorák); Mijatovke (Binicki); Selection from A Waltz Dream (O. Straus); Waltz (Mohr). **7.20,** Announcements. **7.30,** Talk. **8.0,** Concert relayed from **Ljubljana, 527 kc/s, 569.3 metres. 10.0,** Time; News; Concert from the Domovina Restaurant. **10.50,** Dance Records. **11.30,** Close Down.

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.20,** See **Königsberg.** News in the Interval. **8.0,** Interval. **8.45,** Gym. for Women. **9.0,** Interval. **9.40,** Gym. for Children. **10.0,** News. **10.10,** Silesian Folk Songs, with Commentary. **10.50,** Programme for Children. **11.15,** Weather for Shipping. **11.30,** Interval. **11.55,** Weather. **12 Noon,** Young People's Concert from the Radio Exhibition. **1.45 p.m.,** News. **2.0,** Interval. **2.45,** Greetings; Announcements. **3.0,** Weather; Exchange. **3.15,** Young People's Concert, relayed from the Radio Exhibition. **3.40,** Book Review. **4.0,** Concert by Boys' and Girls' Choirs and Wind Bands, relayed from the Radio Exhibition. Talks by Boys and Girls in the Intervals. **5.30,** Talk: Back to Pure German. **5.50,** Topical Talk. **6.0,** Travelogue: Bali, an Earthly Paradise, illustrated by Walter Niemann's Bilder aus dem fernen Osten, played by the Composer. **6.55,** Poem; Weather. **7.0,** Who knows this Book?—Friedrich Kayssler reads Extracts from a Book of the Month and announces Results of the 10th August Literary Competition. **7.30,** Italian Lesson (on Records. **8.0,** News. **8.35,** Programme for Young People. **9.0,** Folk Song Concert by Hitler Youth from the Provinces, relayed from the Radio Exhibition. **10.0,** News. **10.25,** Talk: Freiherr von Stein's Civic Ideal. **10.45,** Weather. **11.0,** Helmuth Krüger and his Dance Band, relayed from the Radio Exhibition. Gustav Jacoby in his Repertoire.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Hymn; Gym. **6.15,** Weather; Meditation. **6.20,** See **Königsberg. 7.0,** News. **7.10** (approx.), See **Königsberg. 8.0,** Gym. **8.20,** Physical Culture. **8.35,** Interval. **9.0,** Programme for Schools. **9.40,** Interval. **10.0,** Weather; News. **10.10,** Market Prices. **10.30,** Announcements; Records. **11.25,** Exchange. **11.30,** Interval. **12 Noon,** Orchestral Concert. Overture, Die schöne Galathee (Suppé); Waltz (German); Babillage (Gillet); Rusticanella (Cortopassi); Waltz, Schallwellen (Joh. Strauss); Murmelndes Lüftchen (Jensen); Violetta (Rust); Waltz (Lanner); March (Sousa). In the interval at **12.30 p.m.,** Weather. **1.0,** News. **1.15,** Records. **2.0,** Weather; News; Water Level. **2.15,** To be announced. **3.0,** Exchange. **4.0,** See **Berlin (Deutschlandsender). 6.0,** Announcements. **6.5,** Programme for Women. **6.30,** Lieder Recital: Four Songs (Wolf-Ferrari); Four Songs (Schmid). **6.50,** Fantasia in C, Op. 17 (Schumann). **7.20,** Folk Songs. **7.40,** Echoes of the Day. **8.0,** See **Frankfurt. 8.35,** Programme for Young People. **9.0,** Opera Music. **10.20,** Weather; News; Sports Notes. **10.50,** Dance Music by the Georg Grüber Band. **1.0 a.m. (Thursday)** (approx.), Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**6.15 to 6.30 a.m.,** Gym. **12 Noon,** Concert of Light Music by the Station Orchestra; Conductor, Neppach. **1.25,** Time; Weather; Exchange. **3.30,** Talk for Women: The Land of the Pharaohs. **3.59,** Time from Neuchâtel Observatory. **4.0,** From Gluck to Wagner—Concert by the Station Orchestra. **5.0,** Programme to be announced. **6.0,** Records: German and Italian Singers. **6.30,** Reading. **7.0,** Time; Weather; Market Prices. **7.20,** English Lesson. **7.50,** Concert of Operetta Music by the Station Orchestra; Conductor, Reinshagen. **8.30,** Talk: Macedonia. **9.0,** News. **9.10,** Military Band Concert; Conductor, Brändli. **10.15,** Tourist Report.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian **10.30,** See **Moravská-Ostrava. 11.0,** Water Level. **11.5,** Records. **12.5 p.m.,** Hints for Housewives. **12.10,** News in Slovak. **12.15,** Record. **12.26,** See **Prague. 12.30,** See **Brno. 1.30,** Records. **1.40,** News and Weather in German and Hungarian. **1.50 to 2.0,** See **Prague. 3.15 to 4.20,** See **Prague. 4.40,** See **Prague. 5.40,** Educational Talk. **5.50,** Records. **6.0,** Talk for Tourists. **6.10,** Hints for Housewives. **6.15,** Hungarian Transmission: Talk; Pianoforte Recital by Magda Richterova. **6.55,** See **Prague. 7.10,** Talk. **7.25,** See **Moravská-Ostrava. 7.55,** See **Prague. 10.45,** News in Hungarian. **11.0** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.**—**5.0 a.m.,** Hymn; Motto. **5.10,** Records. In the Interval at **5.40,** Time; Weather. **6.0,** Time; Weather; Gym. **6.25,** Orchestral Music. **7.0,** Time; Weather. **7.5,** News. **7.15,** Concert (contd.). **8.0 to 8.10,** Cookery Hints. **8.40,** Gym. for Women. **9.0,** Time; Weather; News. **10.10 to 10.40,** Programme for Schools. **11.30,** Time; Weather; News; Water Level. **11.45,** Programme for Farmers. **12 Noon** (from **Gleiwitz**), Orchestral Concert.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Records. **1.0 p.m.,** News. **1.10,** Concert by the Radio Orchestra. Soloist: Kerschaver (Tenor). Danceries (Gervaise-Souris); Second Petite Suite (de Micheli); Persian Suite (Tournier); Songs: (a) The Legend of the Grail from Lohengrin (Wagner), (b) Aria from Oberon (Weber); Suite fantastique (Foulds); Les néréides (Brusselmans). **2.0,** Interval. **4.55,** Announcements. **5.0,** Dance Music, relayed from the Casino, Blankenberghe. **6.0,** Talk. **6.15,** Sonata No. 42 (Mozart), on Records. **6.30,** Concert by the Radio Orchestra. Soloist: Mme. Moulaert-Maes (Songs). Madrigal (Rieti); Song, Cocardes (Poulenc); Le marchand de sable qui passe (Roussel); Song and Pianoforte; Poèmes juifs (Milhaud); Suite, Harry Janos (Kodaly). **7.30,** Announcements; Medical Talk. **8.0,** Orchestral Concert with Soloists. **8.45,** Records. **9.0,** Wagner Concert. **10.10,** News. **10.20,** Dance Music, relayed from the Continental Palace Hotel, Blankenberghe. **11.0** (approx.), Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW.—Programme in Flemish. **11.57 a.m.,** Weather. **12 Noon,** Orchestral Concert. Soloist: Verbruggen (Songs). Selection from The Gipsy Baron (Joh. Strauss); Three Songs; Serenade (Braga); Canzonetta (Tchaikovsky); La paloma (Yradier-Weninger). **1.0 p.m.,** News.

FROM THE BERLIN RADIO SHOW. This evening the Deutschlandsender relays a folk song concert given by the Hitler Youths' Choir at the Berlin Radio Show. The picture shows a rehearsal in progress.

Conductor, Pöschke. March (Freidemann); Waltz (Zimmer); Festival Overture on the Song, Ueb immer treu und Redlichkeit (Hartung); Baby Parade (Manafred); Suite (Micheli); Humorous Potpourri (Schreiner); Bach and Händel Potpourri (Zimmer); Waltz (Mannfred). In the Interval at **12.30 p.m.,** Time; Weather. **1.30,** Time; Weather; News. **1.45** (from **Gleiwitz**), Concert (contd.); March (Meissner); Overture, Rosamund (Schubert); March Potpourri (Kochmann). **2.20,** Exchange. **2.25,** Post Office Propaganda; Records. **2.50,** Market Prices. **3.10,** Talk. **3.30,** Programme for Parents. **4.0,** See **Hamburg. 5.30,** Weather; Market Prices. **5.35,** Song Recital by Hanna Sattler (Contralto). Six Songs (Westermann); Eight Gipsy Songs (Brahms). **6.5,** Topical Talk. **6.20,** Book Review. **6.35,** Talk: Silesian Flags and Standards. **6.50,** Programme Announcements; Weather; Market Prices. **7.0,** See **Cologne. 8.0,** See **Frankfurt. 8.35,** See **Berlin (Deutschlandsender). 9.0,** Yrjö Kilpinen Song Recital by Gerhard Hüsch, with the Station Orchestra. Conductor, Prade. **10.20,** Time; Weather; News; Sports Notes. **10.45,** To be announced. **11.0,** See **Berlin (Deutschlandsender). 12 Midnight** (approx.), Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 a.m. to 7.15,** See **Prague. 10.0,** See **Prague. 10.30,** See **Moravská-Ostrava. 11.0,** See **Prague. 12.30 p.m.,** Military Band Concert. **1.20,** Records. **1.30,** Labour Exchange; Social Notes. **1.40,** See **Prague. 2.0 to 2.5,** Exchange. **3.15 to 4.20,** See **Prague. 4.40,** See **Prague. 5.40,** Notes for Housewives. **5.45,** German Transmission: Richard Wagner Song Recital by Anni Hoffmann (Soprano) and J. Barton (Tenor); Duet from The Valkyrie, Aria and Prayer from Tannhäuser; Arias from Siegfried, Lohengrin and Tannhäuser. **6.20,** Recital of Russian Songs. **6.55,** See **Prague. 8.10,** Record. **8.15,** Pianoforte Recital. **8.40 to 11.0,** See **Prague. 11.0** (approx.), Close Down.

1.10, Records. In the interval, Songs by Verbruggen. **2.0,** Interval. **4.55,** Announcements. **5.0,** Concert by the Symphony Orchestra. Overture, Richard III (Gilson); Symphony No. 5 (Glazunov); Catalonia (Albéniz). **5.45,** Programme for Children. **6.30,** Programme to be announced. **7.15,** Talk: Optimism. **7.30,** Gardening Talk. **8.0,** Concert. Part 1: The Symphony Orchestra. Festival Overture (De Wol); Symphonic Poem, A la Lys (Uyttenhove); Aubade and Waltz (Maes); Part II: Organ Recital by Van Puyvelde, relayed from **Grammont.** Fantasia and Fugue in G minor (Bach); Paix monacale (Peeters); Gavotte (Martini); Introduction and Toccata from The Gothic Suite (Boëllman); Two Chorals (Bach); Finale from The First Symphony (Guilmant); Part III: Symphony Orchestra (contd.). Fantasia (Verhoeven); Symphonic Poem, Franciscus' Loflied, for Orchestra and Speaking Voice (Meulemans); Hildegard Suite (Roels). In the interval at **8.45,** Talk. **9.50,** Angelus. **10.0,** News. **10.10,** Records of Sound Films. **11.0** (aprox.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15,** Time; News. **1.40,** Records. **6.0,** Time; Weather. **6.5,** Concert by the Station Orchestra. Overture, Salvator Rosa (Gomez); Suite romantique (Bullérian); Selection from Le Roi de Lahore (Massenet); Selection from Frühling im Wienerwald (Ascher). **7.0,** Talk. **7.15,** Concert by the Station Orchestra. Johann Strauss Potpourri (Weber); Serenade (Buchbinder); Waltz (Jos. Strauss); Intermezzo, Coquelicot (Elliot); Chansonnette (Friml); Romanian Potpourri (Dinico); March (Leopold). **8.0,** Talk. **8.15,** 'Cello Recital by George Casana. **8.45,** Wireless Notes. **9.0,** Song Recital by Aurelie Demetresco. Aria from Figaro (Mozart); Song (Brahms); Morgengruss (Schubert); Der Neugierige (Schubert); Elsa's Dream from Lohengrin (Wagner); Song (Montzia). **9.30,** Clarinet Recital by Metani. Concerto No. 1 (Weber); Fantaisie-Impromptu (Bourneville). **10.0,** News. **10.30,** Concert from the Cina Restaurant.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym.; Records. **9.45,** News. **10.0,** Talk; Records. **12 Noon,** Chimes. **12.5 p.m.,** Concert by the Virány Chamber Orchestra. **1.30,** Concert by the Akom Vocal Quintet. **2.40,** Market Prices; Cookery Notes. **3.30,** Programme for Students. **4.10,** Talk. **5.0,** Programme by Béla Révesz. **5.30,** Pianoforte Recital by Mme. Kresz-Drewett. **6.10,** Talk: Kisfaludy, the Poet. **6.40,** Hungarian Folk Song Recital by Imre Hamory. **7.50,** Der Cupido von Holics—Play (Ferenc Herceg). **8.40,** Dance Music by the Mandits Jazz Band. **9.35,** News. **9.45,** Chamber Music by the Molles String Quartet: String Quartet in F (Glazunov); String Quartet in B Flat (Haydn). **10.50,** Records. **11.30,** Concert by the Farkas Cigány Band, from the Café Bodo.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Hymn; Records. **6.5,** Gym. **6.25,** See **Breslau. 6.50,** Hymn; Time; Weather; News. **7.15,** See **Breslau. 8.0,** Time; Weather; Water Level. **8.5,** Gym. for Women. **8.20,** Discussion. **8.35,** Interval. **10.0,** Time; News; Water Level. **10.10,** Records. **11.10,** Post Office Propaganda. **11.40,** Talk for Farmers. **12 Noon,** Concert by the fröhliche Fünf; Soloist: Liesenfeld (Xylophone): Pumpernickel (Siede); Waltz from Der Opernball (Heuberger); Polka (Riedel); Concert Piece (Friedelmann); Püppchens erste Liebe (Meisel); Dance Suite (Siede); Serenade (Glan); Hungarian Melodies (Krüger); Marching Song (Cowler). **12.45 p.m.,** News; Greetings. **1.0,** Rhapsodies and Suites on Records. **1.45,** News. **2.0 to 2.45,** Concert of Folk Music by Robert Küpper (Baritone), Hans Georg Teumer (Songs to Lute) and a Village Band. **3.0,** Gym. for Children. **3.30,** Exchange. **3.50,** Topical Talk. **4.0,** Orchestral Concert; Conductor, Hartmann: Overture, Indra (Flotow); Waltz from Der Opernball (Heuberger); Stelka (Ailbout); Intermezzo (Aubry); Spanish Serenade (Bizet); Selection from Thaïs (Massenet); Baci al buio (Micheli); The Dwarves' Wedding (Anger); In the Fairy Castle (Anger); Suppé Potpourri (Urbach). **5.0,** Book Review. **5.15,** Sonata in G for Violin and Pianoforte (Brahms) by Melanie Wolff (Violin) and Hans Haass (Pianoforte). **5.45,** Talk. **6.0,** Talk. **6.20,** German for Germans. **6.40,** Topical Talk. **6.50,** Exchange; Sports Notes. **7.0,** Concert by the Small Station Orchestra; Conductor, Eysoldt: Overture, Raymond (Thomas); Selection from Tosca (Puccini); Rhapsody (Dohnanyi); Amare (Clemus); Mädels und Burschen (Clemus); Waltz, Geheime Anziehungskräfte (Strauss); Prelude to Light Cavalry (Suppé). **8.0,** News. **8.35,** See **Berlin (Funkstunde). 10.0,** Time; Weather; News. **10.30,** Concert by the Cologne Schrammel-Quartet: March (Wagner); Wiener Fiakerlied (Pick); Waltz, Münchner Kindl (Komzak); Saxaphone Duet; Accordion Duet; Ländler (Keller); March (Drescher). **11.0,** German East Africa—Play (Niles). **12 Midnight** (approx.), Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,466 kc/s, 206 metres; 10 kW.—**11.30 a.m. to 12 Noon,** Programme in English by the International Broadcasting Company of London. **11.30,** Happy Half-Hour. Light Orchestral Music. **12 Noon to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English by the I.B.C. **4.30,** Isle of Wight, Portsmouth and Southsea Concert. Part I—Steppin' Out. Part II—Dance Music. Part III—Military Band Music. **6.0 to 11.0,** Programme in French. **11.0** till Close Down, Programme in English by the I.B.C. **11.0,** Variety Concert. **11.30,** Talkie Time: Tunes from the Talkies and Shows. **12 Midnight,** Club Concert for Southwold and Halesworth Listeners. Dance Music. **12.30 a.m. (Thursday),** I.B.C. Time Signal. **12.31,** Dance Music. **1.0,** I.B.C. Good-night Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.15,** Gym. **6.40,** Time; News. **6.55,** Orchestral Concert relayed from **Bad Satzschlirf. 8.10,** Water Level; Weather. **8.15 to 8.35,** Gym. **10.0,** News. **10.10,** Sequence for Children. **10.45,** Notes for Housewives. **11.0,** Concert. **11.40,** Announcements; Exchange; Weather. **11.50,** Social Notes. **12 Noon,** Orchestral Concert; Conductor, Schumacher: March (Schumacher); Overture, Alessandro Stradella (Flotow); Fantasia (Nehl); Tales from the Vienna Woods (Joh. Strauss); The Lost Chord (Sullivan); Military Fanfare (Ascher); March (Böhr); The Mill in the Black Forest (Eilenberg); March (Wilke). **1.0 p.m.,** Time; News. **1.10,** Local

AUG. 22nd WEDNESDAY *continued*

News. 1.20, Choral Records. 1.50, Time; News. 2.0, Records. 2.30, Kaiserslautern-Freiburg-Trier Inter-Relay: Palatinate Wines—Sequence, Literary and Musical (Kaiserslautern); Beethoven Pianoforte Recital from (Freiburg); Reading from Trier. 3.30, Weather. 3.35, Industrial Review. 3.50, Time; Exchange. 4.0, Concert from **Bad Wildungen**. 5.30, Book Review. 5.45, The Dawn—Play for Young People. 6.20, Talk: The Oil Trade in Tripoli. 6.35, Reading. 6.45, Weather; Exchange; Announcements; Time. 6.50, Topical Talk. 7.0, Round the World in a Paddle Boat—Song Cycle (Willy Czernik) by Otto Köhler (Tenor). 8.0, Time; News. 8.10, Local Review. 8.35, See **Berlin (Funkstunde)**. 9.0, Dance Music. 10.20, Time; News. 10.35, See **Stuttgart**. 10.45, News; Weather; Sports Notes. 11.0, See **Munich, 12 Midnight to 1.0 a.m. (Thursday)**, Respighi Records. 1.0 (approx.), Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg** and **Hanover, 1,330 kc/s, 225.6 metres.**—5.45 **a.m.**, Time; Weather; Talk for Farmers. 6.0, Gym. 6.15, Time; Weather. 6.20, See **Königsberg**. 7.0, Time; News. 7.10, See **Königsberg**. 8.0, Weather; Talk for Housewives. 8.10, Announcements; Records. 10.50, News. 11.0 (from **Hanover**), English Programme for Schools: Scene from Act V of Coriolanus (Shakespeare). 11.30, Records. 12 **Noon,** Market Prices. 12.5 **p.m.**, Time; Weather; Shipping Notes. 12.15, Concert from **Berlin (Funkstunde)**. 1.0, Exchange; Market Prices. 1.15, Weather. 1.20, Orchestral Concert. 2.15, News. 2.30, Records. 3.0, Exchange. 3.40, Shipping Notes; Aviation Notes. 4.0, Military Band Concert from **Stettin**; Conductor, Emil Pasche. 5.30, Talk: Emil von Behring. 5.50, Regenbagen äwert Kinnerland—Sequence in Dialect (Grund). 6.30, Records. 6.45, Exchange; Market Notes. 6.55, Weather. 7.0, Talk: Güstrow, the Heart of Mecklenburg, relayed from **Stettin**. 8.0, See **Frankfurt**. 8.35, See **Berlin (Funkstunde)**. 9.0, Dance Music. 10.0, News. 10.20, Dance Music (contd.). 11.0, Music by the American Legion Band. 12 **Midnight,** Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW **(until 3.40 p.m.).** Transmitted on **Kootwijk,** 50 kW from 3.40 **p.m.**—7.40 to 9.40 **a.m.**, Programme of the Workers' Radio Society, (V.A.R.A.). 7.40, Records. 9.10, Dietetics. 9.40, Religious Programme of the Liberal Protestant Radio Society (V.P.R.O.). 9.55 till Close Down, V.A.R.A. Programme. 9.55, Concert for Night Workers. 11.40, Concert of Light Music. 12.40 **p.m.**, Concert of Light Music; Conductor, van der Horst. 1.40, Interval. 1.55, Organ Recital by Jong. 2.40, Programme for Children. 5.10, Concert by the V.A.R.A. Ensemble; Conductor, Bakels; Weibermarsch (Lehár); Dorfsschwalben aus Oesterreich (Strauss); Arietta (Gabriel-Marie); The Wedding of the Rose (Jessel); Novelette (Caludi); Im grünen Wald, dort wo die Amsel singt (Oscheit); Ideale (Tosti); Erinnerung (Sumkay); Johann Strauss Potpourri (Morena). 5.55, Records. 6.10, Organ Recital by Steyn; Chinesische Wachtparade (Neumann); Baby (Holländer); Das Zauberlied (Meyer-Helmund); Serenade (Pierné); Macushla (MacMurrough); Selection from Nina Rosa (Romberg). 6.40, Sports Talk. 7.0, Concert of Light Music; Conductor, van der Horst. 7.40, S.O.S. Messages. 7.43, Amsterdam—Variety Programme. 9.10, Concert by the V.A.R.A. Orchestra; Conductor, de Groot; March (Hilberto); Overture, Zampa (Hérold); Danse des fleurs (Delibes); London Suite (Coates); Overture, The Black Domino (Auber); Wiener Tänze (Gärtner); Selection from Madam Butterfly (Puccini); Selection from Les millions d'Arlequin (Drigo); Silver Clouds (Ketelbey); Selection from The Merry Widow (Lehár). In the interval at 9.40, News. 10.40, Records. 11.40, Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. (until 6.40 **p.m.**). 20 kW. from 6.40 **p.m.**—Programme of the Christian Radio Society (N.C.R.V.). 7.40 **a.m.**, Bible Reading. 7.55, Records. 9.10, Interval. 10.10, Religious Address. 10.40, Sacred Songs by Jurjaanz (Harmonium) and Annie Geest (Soprano). 11.40, Police Notes. 11.55, Records. 1.10 **p.m.**, Organ Recital by Ronald Parker; Overture (Fétras); The Whistler and His Dog (Pryor); La Houssarde (Ganne); Babillage (Gillet); Polo-Spiele (Fetras); Selection from La Traviata (Verdi); Festjubel (Blankenburg). 2.10, Programme for Stamp Collectors. 2.40, Bible Reading. 3.10, Records. 3.25, Interval. 3.40, Song Recital by Annie Lieman (Soprano), Fred Gersseling (Pianoforte): Suleika (Mendelssohn); Waldeinsamkeit (Reger); Fantasia (Mahler); Erinnerung (Mahler); Berceuse (Baton); Je veux (Baton). Records: Three Gipsy Songs (Brahms); Three Pieces (Granados); Minuet (Wekerlin). Records: Three Songs (Cesèk); Song (Brandeler); The Nightingale (Zangwijn); Song (Zangwijn); Folk Song (Vladeracken). 4.40, Programme for Children. 5.40, Records. 6.10, Programme to be announced. 6.40, Police Notes; Church News. 6.55, Camping Songs. 8.25, Records. 8.30, Talk. 8.40, Talk: Missionary Work in Celebes. 9.10, Song Recital by Annie Woud (Contralto). 9.30, Records. 9.40, Press Review. 9.50, Song Recital (contd.). 10.10, Records. 11.10 (aprox.), Close Down.

INNSBRUCK.—Relays **Vienna.**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres,** and **Skamlebaek, 49.5 metres.**—7.0 **a.m.**, Gym. 7.27, Weather. 8.30, Service from Copenhagen Cathedral. 11.0, Weather. 11.10, Fish Prices. 12.0 **Noon,** Chimes; Weather. 12.5 **p.m.**, Concert by the Bendix String Ensemble, relayed from **Wivex.** 2.0, Interval. 2.30, Records. 3.0, Talk for Women. 3.30, Concert by the Station Orchestra. Conductor: Fritz Mahler; Soloist: Ellen Paaske Sörensen; Overture, Heracles (Handel); Polish Dance (Fischer); Nocturne No. 5 in C (Haydn); Ballet Music from Rosamund (Schubert); March (Toch); Waltz from Der lustige Krieg (Strauss); Danish Songs; Overture, Les Cloches de Corneville (Planquette); Polka-Mazurka (Jos. Strauss); Waltz, Rudolfsklänge (Jos. Strauss); March (Suppé); Waltz, Künstlerleben (Jos. Strauss); Overture, Gasparone (Millöcker). 5.0, Interval. 5.30, Exchange. 5.45, Talk for Farmers. 6.15, French Lesson. 6.45, Weather; Wireless Notes. 7.0, News. 7.15, Time. 7.30, Talk: Thirty Years Experience on an Agricultural Commission. 8.0, Time. 8.1, Recital by Leo Hansen (Violin) and Gurnar Frederiksen (Viola); Grand Duo in E flat (Pleyel); Adagio and Rondo from the Duet in F (Michael Haydn). 8.25, The Harvest—Play in Three Acts (Demuth). 10.0, News. 10.15, Concert of Popular Danish Music by the Station Orchestra; Conductor: Gröndahl: Overture, Little Christie (Hartman); Extracts from Once upon a Time (Lange-Müller); Dream Pictures (Lumbye); Waltz (Lumbye); Selections from Wayland the Smith (Henriques); Minuet from The Little Mermaid (Henriques); Dance from Mascarade (Nielsen). 11.0, Dance Music from Nimb's Restaurant. In the interval, at 12 **Midnight,** Chimes. 12.30 **a.m. (Thursday),** Close Down.

KIEL.—Relays **Hamburg. KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—5.0 **a.m.**, Records. 5.50, Weather. 6.0, Gym. 6.20, Orchestral Concert; Iwan. 7.0, News. 7.10 (approx.), Concert (contd.). 8.0, Prayers. 8.30 to 9.0, Gym. for Women. 9.5, Programme for Schools. 10.40, News. 10.55, Weather. 11.30, Records (Schubert, Schumann, Strauss and Wolf). 12 **Noon,** See **Berlin (Funkstunde).** 1.0 **p.m.**, News. 1.5, Potpourri Records. In the intervals at 1.20, News; Programme Announcements; and at 2.0, News. 2.30, Post Office Propaganda; Records. 3.0, Exchange. 3.20, Notes for Housewives. 3.30, Play for Children. 4.0, Concert from the Zoo. In the interval at 5.0, Talk: The Königsberg Fair. 5.50, Talk: Young Germans in Foreign Countries. 6.15, Market Prices. 6.25 (from **Danzig**), Song Recital: Der Sänger (Schubert-Schumann); Wohlauf noch getrunken (Schumann); Minnelied (Schubert-Brahms); Was zieht mir das Herz so (Beethoven-Schubert-Zelter); Die Rose, die Lilie, die Taube, die Sonne (Franz-Schumann). 6.55, Weather. 7.0, Programme for Girls. 7.30, Organ Recital. 8.0, See **Frankfurt.** 8.35, See **Berlin (Funkstunde).** 9.0 (from **Danzig**), Die goldene Eva—Comedy (Schönthan-Ellfeld). 10.0, Weather; News; Sports Notes. 10.30 (from **Danzig**), Dance Music by the Vincent Douglas Band. 12 **Midnight** (approx.), Close Down.

KOSICE.—Relays **Prague. LAUSANNE.**—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.**—5.50 **a.m.**, Notes for Farmers. 6.0, Gym. 6.25, See **Breslau.** In the Interval at 7.0, News. 8.0, Gym. 8.20, Records. 9.0, Interval. 9.40, Exchange. 9.45, Announcements. 9.55, Weather; Water Level Report. 11.0, Announcements; Records. 11.30, News; Time. 11.40, Weather. 11.50, Notes for Farmers. 12 **Noon** (from **Dresden**), Concert by the Dresden Philharmonic Orchestra; Conductor, Schestak. In the Interval at 1.0 **p.m.**, News; Time. 2.0, News. 3.20, Talk: The Drama of the Reformation. 3.40, Exchange. 4.0, Programme for Young People. 4.50, Pianoforte Concerto in D minor (Mozart) on Records. 5.30, Talk: Robert Wilhelm Bunsen. 5.50, Exchange; Weather; Time. 6.0, Talk for Fire Brigade Week. 6.15 (from **Dresden**), Concert by the Plietzsch-Marko Orchestra; Conductor, Plietzsch: Triumphal March from Cleopatra (Mancinelli); Overture, Der Waffenschmied (Lortzing); Suite (Byng); Selection from Manon Lescaut (Puccini); Two Serenades (Meisel); Overture, Der Königsleutnant (Titl); Jugendklänge aus Alt-Heidelberg (Rhode); Three Miniatures (Cui). 7.35, Talk: Wagner. 8.0, News. 8.10, See **Frankfurt.** 8.35, See **Berlin (Funkstunde).** 9.0, Concert by the Leipzig Symphony Orchestra; Conductor, Blumer; Soloists, Charlotte Börner (Soprano) and Stanek (Violin): Overture, Il Seraglio (Mozart); Four Arias (Beethoven): (a) Hoffnung, (b) Liebesklage, (c) Stille Frage, (d) Liebesungeduld; Military March in D (Schubert); Fantasia appassionata for Violin and Orchestra (Vieuxtemps); Waltz (Tchaikovsky); Songs (R. Strauss): (a) Morgen, (b) Meinem Kinde, (c) Ständchen; Burlesque for Violin (Suk); Waltz, Wo die Zitronen blühn (Joh. Strauss); March from Sigurd Jorsalfar (Grieg). 10.20, News. 10.50, Beethoven Pianoforte Recital by Hoppé; Sonata in D minor, Op. 31; Sonata in A, Op. 101. 11.30, Concert from **Munich.** 12.30 **a.m. (Thursday),** Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 150 kW.—7.45 **a.m.**, Records. 8.0, News in French; Record; News in German; Records. 12 **Noon,** Concert by the Station Orchestra; Conductor: Pensis; Overture, Si j'etais Roi (Adam); Waltz (Moszkovsky); Selection from Tannhäuser (Wagner); The Old Chiming Clock (Humphries); Selection from Rose-Marie (Friml); Wedding Procession from Feramors (Rubinstein); Viennese Dance (Friedmann); Première Berceuse (Pensis); March, Hoch Heideeksburg (Herzer). In the Intervals at 12.30 **p.m.**, News in French and German, and at 1.0, Exchange. 1.15, Records. In the Interval at 1.30, Exchange. 2.0, Exchange. 3.45, Exchange. 6.30, Concert. 7.30, Exchange. 7.35, Tourist Talk. 7.40, Concert by the Station Orchestra; Conductor, Pensis: March, The Guides (Eiffes); Procession (Krüger); Oh Melanie loss dech kössen (Albrecht); Gavotte, Marie-Adelheid (Günther); Chant sans Paroles (Pensis); March, Letzeburg de Letzeburger (Albrecht). 8.0, News in French and German. 8.20, Concert by the Station Orchestra; Conductor, Pensis; Soloist, Jaans (Baritone); Overture, Carnaval (Glazounov); The Volga Boatmen; Sabbat infernal (Dowell); Song, Air from Le Châlet (Adam); Rhapsody No. 6 (Liszt). In the Interval at 8.35, Exchange. 9.0, Military Band Music relayed from the Place d'Armes; Conductor: Mertens; Overture (Zinnen); Scénes luxembourgeoises (Mertens). 9.30, Concert by the Station Orchestra; Conductor: Pensis; Soloist, Jaans (Baritone); Waltz from The Sleeping Beauty (Tchaikovsky); Selection from La Bohême (Puccini); The Two Grenadiers (Schumann); Suite from La Source (Delibes); Song, Ech sin e gro'ssen Hexemeschter (Dicks); Piece (Dvorak); Selection from No, No, Nanette (Youmans). 10.30, Dance Records.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—9.0 **a.m.**, News. 10.0, Exchange; Announcements. 10.30, Interval. 2.0 **p.m.**, Chimes; Time; Weather; Light Music. 2.30, Sextet Concert. 3.0, Announcements; Exchange; Light Music. 3.30, Sextet Concert. 4.0, Light Music. 4.15, Sextet Concert. 4.40, News. 5.0, Interval. 6.0, Chimes; Light Music. 7.0, News. 7.10 (approx.). Pianoforte Recital: Islamey (Balakirev); Theme with Variations (Paganini-Liszt); Ballad (Chopin); Jeu d'eau (Ravel); Sevilla (Albéniz). 7.30, Exchange. 7.40 (approx.), Concert: Part I—Songs; Part II—Orchestral Music: Prelude, La revoltosa (Chapí); Waltz, from Eva (Lehár); Impressions d'Italie (Charpentier); Offenbachiana (Conradi); Oriental Dance (Glazunov). 8.30, News. 8.40 (approx.), Concert: Part I—Violin Recital: Rondino on a Theme of Beethoven (Kreisler); Song without Words (Dvorák-Kreisler); Hungarian Czardas No. 2 (Hubay); Serenade (Tchaikovsky); Valse bluette (Drigo); Jota (Sarasate); Song of the Volga Boatmen (arr. Kreisler); Petite Marche viennoise (Kreisler); Part II—Opera Music: Arias from William Tell (Rossini); La Favorita (Donizetti); I Puritani (Bellini); La Bohême (Puccini); Martha (Flotow); Adriana Lecouvreur (Cilea); André Chenier (Giordano); Part III—Orchestral Music: March, El Capitan (Sousa); Serenade (Volkman); The Flight of the Bumble-bee (Rimsky-Korsakov); Selection from The Three-cornered Hat (Falla); Ballet Music from Rosamunde (Schubert; Selection from Lohengrin (Wagner); Mai (Hahn); Orgia (Turina); Ay, ay, ay! (Freire). 9.50, Sports Notes; 10.0, Chimes; Time; Bullfighting Notes. 10.5 (approx.), Peruvian Programme. 11.0, News. 11.10 (approx.), Concert by the Station Sextet; Soloist, Ocaña (Tenor): Interlude by Ramón Gomez de la Serna. 12.45 **a.m. (Thursday),** News. 1.0, Chimes and Close Down.

MADRID

EAQ, 10,000 kc/s, 30 metres; 20 kW.—11.15 **p.m.**, News. 11.30, Spanish Music. 11.45, News. 12 **Midnight,** Spanish Music. 12.45 **a.m. (Thursday),** Light Music. 1.0 **a.m.**, Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.**—7.30 **a.m.**, Gym. 7.45, Time; News. 11.30, Light Music. 12.30 **p.m.**, Records. 12.45, News. 1.0, Time; Announcements. 1.5 to 2.15, Concert by the Malatesta Chamber Orchestra. In the Interval at 1.30, Records; Exchange. 2.15 to 2.25, Exchange. 4.35, News. 4.54, Programme for Children. 5.10, Concert of Chamber Music. 5.55, Weather. 6.0 to 6.10, Wheat Market Prices. 7.0, Announcements. 7.15, News in Foreign Languages. 8.0, Time; Announcements; Records. 8.45, Musical Album. 9.30, Symphony Concert from the Basilica di Massenzio. After the Concert, News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—12 **Noon,** Announcements; Concert: March (Rosey), Waltz, Dortschwalben aus Oesterreich (Strauss); Overture, Hans Heiling (Marschner); Baci al buio (Micheli). 12.29 **p.m.**, Time Signal from Neuchâtel Observatory; Weather. 12.33, Concert: Selection from Siberia (Giordano); Gavotte (Schütt); Il pescatore canta (Tosti). 12.55, News. 1.5, Sports Notes. 1.15, Records. 1.30, Interval. 3.59, Time Signal from Neuchâtel Observatory. 4.0, See **Beromünster.** 6.0, Interval. 7.44, Announcements. 7.45, News. 8.0, Talk for Farmers. 8.15, The Four Seasons in Song and Dialect Poetry. 9.0, Talk. 9.15, Concert by the Radio Orchestra: Overture, Poet and Peasant (Suppé); Waltz, The Skaters (Waldteufel); Selection from Il Trovatore (Verdi); Non t'amo piu (Tosti); Selection from The Girl in the Taxi (Gilbert). 10.0 (approx.), Close Down.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—6.0 to 7.15 **a.m.**, See **Prague.** 10.0, See **Prague.** 10.30, Concert. 11.0, See **Prague.** 12.30 **p.m.**, See **Brno.** 1.30, Records. 1.40 to 2.0, See **Prague.** 3.15 to 4.20, See **Prague.** 4.40, See **Prague.** 5.40, Notes for Workers. 5.50, Theatre Notes. 6.10, Local News. 6.15, Military Band Concert. 6.55, See **Prague.** 7.25, Concert: March (Rehor); Waltz (Stolc); Polka (Smid); Song from Der Opernball (Heuberger); Polka (Ignotus); Waltz Song (Fiala); March (Kmoch). 7.55, See **Prague.** 10.45 till **Close Down,** Records. 11.0 (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—5.0 **a.m.**, News. 5.30, Fanfare. 5.45, Gym. 6.15, Programme Announcements. 7.30, Records. 9.0, Musical Programme. 9.55, Time Signal. 10.0, News. 10.15, Records. 11.10, Programme for Collective Farm Workers. 2.45 **p.m.**, News. 3.15, Programme for Children. 3.55, Time Signal. 4.0, News. 4.30, Communist Party Programme. 5.30, Red Army Programme. 8.0, Orchestral Concert. 9.0, Talk in Czech: Soviet Aviation. 9.55, Chimes. 10.5, Talk in English: In a Moscow Bicycle Factory. 11.5, Request Programme in German.

MOTALA.—Relays **Stockholm. MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nurnberg, 1,267 kc/s, 236.8 metres.**—6.30 **a.m.**, Gym. 6.45, Motto. 6.50, Italian Lesson. 7.15, Time; Weather; News. 7.25, Concert by the Anny Rosenberger Chamber Quartet. 9.50, Gym. for Women. 10.55, Market Prices. 11.5, Exchange. 11.15, Time; Weather; News. 11.30, Announcements; Records. 12 **Noon,** Records. 1.15, Time; Weather; News. 1.25, Orchestral Concert: Conductor: Rein; Overture, Morning, Noon and Night (Suppé); Folk Songs (Komzak); Gluck and Wagner Potpourri (Schreiner); Waltz (Kéler-Béla); March (Fucik). 2.0, News; Programme Announcements; Exchange. 2.20, Recital by Heinz Lorentz (Violin) and Rudolf Peters (Pianoforte); Sonata in D Minor (Sennaillié); Serenade for Violin and Pianoforte (Fleischer). 2.50, Talk. 3.10, Pianoforte Recital by Fritz Hübsch; Sonata in G Minor (Rüdinger); Variations, Eulenspiegeleien (Jos. Haas). 3.30, Talk: Through the Sahara by Car. 3.50, Weather; Exchange. 4.0, Concert by the Leo Schneider Orchestra. 5.30, Programme for Children. 5.50, Recital by Helene Reuchel-Pacic ('Cello) and Gertraud Schulze (Pianoforte). 6.10, Sequence for Young People. 6.50, Time; Weather; Exchange. 7.0, See **Cologne.** 8.0, See **Frankfurt.** 8.35, See **Berlin (Funkstunde).** 9.10, The Rumour—Humorous Sequence. 9.45, Talk: The Old Germanic Religion. 10.0, Time; Weather; News; Exchange; Programme Announcements. 10.20, Programme to be announced. 11.0, Dance Music by the Bruno Aulich Band. 12.30 **a.m. (Thursday)** (approx.), Close Down.

NAPLES.—Relays **Rome. NOTODDEN.**—Relays **Oslo**

AUG. 22nd WEDNESDAY *continued*

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jeløy, 6,990 kc/s, 42.92 metres.**—**11.15 a.m.,** Service. **11.50,** Exchange. **12.45 p.m.,** News. **12.55,** Nauen Time Signal. **1.0 to 2.0,** Records. In the intervals, Weather; Report for Farmers; Exchange. **5.30,** Records. **6.10,** Recitation. **6.30,** Programme for Girls relayed from **Bergen, 850 kc/s, 352.9 metres.** **7.0,** Announcements. **7.15,** Weather; News. **7.30,** Time. **7.31,** Talk for Farmers. **7.40,** Dance Music on Two Pianofortes. **8.0,** Talk. **8.30,** Concert by the Station Orchestra; Conductor, Kramm; Meerestille und glückliche Fahrt (Mendelssohn); Symphony No. 39 in E flat (Mozart); Suite, Aus Holberg's Zeit (Grieg). **9.40,** Weather; News. **10.0,** Topical Talk. **10.15,** Recital of Popular English Songs by Harry Hopewell, relayed from **Bergen.** **11.30** (approx.), Close Down.

OSTERSUND.—Relays **Stockholm.**

PALERMO

565 kc/s, 531 metres; 4 kW.—**12.45 p.m.,** News. **1.0 to 2.0,** Light Music. In the Interval at **1.30,** Time; News; Weather. **5.30,** Chamber Music. **6.10 to 6.30,** Balilla Programme. **8.0,** Announcements; Tourist Notes; Programme for Farmers; News. **8.20,** Records. In the Interval at **8.30,** Time; News. **8.45,** La gran via—Musical Comedy in One Act (Valverde). In the Interval, Talk. **9.45** (approx.), La consegna è di russare—Comedy in One Act (Geyd). **10.15** (approx.), Selection from Katia la ballerina (Bellini). **11.0,** News.

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 a.m.,** News. **10.0,** Programme from **Lyons (La Doua).** **12 Noon,** Tourist Report. **12.15 p.m.,** Concert by the National Orchestra; Conductor, Rosenthal. **1.0,** News. **1.15,** Concert (contd.). **2.0,** Records. **2.30,** Le Baiser—Comedy in One Act in Verse (de Banville) followed by Saint Nicolas—Operetta in One Act (Mortarieu); Variety Items and Duets in the intervals. **6.0,** Programme for Children. **6.30,** News. **7.45,** Tourist Talk. **8.0,** Records. **8.30,** Variety Programme. After the Programme, News. **10.30,** Dance Music by the Audier Orchestra.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.10 a.m.,** Farfare; Records; in the interval, at **7.20,** News. **8.0,** Concert. **8.30,** News. **8.45,** Cookery Talk. **12 Noon,** Exchange. **12.5 p.m.,** Records: Russian Music. **12.25,** News. **12.35,** Records. **1.5,** Exchange. **1.10,** Records. **1.30,** Orchestral Music; Overture, William Tell (Rossini); Invitation to the Waltz (Weber); Hungarian Dances Nos. 5 and 6 (Brahms). **2.0,** Exchange. **3.15,** Exchange. **3.45,** Exchange. **4.50,** Exchange. **6.5,** Exchange. **6.45,** Exchange. **6.49,** Records of Rubinstein and Kreisler; Impromptu in A flat (Schubert); Waltz in A (Chopin); Humoresque (Dvorak); Jota (Falla). **7.10,** News. **7.30,** Records. **7.45,** Ballet Suite (Popy). **8.0,** Interval. **8.10,** Records: Extracts from I Pagliacci (Leoncavallo); and The Merry Widow (Lehár); In the Intervals, Talk; Exchange. **10.20,** News. **10.30,** till Close Down, Programme in English arranged by the International Broadcasting Company of London. **10.30,** Variety. **11.0,** I.B.C. Goodnight Melody and Close Down.

PARIS

RADIO PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.,** Gym. **7.0,** Records. **7.15,** Press Review; Weather. **7.45,** Gym. **8.0,** Records. **10.15,** Concert from **Vichy:** Crinière au vent (Chillemont); Overture (Caffot); Two Pieces (Albéniz); Fantasy (Bisson); Danse villageoise (Chabrier); Gerbe de fleurs (Missa); Minuet Pompadour (Edbon-Herbé); Tarantella (Barat). **12 Noon,** Eduactional Talk. **12.15 p.m.,** Concert by Goldy's Orchestra. Soloist: Marcel Marmont (Songs). Foxtrot (Green); Tell me to-night (Spoliansky); Rumba (Grenet); Trees (Rasbach); March of the Grenadiers (Schertzinger); Waltz (Revel); Foxtrot (Connelly); Songs; Mahogany Hall (Williams); Foxtrot (Warren); Melody (Ketelbey); One Step (Heymann); Melody (Weldon); Songs; Potpourri (Salabert); Melody (Bond); Katesk (Packay); Tango (Vasek); Rumba (Stubbs); Melody (Whiting). In the interval at **1.20 p.m.,** Exchange. **6.20,** Notes for Farmers. **6.45,** Medical Talk. **7.0,** Sinfonia breve (Inghelbrecht) on Records. **7.15,** British Press Review. **7.30,** Topical Talk. **8.0,** Readings (André Maurois). **8.20,** News. **8.30,** "Il Seraglio"—Opera in Three Acts (Mozart), relayed from **Vichy.** Conductor: Hahn. In the intervals, News; Fashion Review.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres,** and **25.27 metres.**—**3.0 p.m.,** Harvest of Song. **3.15,** Sammy Fuller. **3.30,** To-day's Children. **3.45,** News; Cooking School. **4.0,** Uncle Tom and Betty. **4.15,** Merry Macs. **4.30,** U.S. Army Band. **5.0,** Al and Lee Reiser. **5.15,** Fields and Hall. **5.30,** Vic and Sade. **5.45,** Hotel William Penn Orchestra. **6.0,** Business News and Markets. **6.15,** Hon. Archie and Frank. **6.30,** Farm and Home Hour. **7.30,** KDKA Home Forum. **8.0,** Joe White (Tenor). **8.15,** Happy Days in Dixie. **8.45,** Human Values. **9.0,** Betty and Bob. **9.15,** Stanley Metcalfe (Tenor). **9.30,** Market Reports. **9.45,** Chicago Symphony Orchestra. **10.15,** KDKA Kiddies' Klub. **10.30,** To be announced. **10.45,** Little Orphan Annie. **11.0,** Time; Temperature; Weather. **11.14,** Goodrich Baseball Resumé. **11.30,** Comedy Stars of Hollywood. **11.45,** Lowell Thomas. **12 Midnight,** Dan and Sylvia. **12.10 a.m. (Thursday),** News. **12.15,** To be announced. **12.30,** Irene Rich. **12.45,** Frank Buck. **1.0 to 6.0 a.m.,** Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 to 7.15 a.m.,** Gym; Music; News. **10.0,** Record. **10.5,** News. **10.20,** News in German. **10.25,** Record. **10.30,** See **Moravska-Ostrava.** **11.0,** Records. **12, Noon,** Economic Talk. **12.5 p.m.,** Talk for Farmers. **12.10,** Records. **12.20,** News. **12.30,** See **Brno.** **1.20,** Talk. **1.30,** Labour Exchange. **1.40,** Records. **1.50,** Exchange. **1.55,** Exchange and Weather in German. **2.0,** Interval. **3.15,** Concert by Erno Kostal and his Orchestra. **4.15 to 4.20,** Exchange; Weather. **4.40,** Dance Music by Dvorsky and his Melody Boys, from the Imperial Hotel, Karlsbad. **5.40,** Record. **5.45,** Technical Talk. **5.55,** Records. **6.5,** Announcements. **6.10,** Notes for Farmers. **6.15,** Record. **6.20,** German Transmission; Topical Talk; Talk for Workers. **6.5,** News. **7.0,** Time; News. **7.10,** Reading. **7.25,** Operetta Songs and Duets by Franta-Weisenstein and Kadlecova. **7.55,** Talk: The 1934 Salzburg Festival. **8.10,** Chopin Song Recital by Marie Vojtkova (Soprano) and Marak (Tenor). **8.40,** Part 6 from The Case of Vivian Ware—Play (Ellis). **9.25,** String Quartet No. 7 in D (Mozart), by the Ondricek Quartet. **10.0,** Time; News. **10.15,** Records. **10.45,** News in French. **11.0** (approx.), Close Down.

REYKJAVIK

208 kc/s, 1,442 metres; 16 kW.—**12 Noon,** Weather. **2.15 p.m.,** Variety Programme. **5.0,** Weather. **9.10,** Weather. **9.25,** Music. **9.50,** Announcements. **10.0,** Time; Violin Recital. **10.30,** Reading. **11.0,** News. **11.30,** Quartet in F (Dvorak) on Records.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan (No. 2), 1,348 kc/s, 222.6 metres; Turin (No. 2), 1,357 kc/s, 221.1 metres,** and **2RO, 11,810 kc/s, 25.4 metres.**—**7.30 a.m.,** Gym. **7.45 to 8.0,** Time; News. **12.30 p.m.,** Records. **1.5 to 2.15,** See **Milan.** In the interval at **1.30,** Time; News. **4.30,** Children's Radio Review. **4.55,** News. **5.10,** See **Milan.** **5.55,** Weather. **6.0 to 6.10,** Wheat Market Prices. **7.0,** Announcements. **7.15,** News in Foreign Languages. **8.0,** Time; News. **8.10,** Records. **8.30,** Government Notes. **8.45,** Il Guarany—Opera in Four Acts (Gomez). In the intervals, Recitations; Announcements. After the Opera, News.

RUYSSELEDE

10,330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.,** News in French. **8.0,** Records: The Damnation of Faust (Berlioz). **9.0,** News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW.—Relayed at Intervals by **W2XAF** on **31.48 metres** and by **W2XAD** on **19.56 metres.**—**7.0 p.m.,** Dreams Come True. **7.15,** The Wise Man. **7.30,** Women's Radio Review; Talks; Orchestra. **11.35,** Exchange. **12 Midnight,** Variety Programme. **1.0 to 3.0 a.m. (Thursday),** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW.; and **Geneva, 401 kc/s, 748 metres.**—**12.29 p.m.,** Time. **12.30,** News. **12.40** (from **Geneva**), Records. In the interval at **1.0,** Exchange. **2.0,** Interval. **3.59,** Time. **4.0 to 6.0,** See **Beromünster.** **6.0** (from **Geneva**), Programme for Children. **7.0** (from **Geneva**), Talk. **7.30,** (from **Geneva**), Wireless Notes. **7.59,** Weather. **8.0** (from **Geneva**), Violin Recital by Suzanne Bornand. **8.20** (from **Geneva**), Reading. **8.45,** Concert by the Station Orchestra; Conductor, Echenard; Soloist, Hoogstoel (Clarinet); Part I—Stravinsky Music. **9.10,** News. **9.20,** Concert (contd.); Part II—Light Music. **10.0** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Östersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.**—**7.45 a.m.,** Service. **8.0,** Weather. **12.30 p.m.,** Weather. **12.45,** Exchange. **12.55,** Time. **1.0 p.m.,** Concert from **Kalundborg.** **2.0,** Reading. **2.30,** Concert by Carlsten (Violin) and Lang-Fagerström (Harp): Meditation from Thaïs (Massenet); Serenade (Pierné); Legend (Zabel); Aubade (Hasselmans); Canzonetta (d'Ambrosio); Nocturne (Chopin-Sarasate). **5.0,** Weather. **5.5,** Reading. **5.30,** Pianoforte Recital by Herbert Westrell: Two Etudes (Neupert); Two Pieces (Rachmaninov): (a) Elegie, (b) Polka; Paraphrase on Verdi's Rigoletto (Liszt). **5.50** (from **Sundsvall**), Talk. **6.15,** Records. **7.15,** Weather; News. **7.30** (from **Sundsvall**), Report. **8.0,** En chemin de fer—Sketch (Charasson). **8.20,** Concert of Light Music: Ballet Music from Hippolyte et Aricie (Rameau); Three Pieces (Debussy): (a) Mazurka, (b) Bruyères, (c) Dance. In the Silent Night (Rachmaninov); Two Negro Spirituals (arr. Sköld): (a) Deep River, (b) Old Folks at Home; Country Gardens (Grainger). **9.15,** Talk. **9.45,** Weather; News. **10.0,** Dance Music from the Grand Hotel. **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.30 a.m.,** Concert from **Lyons (La Doua).** **12 Noon,** Records. **12.45 p.m.,** News. **1.0,** Time; Exchange. **1.5,** Records. **1.15,** Concert from **Bordeaux-Lafayette.** **2.0,** Interval. **3.30,** Orchestral Concert relayed from **Vichy;** Conductor: Brouillac. **4.45,** Talk on Electro-Technics. **5.0,** Concert of Light Music by the Station Orchestra; Conductor: Roskam; Pasodoble (Ricardo); Wedding Serenade (Klose); Foxtrot (Snyder); Selection from Boccaccio (Suppé); Tango (Pomery); Oriental Suite for Saxophone and Pianoforte (Gurewitch); Waltz, Künstlerleben (Strauss), Dancing Moon (Aubry); Rumba (Simons); March (Holzmann); **6.0,** Talk: the Importance of the Next Five Years in France. **6.15,** Talk in German: Handicrafts. **6.30,** Concert by the Station Orchestra; Conductor: de Villers; Polonaise (Dvorák); Two Pieces (Guiraud); Overture, Zampa (Hérold); Ballet Music from Patrie (Paladilhe); Symphonic Poem, Phaëton (Saint-Saëns); Two Dances from Le Tribut de Zamora (Gounod). **7.30,** Time; News. **7.45,** Records. **8.0,** Press Review in German; Lottery Results; News. **8.30,** Il Seraglio—Opera (Mozart) relayed from **Vichy.** **11.30** (approx.), News.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.35 a.m.,** Notes for Farmers. **5.45,** Hymn; Motto; Time; Weather. **5.50,** Gym. **6.15,** Records. **6.40,** Time; News; Weather. **6.55,** Records. **7.25,** See **Munich.** **8.10,** Weather. **8.15,** Gym. **8.35,** Interval. **9.45,** Talk for Mothers. **10.0,** News. **10.10,** Organ Recital of Oriental Music by Kurt Albrecht. **10.40,** Programme for Women. **11.0,** W. Fröhlich Songs by Liesel Olmesdahl (Soprano). **11.25,** Announcements; Records. **11.55,** Weather. **12 Noon,** See **Frankfurt.** **1.5,** News; Weather. **1.20,** See **Frankfurt.** **1.50,** Time; News. **2.0 to 2.30,** See **Frankfurt.** **4.0,** See **Munich.** **5.30,** Talk: Burgenland. **6.0,** Programme for Young People. **6.25,** Orchestral Concert relayed from **Ulm;** Conductor, Franz Schilling: March (Friedemann); March (Döring); Waltz (Ziehrer); Overture, Undine (Lortzing); In a Persian Market (Ketelbey); Slav Rhapsody (Friedemann); Viennese Potpourri (Hruby); Selection from Der Bettelstudent (Millöcker). **7.45,** Time; Weather; Notes for Farmers. **8.0,** News. **8.10,** See **Frankfurt.** **8.35,** See **Berlin (Funkstunde).** **9.0** (from **Baden-Baden**), Concert by the Baden-Baden Symphony Orchestra; Conductor, Albert: Overture, The Queen's Kerchief (Joh. Strauss); Kaiser Waltz (Joh. Strauss); Mazurka, Die Libelle (Jos. Strauss); Musikabischer Scherz (Joh. Strauss); Radetzky March (Joh. Strauss). Part 2, Mozart Music: Three Dances; Musikalischer Spass; Overture, Figaro. **10.20,** Time; News. **10.35,** Topical Talk. **10.45,** News; Weather; Sports Notes. **11.0,** See **Munich.** **12 Midnight,** Serenade. **1.0 a.m. (Thursday)** (approx.), Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.,** Dance Refrains. **8.30,** News. **8.35,** Songs. **8.45,** Light Music. **12 Noon,** Opera Arias: The Mastersingers (Wagner), Hérodiade (Massenet), Il Trovatore (Verdi); Hamlet (Thomas). **12.15 p.m.,** Military Band Music. **12.30,** News; Exchange. **12.45,** Request Music. **1.0,** News; Market Prices. **1.5,** Extracts from Sound-Films, **1.15,** Concert by a Viennese Orchestra. **1.30,** Operetta Music: Airs from Femmes de minuit (Moretti), The Dubarry (Millöcker); A Waltz Dream (Strauss), Frasquita (Lehár). **1.45,** Bal Musette. **2.0,** News; Amusement Guide. **6.0,** News. **6.15,** Chansonnettes. **6.30,** Concert by a Symphony Orchestra: Extract from Children's Corner (Debussy); In the Steppes of Central Asia (Borodin); A Hunt in the Black Forest (Voelker). **6.45,** Opera Music: Arias from L'ombre (Flotow), Les brigands (Offenbach), Don Quichotte (Massenet), and Madame Butterfly (Puccini). **7.0,** Military Band Concert. **7.15,** Light Music. **7.30,** News; Racing Results; Market Prices; Exchange. **7.45,** Light Music: Un peu d'amour (Silésu); Petersburger Schlittenfahrt (Eilemberg); March (Pirev). **7.50,** Talk. **8.15,** Dance Music. **8.30,** Medical Talk. **9.0,** The Studio Corridors—Les coulisses du studio—a Radio Fantasy. **10.0,** Operetta Songs: Songs from Oh Papa (Yvain); La belle Hélène (Offenbach); Passionément (Messager); Honolulu (Cazes); Le printemps chante (Mauprey); Femmes de minuit (Moretti); Té mon bon (Bossy). **10.15,** News. **10.30,** Orchestral Concert: Extase (Ganne); French Waltz (Curti); Chant d'été; Club des cinq (Curti); Parfum viennois (Curti); Ideale (Tosti). **11.0,** Request Programme. **11.15,** Hawaiian Guitar Recital. **11.30,** Chansonnettes. **11.50,** Light Music. **12 Midnight,** News; Greetings. **12.5 a.m. (Thursday),** Le caveau de minuit—a Radio Fantasy. **12.15.** Overture, Oberon (Weber), by an Orchestra. **12.30,** Close Down.

TRONDHEIM.—Relays **Oslo.** **TURIN.**—Relays **Milan.**

VATICAN CITY

15,120 kc/s, 19.84 metres; 10 kW. (Morning); **5,970 kc/s, 50.26 metres** (Evening).—**11.0 to 11.15 a.m.,** Religious Information in Spanish. **8.0 to 8.15 p.m.,** Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz,** and **Salzburg, 1,294 kc/s, 231.8 metres.**—**9.0 a.m.,** News. **9.20,** Market Prices. **9.30,** Weather. **10.50,** Water Level. **11.30,** Programme for Women. **11.55,** Weather. **12 Noon,** Records. **1.0 p.m.,** Time; Weather; News; Programme Announcements. **1.10,** Records. **2.0,** Announcements. **2.10 to 2.30,** Records. **3.30,** Time; Weather; Exchange. **3.50,** Programme for Children. **4.10,** News. **4.15,** Programme for Young People. **4.40,** Records. **5.30,** Talk: The Dopolavoro Movement. **5.50,** Song Recital by Maria Zuber (Soprano) and Rudolf Hofmann (Tenor): Aria from Il Seraglio (Mozart); Aria from Tales of Hoffmann (Offenbach); Aria from Gianni Schicchi (Puccini); Russian Song from Russalka (Dvorák); Aria from Il Trovatore (Verdi); Aria from Die Bacchusnacht (Granichstaedten); Song from Susi (Réyi); Wien, lachendes Wien (Fiebrich); Wienerwald (Chmel); Wine Festival Song (Hell); Jung is' ma nur amal (Fohringer); Song (Pierné); Wenn ich vom Kahlenberg herunterschau (Kronegger). **6.30,** Talk. **6.55,** Talk: Accidents in Summer. **7.20,** Technical Review. **7.30,** Time; Programme Announcements; Weather; News. **7.40,** Concert by the Vienna Symphony Orchestra; Conductor, Schönherr: Overture, A Midsummer Night's Dream (Mendelssohn); Ballet Scene (Lehner); Was der Wind erzählt (Andress); Pan im Frühling (Andress); Ballet Scene (Frank); Three Pieces (Wetchy); Ballet Scene (Klein); Bacchanale from Tannhäuser (Wagner). **9.30,** Humorous Readings. **10.5,** Talk: Economic Problems. **10.30,** News; Weather; Announcements. **10.50,** Talk: The Twenty-sixth Esperanto Congress in Stockholm. **11.0,** 'Cello Recital by Wilhelm Winkler: Sonata in F (Handel); Elegy on the Autumn (Wunderer). **11.25,** Orchestral Concert; Conductor, Siedl: Tarantella (Popper); Overture, Raymond (Thomas); Waltz (Waldteufel); Birthday Greetings (Ketelbey); Egyptian Serenade (Lincks); Selection from Tales of Hoffmann (Offenbach-Schreiner); Overture, The Cricket on the Hearth (Goldmark); Song (Hügel); Viennese Potpourri (Hruby); Romantic Waltz (Heineke); Selection from Schön ist die Welt (Lehár); March (Wacek). **1.0 a.m. (Thursday)** (approx.), Close Down.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.,** Hymn. **6.35,** Records. **6.38,** Gym. **6.53,** Records. **7.5,** News. **7.10,** Records. **7.20,** Hints for Housewives. **7.25,** Announcements. **7.40,** Interval. **11.57,** Time. **12 Noon,** Fanfare from the Tower of St. Mary's Church, Cracow. **12.3 p.m.,** Weather. **12.5,** News. **12.10,** Records. **1.0,** News. **1.5,** Concert by the Grossman Orchestra. **2.0,** News. **2.5,** Economic Review. **2.15,** Interval. **4.0,** Concert by the Hollywood Theatre Dance Band; Soloist, Nina Grudzinska (Songs). **5.0,** Talk: Children's Letters. **5.15, Warsaw-Lwów** Exchange Programme: Recital by Braginska (Songs) from **Warsaw,** and Danczowski ('Cello) from **Lwów:** Songs: (a) Aria from The Czar's Bride (Rimsky-Korsakov), (b) Les Larmes m'aveuglent (Tchaikovsky); 'Cello Sonata in G (Brewal); Songs: (a) Le Choix (Moniuszko), (b) Invocation (Malinowski), (c) Je pensais (Malinowski); 'Cello Solos: (a) Malaguena (Albéniz), (b) Spanish Dance (Granados), (c) Allegro spirituoso, (d) Concert Polonaise (Popper). **6.0,** Talk. **6.15,** Concert, relayed from **Ciechocinek;** Conductor, Szulc: Overture, Die schöne Galathée (Suppé); Waltz, O schöner Mai (Joh. Strauss); Selection from Dybuk (Szulc); Serenade (Moszkovsky); Mazurka (Szulc). **6.45,** Talk. **6.55,** Talk on Art. **7.0,** Miscellaneous Items. **7.10,** Programme Notes. **7.15,** Records. **7.50,** Sports Notes. **8.0,** Great Thoughts. **8.2,** Topical Talk. **8.12,** Concert of Light Music, relayed from **Lwów, 795 kc/s, 377.4 metres. 8.50,** News. **9.0,** Fanfare. **9.2,** Programme for Farmers. **9.12,** Recital by B. Gimpel (Violin) and J. Gimpel (Pianoforte): Sonata in A (Brahms); Violin Solos: (a) Piece (Bloch), (b) Romanian Dances (Bartok), (c) Minstrels (Debussy); Pianoforte Solos: (a) Ondine (Ravel), (b) Sonata in F Sharp (Scriabin). **10.0,** Literary Programme. **10.15,** Dance Music from the Paradise Dance Hall. **11.0,** Weather and Aviation Report.

ZURICH.—Relays **Beromünster.**

THURSDAY
AUGUST THE TWENTY-THIRD

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres,** and **Cork, 1,260 kc/s, 241.9 metres.**—**1.30 to 2.30 p.m.,** Time; Exchange; Weather; Records. **6.0,** Programme for Children. **6.45,** News. **7.0,** French Lesson. **7.15,** Miss Joyce (Poetry Reading). **7.30,** Time. **7.31,** Music by the Station Orchestra. **8.0,** Thompson Dawson (Baritone). **8.15,** Mai Johnson (Pianoforte). **8.30,** Music by the Station Ensemble. **8.50,** M. Devitt (Soprano). **9.5,** Drama—presented by The Mummers. **9.35,** G. Lyons (Tenor). **9.45,** Michael McMahon (Traditional Fiddle). **10.0,** Variety Programme. **10.30,** Time; News; Weather. **10.40,** Records. **11.0** (approx.), Close Down.

BASLE.—Relays **Beromünster.**

BELGRADE

686 kc/s, 437.3 metres; 2.5 kW.—**10.45 a.m.,** Announcements. **10.50,** Water Level. **11.0,** Records. **11.59,** Time; Chimes. **12.5 p.m.,** Concert by the Station Orchestra. **12.45,** Exchange; Announcements. **1.10,** Concert by the Station Orchestra. **1.30,** News; Time. **5.55,** Time; Announcements. **6.0,** Programme for Women. **6.30,** Records. **6.45,** Moszkowski Concert by the Station Orchestra: Waltz, L'amor; Serenade; Spanish Dances. **7.5,** Announcements. **7.15,** Popular Songs by Teodora Arsenovic, with Orchestra. **7.45,** Talk. **8.15,** See **Vienna. 10.0,** Time; News; Concert from the Dva Jelena Restaurant. **11.10,** Dance Records. **11.30,** Close Down.

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.20,** See **Berlin (Funkstunde). 7.0,** News. **7.10,** See **Berlin (Funkstunde). 8.0,** Interval. **8.45,** Gym. for Women. **9.0,** Talk: The German Language. **9.40,** Programme for Housewives. **10.0,** News. **10.10,** Literary Sequence (on Records). **10.50,** Gym. **11.15,** Weather. **11.30,** Programme for Peasants. **11.55,** Weather. **12 Noon,** See **Breslau. 12.55 p.m.,** Time. **1.0,** Liszt Records. **1.45,** News. **2.0,** Interval. **2.45,** Greetings; Announcements. **3.0,** Weather; Exchange. **3.15,** Play for Children. **3.40,** Reading. **4.0,** Orchestral Concert from the Radio Exhibition Garden; Conductor, Budde: Overture, Zampa (Hérold); Selection from Faust (Gounod); Selection from La Bohème (Puccini); Nocturne (Kaun); Waltz, Roses from the South (Joh. Strauss); Overture, William Tell (Rossini); Overture, Nebuchadnezzar (Verdi); Ballet Music from Coppélia (Delibes). In the interval at **4.35,** Report. **5.30,** Review of Periodicals. **5.45,** Handwork Instructors at the Microphone. **6.10,** Famous Opera and Operetta Arias Sung by Schömmer. **6.40,** Talk. **7.0,** Concert of Hunting Music. **8.0,** Motto; Weather; Announcements. **8.10,** The Neubelz Annual Hiring Fair—Radio Picture. **8.30,** Symphony Concert by the Berlin Philharmonic Orchestra; Conductor, Laber: Jupiter Symphony (Mozart); Contredanses (Beethoven); Midsommarvarka (Alfvén); Comedietta (Graener); Overture, Euryanthe (Weber). In the interval at **9.0,** Radio Recollections. **10.0,** News. **10.30,** Technical Talk. **10.45,** Weather. **11.0,** Sequence of Music and Poetry (Randolf-Schmalnauer). **11.30,** Records: The World's Best Dance Bands. **12.55 a.m. (Friday),** Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Hymn; Gym. **6.15,** Weather; Meditation. **6.20,** Orchestral Concert of Light Music. **7.0,** News. **7.10,** Concert (contd.). **8.0,** Gym. **8.20,** Interval. **9.0,** See **Berlin (Deutschlandsender). 9.45,** Programme for Children). **10.0,** News. **10.10,** Market Prices. **10.30,** Records; Announcements. **11.25,** Exchange. **11.30,** Interval. **12 Noon,** See **Munich.** In the interval at **12.30,** Weather. **1.0,** News. **1.15,** Records. **2.0,** News. **2.15,** Concert from **Leipzig. 3.0,** Exchange. **4.0,** See **Berlin (Deutschlandsender). 6.0,** Announcements. **6.5,** German Folk Dances—Programme by a Young People's Choir. **6.30,** A Microphone Trip on Records. **7.0,** Chamber Music: Kurt Schlenger (Flute), Zernick (Violin), Kirchner (Viola), Reimann (Cello): Quartet in C (Joh. Chr. Bach); Duet in E flat (Beethoven); Quartet in D (Mozart). **7.40,** Echoes of the Day. **8.0,** News. **8.10,** See **Leipzig.** In the interval at **10.20,** News. **12 Midnight,** Dance Records. **1.0 a.m. (Friday),** Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**6.15 to 6.30 a.m.,** Gym. **12 Noon,** Records. **12.29 p.m.,** Time Signal from Neuchâtel Observatory. **12.30,** News. **12.40,** Records. **1.25, to 1.35** (approx.), Time Signal from Neuchâtel Observatory; Weather; Exchange. **3.30,** Records. **3.59,** Time. **4.0 to 6.0,** See **Sottens. 6.0,** Programme for Children. **6.30,** Talk: Motor Cars and Racing Cars. **7.0,** Time; Weather. **7.1,** Talk: The Berne Motor Grand Prix. **7.10,** Popular Programme, with the Thun Yodel Club. **7.50,** Talk. **8.15 to 10.0,** See **Vienna. 10.0** (approx.), Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BORDEAUX-LAFAYETTE

1,077 kc/s, 278.6 metres; 12 kW.—**6.30 p.m.,** News. **7.30,** News; Exchange. **7.40,** Labour Exchange. **7.55,** News. **8.15,** See **Vienna. 9.30,** Comedies.

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian. **10.30,** See **Prague. 11.0,** Water Level. **11.5,** See **Prague. 12.5 p.m.,** Record. **12.10,** News in Slovak. **12.15,** Record. **12.20 to 12.30,** See **Prague. 12.30,** See **Moravská-Ostrava. 1.30,** See **Prague. 1.40,** News and Weather in German and Hungarian. **1.50,** See **Prague. 2.0 to 2.5,** Market Prices. **3.15 to 4.20,** See **Prague. 5.40,** Records. **5.50,** Talk: Educational Methods in the Past. **6.0,** Records. **6.10,** Hints for Housewives. **6.15 to 6.55,** Hungarian Transmission: Three Talks. **6.55,** See **Prague. 7.35,** Topical Talk. **7.50,** One-Act Farce (Heltay). **8.10,** Talk on the following Transmission. **8.15,** See **Vienna. 10.45,** News in Hungarian. **11.0** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.**—**5.0 a.m.,** Hymn; Motto. **5.10,** Records. **6.0,** Time; Weather; Gym. **6.25,** See **Cologne. 7.0,** Time; News. **7.5,** See **Cologne. 8.0,** Cookery Hints. **8.10,** Records: Light Music. **9.0,** Time; News. **10.10 to 10.40** (from **Gleiwitz**), Broadcast for Schools. **11.30,** Time; News. **11.45,** Programme for Farmers. **12 Noon,** Orchestral Concert; Conductor, Weisshaupt: Overture, Le Part du Diable (Auber); Selection from Cavalleria rusticana (Mascagni); Treue Waffengefährten (Blankenburg); Song from The Bird Fancier (Zeller); Selection from Faust (Gounod). In the interval at **12.30 p.m.,** Time; Weather. **1.30,** Time; News. **1.45,** Orchestral Concert (contd.): March (Schmiedecke); Waltz, Blumen der Liebe (Rust); Selection from Der Opernball (Heuberger). **2.20,** Exchange. **2.25,** Announcements; Records. **2.50,** Market Prices. **3.10,** Talk: Paddling and Sailing. **3.20,** Reading (Dressler). **3.30,** Programme for Children. **4.0,** Military Band Concert: March (Wollny); Overture, Eine Nacht in Venedig (Joh. Strauss); Waltz, Winterstürme (Fucik); Polka, Turandot (Reindel); Marinelieder Potpourri (Prager); Overture, Der Wanderer im Gebirge (Steinbeck); Waltz, Lustiges Wien (Meisel); Bruder Leichtfuss (Kutsch); Potpourri (Robrecht); Singende (Bataillone). **5.30,** Weather; Prices. **5.35,** Programme for Mothers. **5.55,** Report: Repairing Locomotives. **6.15,** Talk: Property Law. **6.35,** Reading (Grätsch). **6.50,** Announcements; Weather. **7.0,** See **Stuttgart. 8.0,** Announcements. **8.10,** See **Königsberg. 10.0,** Talk: Görbersdorf. **10.20,** Time; News. **10.45,** See **Hamburg. 12 Midnight** (approx.), Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 12.30 p.m.,** See **Moravská-Ostrava. 1.30,** See **Prague. 2.0 to 2.10,** Labour Exchange in German **3.15 to 4.20,** See **Prague. 5.40,** Report for Housewives. **5.45,** Talk on Natural History. **5.55,** Records. **6.20,** German Transmission: Talk: The Olympic Games in Prague; Talk. **6.55,** See **Prague. 7.35,** Topical Talk. **7.50,** A Sketch (Konecny). **8.10,** See **Prague. 8.15 to 11.0,** See **Vienna. 11.0** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Records. **1.0 p.m.,** News. **1.10,** Orchestral Concert: Overture, Solidarité (Weyts); Ballet Music from Hérodiade (Massenet); La lettre de Manon (Gillet); Selection from Paganini (Lehár); A Fête in Aranjuez (Demersseman); Waltz from The Chocolate Soldier (O. Straus). **2.0,** Interval. **4.55,** Announcements. **5.0,** Concert by the Radio Orchestra: Li-o-ting (Staub); Moment musical (Schubert); The Niggers' Feast (Robert); Imitation de petits tambours (Poliakin); Humoresque (Demaret); Albanian Suite (Kostal); Waltz, España (Waldteufel). **5.30,** Programme for Children. **6.0,** Talk for Mothers. **6.15,** Records. **7.15,** Talk for Workers. **7.30,** Sports Notes; Travel Talk. **8.0,** Concert of Hungarian Music by the Radio Orchestra: Hungarian March, from The Damnation of Faust (Berlioz); Rhapsody No. 14 (Liszt); Hungarian Dances Nos. 4, 5 and 6 (Brahms); Rhapsody in D (Dvorák); Rhapsody No. 2 (Liszt); Hungarian Dances Nos. 16 and 17 (Brahms). **8.45,** Talk. **9.0,** Dance Music, relayed from the Kursaal, Ostend. **10.10,** News. **10.20,** Request Records. **11.0** (approx.), Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish.—**11.57 a.m.,** Weather. **12 Noon,** Orchestral Concert; Soloist, Locufier (Tenor): March (Blankenburg); Valse caprice (Rubinstein); Overture, La belle Hélène (Offenbach); In a Chinese Temple Garden (Ketelbey); Intermezzo from Cocorico (Ganne); Three Flemish Songs (Benoit); Song, Princesita (Padilla); Selection from Show-Boat (Kern); Caprice on a Popular German Theme (Ochs). **1.0 p.m.,** News. **1.10,** Records. **2.0,** Interval. **4.55,** Announcements. **5.0,** Dance Records. **6.0,** Orchestral Concert; Soloist, Paul Donliez (Pianoforte): March, Unie (Walpot); Suite of Viennese Waltzes (Gilson); Overture, Chant de Louvain (Van Oost); Morceau de genre, Girl (Poot); Marche funèbre d'un hanneton (Dubois); Pianoforte Improvisation (Douliez); Overture, L'oncle Mathurin (Weyts); Rapsodie dahoméenne (De Boeck); Sahara Suite (Ackermans). **7.0,** Book Review. **7.15,** Records. **7.30,** Talk: The Interior Navigation Exhibition. **8.0,** Partita in C minor (Bach) on Records. **8.15,** Concert from **Vienna.** In the Interval, Recitations. **9.45,** Hungarian Fantasy (Liszt) on Records. **10.0,** News. **10.10,** Dance Records. **11.0** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15,** Time; Weather; News. **1.40,** Records. **6.0,** Time; Weather. **6.5,** Concert by the Ionesco Orchestra. **7.15,** Talk. **7.30,** Talk. **7.45,** I Pagliacci—One-Act Opera (Leoncavallo), followed by Cavalleria rusticana—One-Act Opera (Mascagni). In the Interval, Wireless Notes. After the Programme, News.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym; Records. **9.45,** News. **10.0,** Talk; Records. **12 Noon,** Chimes. **12.5 p.m.,** Orchestral Concert. **1.30,** Concert. **2.40,** Market Prices; Cookery Notes. **4.0,** Talk for Young People. **5.0,** Reading. **5.30,** Concert of Operetta Music; Conductor, Tibor Polgár: Overture, Prince Bob (Huszka); Selection from Les Cloches de Corneville (Planquette); Extract from Lilac Time (Schubert-Berté); Potpourri (Jacoby); Zauberwalzer (Strauss); Dornröslein (Poldini); Selection from The Count of Luxembourg (Lehár); Air from Sybil's Letter (Jacoby); Ballet Music from Cinderella (Poldini). **6.45,** Talk with Records: The Life of the Spanish Woman. **7.20,** Cembalo Recital by Endor Krudy. **7.50,** Review of Foreign Affairs. **8.15,** See **Vienna. 10.5,** News. **10.25,** Concert by the Kurina Cigány Band. **11.15,** Dance Music.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Motto; Records. **6.5,** Gym. **6.25,** Concert by the Municipal Orchestra, relayed from Düsseldorf; Conductor, Artz. **6.50,** Time; News. **7.5,** Concert (contd.). **8.0,** Time; Weather; Water Level. **8.5,** Gym. **8.20,** Talk. **8.30,** Interval. **10.0,** Time; News; Water Level. **10.10,** Concert for the Berlin Radio Exhibition; The Small Station Orchestra; Conductor, Eysoldt: Waltz, Mein Ideal (Blon); Prelude to Ilka (Doppler); Selection from Martha (Flotow); Kuss mich (Eysoldt); Sonnenblume (Eysoldt); March (Schmidt-Hagen); Extracts from The Sleeping Beauty (Tchaikovsky); Wiener Moment (Häuser); Viennese Dance No. 2 (Friedman-Gärtner). **11.30,** Post Office Programme. **12 Noon,** Records. **12.45 p.m.,** News; Greetings. **1.0,** Concert by the Station Chamber Orchestra; Conductor, Hartmann: Prelude to The Bohemian Girl (Balfe); Waltz (Ohlsen); Piece (Garadin); Selection from Ariadne auf Naxos (Strauss). **1.45,** News. **2.0** (approx.), Concert (contd.): Novellette (Gade); Albumblatt (Gade); Selection from Rose Marie (Friml); Grubenlichter-Walzer (Zeller); Gondoliera (Bossi); Rose Mousse (Bosc); Prelude (Lincke); Unter dem Siegesbanner (Blon). **3.15,** Reading. **3.30,** Exchange. **3.50,** Announcements. **4.0,** See **Berlin (Deutschlandsender). 5.0,** Talk: Theodor Däubler. **5.15,** Records: Nowakowski (Organ). **5.45,** Talk for the Cologne Colonial Exhibition. **6.5,** See **Berlin (Funkstunde). 6.30,** Adagio from the Violin Concerto in E (Bach), by Kuhlendampff, on Records. **6.40,** Announcements. **6.50,** Exchange. **7.0,** Records: Variety Items. **7.45,** A Flying Visit. **8.0,** News. **8.10,** Recital by the Stauch Trio: Trio in G (Mozart); Polonaise in E (Weber); Valse caprice Op. 4 (Tchaikovsky); Valse impromptu (Liszt); Waltz from Coppélia (Delibes - Dohnányi); Turkish March (Mozart); Trio Op. 121a (Beethoven); Ecossaises (Beethoven). In the intervals, Reading of Fairy Tales by Martha Walter. **10.0,** Time; News. **10.30,** Concert by the Landgraf Orchestra from the Hotel zur Post, Wuppertal-Elberfeld. **12 Midnight** (approx.), Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,455 kc/s, 206 metres; 10 kW.—**11.0 a.m., to 11.30,** Programme in English by the International Broadcasting Company of London: Happy Half-Hour: Concert of Gramophone Records. **11.30 to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English by the I.B.C. **4.30,** Worthing, Littlehampton, Brighton and Hove Concert—For Sale. **5.0,** Dance Music. **5.30,** Quarter of an Hour with Layton and Johnstone (Gramophone Records). **5.45,** Concert: Dance Music. **6.0 to 11.0,** Programme in French. **11.0** till Close Down, Programme in English by the I.B.C. **11.0,** Dance Music, relayed from the Etretat Casino. **11.30,** Concert arranged by the I.B.C. (Ireland), Ltd. **12 Midnight,** Dance Music from the Etretat Casino. **1.0,** I.B.C. Goodnight Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,[illegible] kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.40,** Time; News. **6.50,** Weather. **6.55,** Concert from Bad Orb. **8.10,** Water Level Report; Weather. **8.15 to 8.35,** Gym. **10.0,** News. **10.45,** Talk for Housewives. **11.0,** Announcements; Records. **11.40,** Programme Announcements; Exchange; Weather. **11.50,** Social Notes. **12 Noon,** See **Stuttgart. 1.0 p.m.,** Time; Local News; News. **1.20,** Gramophone Concert of Scandinavian Music. **1.50,** Time; News. **2.0,** Gramophone Concert of Light Music. **2.40,** Fairy Tales and Songs to the Lute. **3.30,** Weather. **3.35,** Economic Notes. **3.50,** Time; Exchange. **4.0,** Concert relayed from **Badenweiler. 5.30,** Discussion: Industrial Art. **5.50,** Topical Talk. **6.15,** See **Stuttgart. 6.45,** Weather; Exchange; Programme Announcements; Time. **6.50,** Social Notes. **7.0,** Sonata in A minor Op. 26 (Schmid) by Raba (Violin). **7.30,** Local Review. **7.40,** Concert. **8.0,** Time; News; Announcements. **8.15,** Symphony Concert, relayed from **Bad Nauheim;** Conductor, Stöver; Soloist, Elly Ney (Pianoforte): Concertino barocco Op. 9 (Lürmann); Pianoforte Concerto in D minor Op. 15 (Brahms); Siegfried's Idyll (Wagner); Selection from The Mastersingers (Wagner). **10.0,** Schloss Schönfeld—Historical Sketch. **10.20,** Time; News. **10.35,** Brandschaden ist Landschaden. **10.45,** News; Weather; Sports Notes. **11.0,** Concert from **Hamburg. 12 Midnight,** See **Stuttgart. 1.0 a.m. (Friday),** Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

984 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg** and **Hanover, 1,330 kc/s, 225.6 metres.**—**5.45 a.m.,** Time; Weather; Programme for Farmers. **6.0,** Gym. **6.15,** Time; Weather. **6.20,** See **Berlin (Funkstunde). 7.0,** Time; News. **7.10,** See **Berlin (Funkstunde). 8.0,** Weather; Health Talk. **8.10,** Announcements; Records. **10.50,** News. **11.0,** Nor'-Nor'-West—Play (Janssen). **11.30,** Records: Strauss-Millöcker Music. **12 Noon,** Programme for Housewives. **12.5 p.m.,** Time; Weather; News. **12.15,** Concert from **Munich. 1.0,** Exchange. **1.15,** Weather. **1.20,** Musical Programme. **2.15,** News. **2.30,** Records: Wind Instrument Music. **3.0,** Exchange. **3.40,** Shipping and Aviation Notes. **4.0,** See **Munich. 5.20,** Talks: (a) German Silk, (b) The War Memorial Exhibition in Hamburg, (c) Topicalities. **6.5,** Hermann the Cheruscan—Historical Sequence (Möller). **6.30,** Talk: The Student in the Labour Camp. **6.45,** Exchange. **6.55,** Weather. **7.0,** Hein Köllisch, a Hamburg Poet—Sequence, with Music. **8.0,** News. **8.10,** See **Leipzig. 10.0,** News. **10.20,** Musical Programme. **10.45** (from **Kiel**), Concert by the Kiel Orchestral Society; Conductor, Döring: Spanish Comedy Overture (Kéler-Béla); Paraphrase, Abendlied (Weninger); Die Dorfschmiede (Heins); Ständchen an die Geliebte (v. Blon); Ninettawalzer (Joh. Strauss); March (von Blon). **11.30** (on **Zeesen**), German Lieder—Concert by the Bremen Cathedral Choir; Conductor, Liesche; Soloists, Kaiser (Baritone) and Krug (Pianoforte): Herzlieb' zu dir alleine (Hasler); Ach herzigs Herz; Liebeskrieg; Mein Lieb will mit mir kriegen (Hasler); Baritone Solos: (a) An die Musik (Schubert), (b) Nacht und Träume (Schubert), (c) Der Freund (Wolf); Rundadinella (Schein); Regiment sein Strasse zieht; So geht es im Schnützelputzhäusel; Bruder Liederlich (Rathgeber); Pianoforte Solos: (a) Impromptu in B flat (Schubert), (b) Intermezzo (Brahms); Baritone Solos: (a) Das Mühlrad, (b) Der König in Thule (Zelter), (c) Am Brunnen vor dem Tore (Schubert); (c) Wohlauf in Gottes schöne Welt (Liesche); Canon Wenn du weisst, was ich weiss (Lachner), (c) Wenn die Bettelleute tanzen, (d) Das Schiff streicht durch die Wellen. **12.30 a.m. (Friday),** Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Kootwijk,** 50 kW. from **3.40 p.m.** Programme of the General Broadcasting Society (A.V.R.O.).—**7.40 a.m.,** Time; Records. **8.40,** Concert by the Station Orchestra; Conductor, Gerharz: Overture, Peter Schmoll (Weber); Selection from A Midsummer Night's Dream (Mendels-

sohn); Liebestraum (Liszt); London Suite (Eric Coates); Andalusa and Villanesca (Granados); Allegretto from La Reine Symphony (Haydn). **9.40**, Time; Prayers. **9.55**, Records. **10.10**, Concert by the Rentmeester Ensemble. **10.40**, Reading. **11.10**, Concert by the Rentmeester Ensemble. **12.10 p.m.**, Concert by the Station Orchestra; Conductor, Gerharz: March (Sousa); Waltz (Métra); Selection from Firenze ridente (Raffaelli); Records; Ballet égyptien (Luigini); Marianina (Monti); Se tu vorresti (Tosti); Strauss Operetta Potpourri (Schlögel); Records; Balalaika Klänge (Tschernlavski-Weninger); Fünf Uhr Tee im Puppenhaus (Rosen); Piece (Finck); March (Ertl). **2.10**, Reading. **2.40**, Records. **3.25**, Interval. **3.40**, Programme for Hospitals. **4.10**, Records. **4.40**, Programme for Children. **5.10**, Concert by Kovacs Lajos and his Orchestra. **6.10**, Sports Talk. **6.40**, Concert by Kovacs Lajos and his Orchestra. **7.10**, Variety Items by Maria Dubas. **7.40**, Time; Weather; News. **7.45**, Records. **7.55**, Talk: Salzburg. **8.15**, See **Vienna**. **9.0**, Records. **9.10**, Light Music. **9.25**, Records. **9.40**, Concert by Kovacs Lajos and his Orchestra; Soloist, Hilde Jager (Songs). **10.40**, News. **10.50**, Records. **11.40**, Time; Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. until **6.40 p.m.**, 20 kW. from **6.40 p.m.**—**7.40** to **8.55 a.m.**, Programme of the Catholic Radio Society (K.R.O.). Records. **9.40** to **10.40**, Programme of the Christian Radio Society (N.C.R.V.). **9.40**, Records. **9.55**, Religious Programme. **10.25**, Records. **10.40** to **1.40 p.m.**, K.R.O. Programme. **10.40**, Records. **11.10**, Religious Address. **11.40**, Police Notes. **11.55**, Concert by the K.R.O. Orchestra. Conductor, Marius van't Woud. An der Mosel (Dreyer); Overture, Der lustige Krieg (Joh. Strauss); Selection from Czar and Carpenter (Lortzing); Eine kleine Liebelei (Lautenschläger); Selection from The Little Dutch Girl (Kálmán); Excelsior (Popy); Records; De Fremersberg (Koennemann); Donauwellen (Ivanovici); Selection from White Horse Inn (Stolz-Benatzky); Canzonetta (Filipucci); Frisch voran (Blankenburg). **1.40 p.m.** till Close Down, N.C.R.V. Programme. **1.40**, Organ Recital by Visser. **2.40**, Programme for Women. **3.10**, Records. **3.25**, Interval. **3.40**, Bible Reading; Baritone and Organ Solos. **4.40**, Handicrafts Lesson. **5.10**, Concert by the Crescendo Orchestra. Conductor, Boetz. Uncle Sammy (Holzmann); Selection from Tannhäuser (Wagner-Gadenne); Records; Overture, Princess Clémentine (Strauwen); Selection from William Tell (Rossini-Martin); Records; Overture, The Barber of Seville (Rossini-Andrieu); March, Stars and Stripes (Sousa). **6.10**, Records. **6.23**, Talk. **6.40**, Police Messages and Religious News. **6.55**, Records. **7.10**, Press Review. **7.40**, Records. **7.45**, Talk. **8.15**, See **Vienna**. In the interval at **9.10**, News. **10.0**, Records. **11.10** (approx.), Close Down.

INNSBRUCK.—Relays **Vienna.**

JUAN LES PINS

1,249 kc/s, 240.2 metres; 2 kW.—**12.30 p.m.**, Amusement Guide; Concert. **1.0**, News. **1.15**, Programme for Children. **3.0**, Amusement Guide; Exchange News. **3.10**, Fashion Notes. **3.20**, Press Review; Concert: Arab Melodies (Glazunov); Le cygne (Saint-Saëns); Arias from La Bohème (Puccini); Manon (Massenet); Jota Aragonesa (Albéniz). **3.35**, News; Weather. **3.45**, Concert by the Municipal Band relayed from the Albert Gardens, **Nice.**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres**; and **Skamlebaek, 49.5 metres.**—**7.0 a.m.**, Gym. **7.27**, Weather. **8.30**, Service from Copenhagen Cathedral. **11.0**, Weather. **11.10**, Fish Prices. **12 Noon**, Chimes; Weather. **12.5 p.m.**, Concert by Andersen's String Ensemble, relayed from the Bellevue Strand Hotel. **2.0**, Interval. **2.45**, Concert by the Station Orchestra; Conductor, Reesen: Gipsy March (Gyldmark); Overture, Titus (Mozart); Minuet in B Minor (Schubert); Norwegian Dance No. 2 in A (Grieg); Contre-danse (Dupuy-Nielsen); Aragon (Albéniz); Polonaise in A (Chopin); Songs; Ouverture romantique (Kéler-Béla); Selection from Bitter Sweet (Coward); Berceuse (Järnefelt); Swedish Dance in A Minor No. 3 (Aulin); March (Komzak). **4.45**, Programme for Boys: A Tour with the Microphone. **5.30**, Exchange. **5.42**, A Poem. **5.45**, Talk: Johannes Clausen. **6.15**, English Lesson. **6.45**, Weather; Announcements. **7.0**, News. **7.15**, Time. **7.30**, Talk: Handicrafts in Technical Schools. **8.0**, Time. **8.1**, Pianoforte Recital of Russian Music by Folmer Jensen. Poem, Op. 32 (Scriabin); Etude in C sharp minor (Scriabin); The Sewing Machine (Mussorgsky); Caprice (Mussorgsky). **8.30**, Talk; Weather. **8.50**, Concert by the Station Orchestra; Conductor, Reesen; Overture, Agnes (Paër); Three Dances from Céphale et Procris (Grétry); La fille au cheveux de lin (Debussy); Romanian Folk Dance (Béla Bartók); Extracts from Pelléas and Mélisande (Sibelius); Dance of the Seven Veils from Salome (Reesen); Alla Marcia from Karelia (Sibelius). **9.50**, News. **10.5**, Music by Einer Jensen (Songs), Frithioff Bruun (Marimba) and Viktor Fischer (Pianoforte). **10.50**, Dance Music, relayed from the Lorry. In the interval at **12 Midnight**, Chimes. **12.30 a.m. (Friday)**, Close Down.

KAUNAS

155 kc/s, 1,935 metres; 7 kW.—**12 Noon**, Time; News. **6.30 p.m.**, Legal Talk. **6.50**, Concert: Overture, Ruslan and Ludmilla (Glinka); Suite (Mussorgsky); Spanish Caprice (Rimsky-Korsakov). **7.30**, Time; News. **8.10**, Concert: Selection from Der Bettelstudent (Millöcker); Delirien-Walzer (Strauss); Serenade (Drdla). **8.40**, Talk. **8.50**, Sports Notes. **9.0**, Song Recital. **9.20**, Talk: The Lithuanian Language. **9.40**, Concert (contd.): Ballet Music from Faust (Gounod); Norwegian Bridal Procession (Grieg). **10.30** (approx.), Close Down.

KIEL.—Relays **Hamburg. KLAGENFURT.** Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—**5.0 a.m.**, Records. **5.50**, Weather. **6.0**, Gym. **6.20**, See **Berlin (Funkstunde). 7.0**, News. **7.10**, See **Berlin (Funkstunde). 8.0**, Service. **8.30**, Gym. for Women. **9.0**, Interval. **9.5**, Broadcast for Schools. **9.35**, Talk for Housewives. **9.50**, Gym. for Children. **10.40**, News. **10.55**, Weather. **11.30**, Records. **12 Noon**, See **Munich.** In the interval at **1.0 p.m.**, Time; News. **2.0**, News. **3.0**, Programme for Farmers. **3.15**, Book Review. **3.30**, Eurhythmics. **4.0**, Concert by the Station Orchestra; Conductor, Wilcken: Suite, Aus dem Morgenlande (Heuberger); Transaktionen Walzer (Jos. Strauss); Gavotte (Sgambati); Jota Aragonesa (Albéniz); Overture, Fra Diavolo (Auber); Selection from The Arabian Nights (Joh. Strauss); Waltz (Waldteufel); A Festival in Aranjuez (Demerssemann); Florentine March (Fucik). In the interval at **5.0**, Tales in Dialect. **5.50**, Talk: Thought. **6.15**, Market Prices. **6.25**, Programme for Farmers. **6.55**, Weather. **7.0**, War Reminiscences. **7.30**, Programme for Girls. **8.0**, News. **8.10**, Concert by the Opera House Orchestra; Conductor, Brückner; Soloists, Donath-Oswald (Pianoforte) and Maria Dahmen (Soprano): Pianoforte Concerto in D minor (Brahms); Overture and Ballad from The Flying Dutchman (Wagner); The Noon-day Witch (Dvorák); Songs: (a) Aria from Tosca (Puccini), (b) Aria from A Masked Ball (Verdi); Ballet Music from Carmen (Bizet). **10.0**, News; Sports Notes. **10.30**, Records. **11.0**, See **Munich. 12 Midnight** (approx.), Close Down.

KOSICE.—Relays **Prague.**

LAHTI

166 kc/s, 1,807 metres; 40 kW. Relayed by **Helsinki, 895 kc/s, 335.2 metres.**—**7.5 to 7.20 a.m.**, Service in Swedish. **7.30 to 7.45**, Service in Finnish. **11.0**, Exchange. **11.5**, Musical Programme. **11.30**, Exchange. **11.45**, News. **11.59**, Time; Weather. **5.0 p.m.**, Concert; Conductor, Linko: March (Nowowieski); Overture, Csokonay (Keler Bela); Valse-Caprice (Urbach); Piece (Lehar); Serenata (Moszkowski); Violin Solo: Extract from The Violin-Maker of Cremona (Hubay); Minuet (Schreker); March (Reh). **5.50**, News in Finnish. **5.59**, Time; Weather. **6.10**, News in Swedish. **6.15**, Talk. **6.35**, 'Cello Recital by Erkki Kihl. **7.0**, Talk. **7.25**, Pianoforte Recital. **7.55**, Recitations. **8.10**, Orchestral Concert: Suite, Op. 98 (Dvorak); Intermezzo from Mona Lisa (Schillings); Canzonetta (Friml); Hungarian Rhapsody No. 12 (Liszt). **8.45**, News in Finnish. **9.0**, News in Swedish. **9.15**, Music relayed from Kappeli. **10.0** (approx.), Close Down.

LAUSANNE.—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.**—**5.50 a.m.**, Programme for Farmers. **6.0**, Gym. **6.25**, See **Cologne. 7.0**, News. **7.5**, See **Cologne. 8.0**, Gym. **8.20 to 9.0**, Records. **9.40**, Exchange. **9.45**, Announcements. **9.55**, Weather; Tides. **11.0**, Announcements; Records. **11.30**, News. **11.40**, Weather. **11.50**, Programme for Farmers. **12 Noon** (from **Dresden**), Concert by the Dresden Soloists' Ensemble: German Dances (Schubert); Romance in G Op. 40 for Violin and Pianoforte (Beethoven); Minuet and Allegro from the String Quartet in C (Mozart); Extracts from the Small Suite for Two Violins and Pianoforte, Op. 14 (Ambrosius); Johann Strauss Waltz Potpourri (Schütt); Melancholy (Bullerian); Romance from the 'Cello Sonata in A minor (Grieg); Ballet Music from Der Fremde (Kaun); American Wood Idyll (MacDowell). **1.0 p.m.**, News. **1.10**, Records: Overtures. **1.50**, News. **2.0**, Concert by the Emde Orchestra: Freundschafts-Marsch (Zeh); Overture, Die Matrosen (Flotow); Traum vom Glück (Lincke); Waltz, Mondnacht am Rhein (Krome); Puppe und Kobold (Armandola); Selection from Frühlingsluft (Jos. Strauss); Czardas; Chant sans Paroles (Tchaikovsky); Suite (Yoshitomo); Spanish Waltz (Ailbout); Barcarolle (Rust); Strauss-Millöcker (Suppé); Potpourri (Komzak); Polka-Mazurka, Silberglöckchen (Ramtlor); Frühling und Liebe (Grothe); March (Bauer). **4.0**, Exchange. **4.20**, Programme for Children. **4.35**, Talk: Königsbrück. **5.0**, Sonata in G for Violin and Pianoforte (Smigelski), by Cläre Schmidt-Guthaus and Gerhard Burgert. **5.25**, Talk: The Minnesingers. **5.50**, Exchange; Weather; Time. **6.0**, Talk: The Leipzig Autumn Fair. **6.20**, Variety Programme; Part I—Folk Songs and Sketches; Part II—The German Folk Song Play (Zilcher). **7.35**, Talk: Constantine the Great. **8.0**, News. **8.10**, Concert for the Radio Exhibition: Workers' Bands and Choirs, Zither, Guitar and Accordion Ensembles, Folk Song Groups, Humour Sketches. In the interval at **10.20**, News. **12 Midnight** (approx.), Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 150 kW.—**7.45 a.m.**, Records. **8.0**, News in French; Record; News in German; Record. **12 Noon**, Concert by the Station Orchestra. Conductor: Pensis. Overture, The Barber of Bagdad (Boieldieu); Waltz, Hoffballtänze (Ziehrer); Piece (Heusser); Suite, Aus dem Nordlande (Frederikser); Berceuse (Krika); Selection from The Czarevitch (Lehár); Liebesfeier (Weingartner); March, Amitié (Zeh). In the interval at **12.30 p.m.**, News in French and German; and at **1.0**, Exchange. **1.15**, Records. In the interval at **1.30**, Exchange. **2.0**, Exchange. **3.45**, Exchange. **6.30** till Close Down, German Evening. **6.30**, Variety Programme. **7.30**, News. **7.35**, Song Recital by Flieschmann (Baritone); Gottes ist der Orient (Schumann); Air from Goethe's Faust (Schumann); Piece (Schubert); Der Sänger (Hugo Wolf). **8.0**, News in French and German. **8.20**, Concert of German Music by the Station Orchestra. Conductor: Pensis. Overture, Der Waffenschmied (Lortzing); Selection from Der Freischütz (Weber); Moment Musical (Schubert); Kinderlieder Suite (Blech). In the interval at **8.30**, Exchange. **9.10**, Concert by the Station Orchestra. Conductor: Pensis. Lyric Suite (Grieg); Pavane pour une Infant défunte (Ravel); Hindu Song (Rimsky-Korsakov); A Toi (Czibulka); Nights of Solitude (Clemus); Les Préludes (Liszt). **10.0**, Violin and Pianoforte Recital by Grete Heukeshoven and Stauch: Sonata in G (Bach); Sonata in E Flat, Op. 18 (Strauss). **10.35**, Dance Records.

LYONS

LA DOUA, 648 kc/s, 463 metres; 15 kW.—**8.0 a.m.**, News. **10.15**, Concert from Vichy Casino. **11.30**, Miltary Band Concert; Pasodoble (Sentis); Waltz, Morganblätter (Strauss); Intermezzo (Moretti); Nocturne (Ganne); Selection from The Countess Maritza (Kálmán); Serenade (Bozi); Piece (Warms); Selection from Miss Helyett (Audran); Boston from Rose de France (Romberg; Two Old Dances (Razigade); Selection from La Bohême (Puccini); March (Sudessi); Violin Solo: Air from Figaro (Mozart); Russian Dance (Tchaikovsky); Serenade (Filipucci); Waltz (Lincke). In the interval at **1.0 p.m.**, News. **1.30**, Programme for Children. **2.30**, Concert. **3.15**, Programme for Invalids. **3.30**, Concert from Vichy Casino. **6.30**, News. **7.30**, Local News. **7.50**, Talk. **8.0**, Talk: Fishing. **8.10**, Talk: Cruising. **8.15**, See **Vienna.** After the Programme, News.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**9.0, a.m.**, News. **10.0 to 10.30**, Exchange; Announcements. **2.0 p.m.**, Chimes; Weather; Music. **2.30**, Concert by the Station Sextet. **3.0**, Amusement Guide; Exchange; Light Music. **3.30**, Concert by the Station Sextet. **4.0**, Variety Music. **4.15**, Concert by the Station Sextet. **4.50**, News. **5.0**, Interval. **6.0**, Chimes; Light Music. **7.0**, Announcements; Programme for Children. **8.15**, See **Vienna. 9.50**, Announcements. **10.0**, Chimes; Concert by the Station Sextet. **10.30**, Literary Talk. **11.0**, News. **11.10** (approx.), Concert by the Municipal Band; Conductor, Ricardo Villa. **12.45 a.m. (Friday)**, News. **1.0**, Chimes. **2.0 to 3.0**, Programme in English arranged by the International Broadcasting Company of London. Dance Music. **3.0**, I.B.C. Goodnight Melody and Close Down.

MADRID

EAQ, 10,000 kc/s, 30 metres; 20 kW.—**11.15 p.m.**, News. **11.30**, Spanish Music; News. **1.0 a.m.** till Close Down, Programme in English arranged by the International Broadcasting Company of London: Music from the Opera. **1.30**, I.B.C. Good-night Melody and Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres**, and **Florence, 610 kc/s, 491.8 metres.**—**7.30 a.m.**, Gym. **7.45**, Time; News. **11.30**, Trio Concert. **12.30 p.m.**, Records. **12.45**, News. **1.0**, Time; News. **1.5**, Fashion Notes. **1.10 to 2.15**, Concert by the Doreno Orchestra. In the interval at **1.30**, Records; Exchange. **4.35**, News. **4.45**, Programme for Children. **5.10**, Light Music. **5.55**, Weather. **6.0**, Report for Farmers. **7.0**, Tourist Report; Dopolavoro Notes. **7.15**, News in Foreign Languages. **8.0**, Time; News. **8.45**, Relay of an Opera. In the intervals, Talk; Art Notes. After the Opera, News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**12 Noon**, Announcements; Concert by the Station Orchestra: Overture, Die Heimkehr aus der Fremde (Mendelssohn); Selection from Manon Lescaut (Puccini). **12.29 p.m.**, Time; Weather. **12.33**, Concert (contd.), Selection, Hans the Flute Player (Ganne); Se tu m'ami (Denza); Intermezzo (Siede). **12.55**, News. **1.5**, Records. **1.30**, Interval. **3.59**, Time. **4.0**, See **Sottens. 6.0**, Interval. **7.44**, Announcements. **7.45**, News. **8.0**, Talk: Toscanini. **8.15**, See **Vienna.** In the Interval at **9.0**, Reading. **10.0** (approx.), Close Down.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.0 to 7.15 a.m.**, See **Prague. 10.0**, See **Prague. 12.30 p.m.**, Concert by the Station Orchestra. Conductor, Divis. Overture, Undine (Lortzing); Two Pieces from Poetic Moods (Dvorák); Selection from Tales of Hoffmann (Offenbach); Waltz of Love, Op. 32 (Provaznik); Song (Zamrzla); March of Liberty (Vackar). **1.30**, See **Prague. 2.0 to 2.10**, See **Brno. 3.15 to 4.20**, See **Prague. 5.40**, Reading in Polish by Fierla. **5.50**, Records. **6.0**, Local Report. **6.5**, Record. **6.10**, Book Review. **6.20**, German Transmission: Poetry Reading. **6.55**, See **Prague. 7.35**, Reading. **7.50**, See **Brno. 8.10**, See **Prague. 8.15**, See **Vienna. 11.0** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.**, News. **5.30**, Fanfare. **5.45**, Gym. **6.15**, Programme Announcements. **7.30**, Records. **9.0**, Musical Programme. **9.55**, Time Signal. **10.0**, News. **10.15**, Concert of Music to Shakespeare's Plays. **11.15**, Programme for Collective Farm Workers. **2.45 p.m.**, News. **3.15**, Programme for Children. **3.55**, Time Signal. **4.0**, News. **4.15**, Book Review. **5.30**, Variety Concert. **9.0**, Programme in German: Letter-Box; Talk by a Textile Worker. **9.55**, Chimes. **10.5**, Talk in French and Spanish: Soviet Commerce.

MOTALA.—Relays **Stockholm. MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nürnberg, 1,267 kc/s, 236.8 metres**; and **Kaiserslautern, 1,195 kc/s, 251 metres.**—**6.30 a.m.**, Gym. **6.45**, Motto; Records. **7.15**, News. **7.25**, Concert from **Stuttgart. 9.50**, Programme for Housewives. **10.50**, Market Prices. **11.0** Talk for Farmers. **11.20**, Time; News. **11.30**, Announcements; Records. **12 Noon**, Concert by the Small Station Orchestra; Conductor, Kloss: Overture, Donna Juanita (Suppé); Two Pieces (Schumann): (a) Abendlied, (b) Träumerei; Waltz, Die Romantiker (Lanner); Gavotte and Minuet (Gossec); Scene from Li-Tai-Pe (Franckenstein); Ballad and Polonaise (Vieuxtemps); Waltz, Liebesspiele (Rust); Polish Dance (Scharwenka); Hungarian Potpourri (Leopold); Love Song (Becce); Waltz Serenade (Rezniczek); Strauss Operetta Potpourri (Schlögel). In the interval at **1.15**, Time; News. **2.0**, News. **2.20**, (from **Nürnberg**), Recital by Pogner (Violin) and Laura Gagstetter (Pianoforte). **3.0**, Reading. **3.30**, Programme for Women. **3.50**, Weather. **4.0**, Concert by the Small Station Orchestra; Conductor, Kloss: Overture, The Arabian Nights (Joh. Strauss); Scene from Sheherezade (Rimsky-Korsakov); Suite, Truderinger Kirchweih (Rüdinger); Marien-Walzer (Lanner); Selection from Der Bettelstudent (Millöcker); Two Pieces (Raff): (a) Cavatine, (b) Rigaudon; Gavotte caprice (Bortkiewicz); Polka, The Canary (Poliakin). **5.30**, Report from Gorodok, Serbia. **5.50**, Concert of Shakesperian Music; Chamber Orchestra; Soloists, Margret Langen (Contralto), Weiler (Harpsichord), Döbereiner (Viola da Gamba), Donderer (Trumpet), Franziska Liebing (Commentary): Pavina Lacrimae verae (Dowland); Songs: (a) Sweet Nymph, come to thy Lover (Morley) (b) What if I seek for Love (Jones), (c) Woeful Heart with Grief oppressed (Dowland); Sonnet No. 8 (Shakespeare); Songs (Dowland): (a) Come again, (b) Fine Knacks for Ladies; Music to A Midsummer Night's Dream (Purcell). **6.30**, Talk: Superstition. **6.50**, Time; Weather; Programme for Farmers. **7.0**, See **Stuttgart. 8.0**, News. **8.10**, Folk Music by the Isarkinder Zither Club. **8.45**, What's the Matter with Mr. Insull?—Sequence (Wanninger); Incidental Music by Kusche. **10.0**, Time; News. **10.20**, Programme to be announced. **11.0** (from **Nürnberg**), Serenade by Josef Schwarz Orchestra. **12 Midnght** (approx.), Close Down.

NAPLES.—Relays **Rome. NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres**; and **Jelöy, 6,990 kc/s, 42.92 metres.**—**10.0 a.m.**, Market Prices. **11.15**, Service. **11.50**, Exchange. **12.45 p.m.**, News. **12.55**, Nauen Time Signal. **1.0 to 2.0**, Records. In the intervals, Weather; Report for Farmers and Exchange. **5.0**, Orchestral Concert. **6.0**, Talk. **6.30**, Service. **7.0**, Announcements. **7.15**, Weather;

AUG. 23rd THURSDAY *continued*

AUG. 23rd THURSDAY continued

News. 7.30, Time. 7.31, German Operetta Music on Records. 7.45, Talk for Farmers. 8.15, See **Vienna.** In the interval, Topical Talk. 10.0, Weather; News. 10.15, Humorous Recitations.

OSTERSUND.—Relays **Stockholm.**

PALERMO

565 kc/s, 531 metres; 4 kW.—**12.45 p.m.,** News. **1.0 to 2.0,** Concert. In the interval at **1.30,** Time; News; Weather. **5.30,** Records. **6.0 to 6.30,** Balilla Programme. **8.0,** Announcements; Programme for Farmers; News. **8.20,** Records. In the interval at **8.30,** Time; News. **8.45,** Symphony Concert. Conductor: Russo. Two Pieces (Malipiero): (a) Toccata di Frescobaldi, (b) Orfeo di Monteverde; Two Pieces from Quadri rustici (Sonzogno): (a) Idillio montano, (b) Bettibecchi; Fugue and March from Il Favorito del Re (Verreti); Symphony in E Flat from the New World (Dvorák). In the interval, Art Review and Topical Talk. After the Concert, Records. **11.0,** News.

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 a.m.,** Press Review; News. **10.15,** Concert from **Vichy. 12 Noon,** Tourist Report. **12.15 p.m.,** Records. **1.0,** News. **1.15,** Concert relayed from **Grenoble, 968 kc/s (309.9 m.). 4.0,** Records. **6.0,** Art and Literary Review. **6.30,** News. **7.45,** Talk: Social Hygiene. **7.53,** Talk. **8.0,** Announcements. **8.10,** Records. **8.15,** See **Vienna.** After the Programme, News.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.10 a.m.,** Fanfare; Records. In the intervals at **7.30** and **8.30,** News. **8.45,** Cookery Talk. **12.5 p.m.,** Records. **12.15,** Interlude by Kito the Clown. **12.25,** News. **12.35,** Records. **1.0,** Exchange. **1.10,** Records. In the interval at **1.20,** Exchange. **2.0,** Exchange. **3.15,** Exchange. **3.45,** Exchange. **6.45,** Exchange. **6.49,** Records: Extracts from Petrushka (Stravinsky). **7.10,** News. **7.30,** Records. **8.0,** Talk. **8.5,** Interval. **8.15,** Serenades: Vergebliches Ständchen (Brahms); Ständchen (Strauss); Ständchen (Schubert); Italian Serenade (Chausson); Florentine Serenade (Duparc). **8.40,** Exchange. **8.55,** Concert by the Georges Léoni Viennese Orchestra. **9.40,** Interval. **9.50,** Concert of Audran Operetta Music: Selection from Le Grand Mogol, La Mascotte, Gillette de Narbonne, La Cigale et la Fourmi, Miss Decima and L'Oncle Célestin. **10.28,** News. **10.30** till Close Down, Programme in English arranged by the International Broadcasting Company of London. **10.30,** Variety Concert on Gramophone Records. **10.45,** Modern Music. **11.0,** I.B.C. Goodnight Melody and Close Down.

PARIS

RADIO PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.,** Gym. **7.0,** Records. **7.15,** News. **7.45,** Gym. **8.0,** Records. **10.15,** Concert from **Vichy:** March (Komzak); Au temps jadis (Gabriel Marie); Ronde villageoise (Gabriel Marie); Overture, Il sognondi Scipione (Mozart); Les clairs de lune (Koechlin); Meditation (Renaud); Selection from Là-Haut (Yvain); Scènes de fête au quartier chinois (Gauwin); Chinese Legend (Dorson); The Vision of Salomé (Joyce). **12 Noon,** Protestant Address. **12.30 p.m.,** Concert by the Victor Pascal Orchestra: Serenade (Rudd); Moresca (Silesu); Cuckoo (Jonasson); Piece (Ray); Pianoforte Solo; The Match Parade (Wehle); Canzonetta (d'Ambrosio); J'ai rêvé d'une fleur (Scotto); Jota aragonesa (Albéniz); 'Cello Solo; Two-Step (Calvette); Qu'avez vous fait de mon amour (Tibor); Czardas (Leoni); Le mariage des roses (Franck); Violin Solo; Piece (Schlögel); Minuet (Beethoven); Intermezzo, Hochzeitszug in Liliput (Translateur); Spanish Caprice (Espinosa); Amorettentänze (Gungl). In the interval at **1.30,** Exchange; News. **3.45,** Exchange. **5.0,** Le chandelier—Comedy in Three Acts (de Musset), followed by Quitte pour la Peur—One Act Play (de Vigny). **7.0,** Programme for Farmers; Exchange; Racing Results. **7.10,** Talk: The Poems of Sully Prudhomme. **7.20,** German News. **7.30,** Topical Talk. **8.0,** Concert of Chamber Music by the Station Quartet and Soloists: Lucienne Radisse ('Cello), Yvonne Galli (Recitations), Héléna Sadoven (Songs), and Léon Kartun (Pianoforte); Sonata No. 1 for 'Cello and Pianoforte (Bach); Songs; Recitations; Pianoforte Solos: Heures Juveniles (Delvincourt); Songs; Quartet in G minor (Brahms). In the intervals at **8.30** and **9.15,** News. **10.30,** Dance Music.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres** and **25.27 metres.**—**3.0 p.m.,** Edward MacHugh. **3.15,** Castles of Romance. **3.30,** To-day's Children. **3.45,** News; Cooking School. **4.0,** U.S. Navy Band. **4.30,** Hazel Arth (Contralto). **4.45,** Al and Lee Reiser. **5.0,** Soloist. **5.15,** Fields and Hall. **5.30,** Vic and Sade. **5.45,** Hotel William Penn Orchestra. **6.0,** Market Reports. **6.15,** Hon. Archie and Frank. **6.30,** Farm and Home Hour. **7.30,** KDKA Home Forum. **8.0,** Musical Keys. **8.30,** Roy Shield's Orchestra. **8.45,** State Federation Pa. Women. **9.0,** Betty and Bob. **9.15,** Alice Joy. **9.30,** Business News and Markets. **9.45,** Chicago Symphony Orchestra. **10.15,** KDKA Kiddies' Klub. **10.30,** To be announced. **10.45,** Orphan Annie. **11.0,** Time; Temperature; Weather. **11.14,** Baseball Resumé. **11.30,** O'Leary's Irish Minstrels. **11.45,** Lowell Thomas. **12 Midnight,** Dan and Sylvia. **12.10 a.m. (Friday),** News. **12.15,** Lois Miller (Organ). **12.30,** Ed. Lowry. **12.45,** Frank Buck. **1.0 to 6.0 a.m.,** Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 a.m.,** Gym.; Music; News. **7.15,** Interval. **10.0,** Record. **10.5,** News. **10.20,** News in German. **10.25,** Records. **11.5,** Concert of Light Music by Fleischans' Chamber Orrhestra. Concert Waltz (Lehár); Symphonic Poem (Potter); Violin Solo, Variations on a Theme of Corelli (Tartini-Kreisler); Valse triste for Saxophone (Veczey); Overture, The Secret (Smetana); Russian Song Potpourri (Wilke); Polka (Braune); Gallop (Dittrich); Slav Dance No. 3 (Dvorák); Tango (Straub). **12 Noon,** Market Prices; Weather. **12.5 p.m.,** Records. **12.20,** News. **12.30,** See **Moravská-Ostrava. 1.30,** Talk: Economics. **1.40,** Records. **1.50,** Exchange. **1.55,** Exchange and Weather in German. **2.0,** Interval. **3.15,** Concert by the Station Orchestra. Conductor, Parik. Orava Rhapsody (Smatek); Intermezzo Op. 147 (Roob); Elegy for Strings (Jindrich); Jeux d'enfants (Bizet). **4.15 to 4.20,** Exchange; Weather. **5.40,** Announcements. **5.45,** Programme for Farmers. **5.55,** Record. **6.0,** Talk for Workers. **6.10,** German Transmission: Sketch (Beck-Utis); **6.55,** Agricultural Review and Talk. **7.0,** Time; News. **7.10,** Programme for Children. **7.35,** Topical Talk. **7.50,** See **Brno. 8.10,** Talk on the following Relay. **8.15,** See **Vienna. 10.0,** Time; News. **10.15,** Concert by the Herman Schrammel Quartet. **10.45,** Records. **11.0,** Close Down.

REYKJAVIK

208 kc/s, 1,442 metres; 16 kW.—**12 Noon,** Weather. **2.15 p.m.,** Variety Programme. **5.0,** Weather. **9.10,** Weather. **9.25,** Music. **9.50,** Announcements. **10.0,** Time; Concert by the Station Orchestra. **10.30,** Reading. **11.0,** News. **11.30,** Pianoforte Records: Dance Music. **12.30 a.m. (Friday)** (approx.), Close Down.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan (No. 2), 1,348 kc/s, 222.6 metres; Turin (No. 2), 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.**—**7.30 a.m.,** Gym. **7.45,** Time; News. **12.30 p.m.,** Records. **1.10 to 2.15,** See **Milan.** In the Interval at **1.30,** Time; News; Exchange. **4.30,** Children's Radio Review. **4.50,** News. **5.0,** Concert; Jolanda Landi (Pianoforte); Virginia Brunetti (Soprano); Maria Soccorsi (Mezzo-Soprano); and Pinova (Songs): Sonata No. 5 in C (Galluppi); Duets: (a) Due labbra di rose (Rossi); (b) Ecco l'amore (Perez); (c) Nocturne (Rossini); (d) L'étoile du nord (Meyerbeer); Pianoforte Solos: (a) Intermezzo (Granados); (b) Asturias (Albéniz); Modern Songs. **5.55,** Weather. **6.0,** Wheat Market Prices. **6.10** (Naples), Talk. **7.0,** Tourist Report; Dopolavoro Notes. **7.15,** News in Foreign Languages. **8.0,** Time; News. **8.10,** Records. **8.30,** Government Notes. **8.45,** Primarosa—Operetta in Three Acts (Pietri); Conductor, Josi. In the Intervals, Talk: Italian Painting and Sculpture; Theatre Notes. After the Operetta, News.

RUYSSELEDE

10,330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.,** News in French. **8.0,** See **Brussels No. 2. 8.15,** See **Vienna. 8.50,** Overture, Si j'etais Roi (Adam), on Records. **9.0,** News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by **W2XAF** on **31.48 metres** and by **W2XAD** on **19.56 metres.**—**7.0 p.m.,** Dreams Come True. **7.15,** Upstaters Quartet. **7.30,** Woman's Radio Review; Talks; Orchestra. **11.35,** Exchange. **12 Midnight,** Concert by Rudy Vallee's Orchestra. **1.0 to 3.0 a.m. (Friday),** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW; and **Geneva, 401 kc/s, 748 metres.**—**12.29 p.m.,** Time from Neutchatel Observatory; News. **12.40** (from **Geneva**), Records. **1.0,** Exchange. **1.5** (from **Geneva**), Records (contd.). **2.8,** Interval. **3.59,** Time from Neuchatel Observatory. **4.0** (from **Geneva**), Concert by the Station Orchestra; Conductor, Echenard. **4.45,** Mussorgsky Song Recital by Mme. Tatiana Poberezska: Serenade, Down the Don, The Magpie, Berceuse, Mushrooming, Hebrew Song, The Orphan, Peasant Cradlesong, The Field Marshal. **5.15,** Concert (contd.). **6.0,** Programme for Children. **6.30** (from **Geneva**), Records. **7.0** (from **Geneva**), Programme for Mountaineers. **7.30,** Sports Notes. **7.59,** Weather. **8.0,** Music Anecdotes. **8.15,** See **Vienna;** in the interval, at **9.0,** News. **10.0** (from **Geneva**), Dance Records.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.**—**7.45 a.m.,** Service. **8.0,** Weather. **12.30 p.m.,** Weather. **12.45,** Exchange. **12.55,** Time Signal. **1.0,** Concert of Light Music from **Göteborg. 2.0,** Talk relayed from **Malmö, 1,312 kc/s, 228.7 metres. 2.20,** Programme of Old Dance Music. **3.0,** Interval. **5.0,** Weather. **5.5,** Service. **5.30,** Song Recital by Lisa Axelsson. **5.45,** Records. **6.45,** Talk. **7.15,** Weather; News. **7.30,** Talk relayed from **Malmö. 8.0,** Reading. **8.15,** See **Vienna.** In the Interval, Talk: Salzburg. **10.0,** Weather; News. **10.15,** Concert of Light Music: March from Athalia (Mendelssohn); Berceuse (Gunnar); Piece (Hillfors); Selection from Dalibor (Smetana); Tango (Mariotti); Selection from Nina Rosa (Romberg). **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.15 a.m.,** Orchestral Concert, relayed from **Vichy;** Conductor, Dorstène. **11.30,** Records. **12.45 p.m.,** News. **1.0,** Time; Exchange. **1.5,** Orchestral Concert; Conductor, de Villers: Selection from Les noces de Jeannette (Massé); Waltz, Tout Paris (Waldteufel); Spanish Dance (Granados); Slav Dance (Dvorák); Ballet Suite, Mascarade (Lacôme); Hungarian Rhapsody No. 2 (Liszt); March (Helmer-Krier). **2.0 to 3.0,** Programme for Children. **3.30,** Orchestral Concert, relayed from the Casino Park, Vichy. **4.45,** Records. **5.0,** Orchestral Concert of French Operetta Music; Conductor, Roskam: Overture, Les Saltimbanques (Ganne); Selection from (a) La Poupée (Audran), (b) Le jour et la nuit (Lecocq); Overture, Rip van Winkle (Planquette); Selection from (a) Passionnément (Messager), (b) Phi-Phi (Christiné), (c) Là-Haut (Yvain). **6.0** Talk in German: French Achievements in North America. **6.15,** History Talk: Vincent de Paul. **6.30,** Orchestral Concert; Conductor, Roskam: Overture, Madame Favart (Offenbach); Waltz Potpourri (Robrecht); Sérénade à l'amour (Filipucci); Foxtrot (Mewer-Ager-Schwartz); Selection from François-les-bas-bleus (Messager); Tango (Roter-Rubans-Grothe); Clarinet and Pianoforte: Petite Pièce (Bode); Foxtrot (Moraweck); Intermezzo (Armandola). **7.15,** Lottery Results; Announcements. **7.30,** Time; News. **7.45,** Press Review in German. **8.0,** See **Vienna. 10.30** (approx.), Close Down.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.35 a.m.,** Programme for Farmers. **5.45,** Hymn; Motto; Time; Weather. **5.50,** Gym. **6.15,** Records. **6.40,** Time; News. **6.55** (from **Karlsruhe**), Concert by the Philharmonic Orchestra; Conductor, Zehn. **8.10,** Weather. **8.15,** Gym. **8.35,** Interval. **9.0 to 9.15,** Programme for Women. **10.0,** News. **10.10,** Kinderszenen (Schumann), on Records. **10.25,** Records. **11.25,** Post Office Programme; Records. **11.40,** Talk: How Germany can become Self-supporting. **11.55,** Weather. **12 Noon,** Concert of Light Music by the Willi Bara Orchestra: Waltz, Brune ou Blonde (Waldteufel); Overture, Masaniello (Auber); Selection from The Gypsy Baron (Joh. Strauss); Violin Solo: Improvisation (Butz); Humoresque (Dvorák); Suite, Impressioni d'Oriente (Amadei); Bella Venezia (Schulenburg); Du bist meine grosse Leidenschaft (Kirchstein); Wie duften so süss die Linden (Heumann); Overture, Der Froschkönig (Rust). **1.0 p.m.,** Time; Local News. **1.5,** News. **1.20,** Records. **1.50,** Time; News. **2.0 to 2.30,** Records. **3.0,** King Drosselbart—Play for Children (Nothardt), after the Fairy Tale by Grimm. **4.0,** See **Berlin (Deutschlandsender). 5.30,** Microphone Visit to a Spa. **6.0,** Talk: Robert Koch. **6.15,** Talk: Ethnology. **6.25,** Spanish Lesson. **6.45,** Time; Weather; Programme for Farmers. **7.0,** Sunburn — Humorous Programme, arranged by Karl Köstlin. **8.0,** News. **8.10,** Local News. **8.20,** Opera Music on Records. **9.20** (from **Mannheim**), Variety Programme. **10.0,** Military Programme. **10.20,** Time; News. **10.35,** Announcements. **10.45,** News. **11.0,** See **Munich. 12 Midnight,** Serenade. **1.0 a.m. (Friday),** Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.,** Dance Refrains. **8.30,** News. **8.35,** Opera Music. **8.45,** Operetta Music. **12 Noon,** Light Music. **12.15 p.m.,** Music by a Viennese Orchestra. **12.30,** News. **12.45,** Request Programme. **1.0,** News. **1.5,** Cabaret Programme. **1.15,** Songs from Sound-Films. **1.30,** Operetta Airs. **1.45, Military Music. 2.0,** News. **6.0,** News. **6.15,** Opera **Arias. 6.30,** Orchestral Music. **6.45,** Popular Songs. **7.0,** Light Music. **7.15,** Songs from Sound-Films. **7.30,** News. **7.45,** Operetta Melodies. **8.15,** Pianoforte Recital. Waltz, Künstlerleben (Joh. Strauss); Fileuse près Carantec (Patou); Capriccio (Bach); La fille aux Cheveux de Lin (Debussy); Siberian Dance (Nin). **8.30,** Operetta Extracts. **9.0,** Acts I and II of Werther—Opera (Massenet). **10.25,** North African News. **10.35,** Acts III and IV of Werther (Massenet). **11.30,** Military Music. **11.50,** Popular Songs. **12 Midnight,** News. **12.5 a.m. (Friday),** Au Caveau de Minuit—Radio Fantasy. **12.15,** Operetta Music. **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo. TURIN.**—Relays **Milan.**

VATICAN CITY

15,120 kc/s, 19.84 metres; 10 kW. **(Morning); 5,970 kc/s, 50.26 metres (Evening).**—**11.0 to 11.15,** Religious Information in French. **8.0 to 8.15,** Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz,** and **Salzburg, 1,294 kc/s, 231.8 metres.**—**9.0 a.m.,** News. **10.50,** Water Level. **11.30,** Talk: Austrian Monasteries. **11.55,** Weather. **12 Noon,** Concert by the Vienna Symphony Orchestra; Conductor, Schönherr; Soloist, Karl Rosner (Violin): Overture, Der Hexenspiegel (Eysler); Violin Solos: (Reckteswald): (a) Romance, (b) Serenade; Quellennixenreigen (Klein); Melody and Minuet (Paderevski); Selection from Boris Godunov (Mussorgsky); Prelude to Faust (Gounod). **1.0 p.m.,** Time; News. **1.10,** Concert by the Vienna Symphony Orchestra; Conductor, Schönherr: Selection from Ritter Pasman (Joh. Strauss); Two Airs from Bub oder Mädel (Granichstaedten); Divertissement from Fall's Dollar Princess (Fétras); Two Airs and Overture from A Waltz Dream (O. Straus). **2.0,** Announcements. **2.10 to 2.30,** Records. **3.30,** Time; Weather; Exchange. **3.50,** Talk for Unemployed Youth. **4.10,** News. **4.15,** Readings for Children. **4.40,** Soprano Song and Pianoforte Recital by Lili Bara and Marietta Stiotta; Part 1, Songs: Canzonetta de concert (Haydn); Neue Liebe (Mendelssohn); Ich kann's nicht fassen (Schumann); Mädchen spricht (Brahms); Two Old Songs; Part 2, Pianoforte: Three Etudes in E major, F minor and A minor (Chopin). **5.10,** Talk: The Desert. **5.20,** Talk. **5.45,** Talk: The International Film Exhibition at the Vienna Autumn Fair. **5.55,** Records: Operetta Music. **6.40,** Talk: Christian Philosophy. **7.5,** Time; News. **7.25,** Weekly Review. **7.55,** Topical Talk. **8.15,** Symphony Concert relayed from the Festspielhaus, **Salzburg;** The Vienna Philharmonic Orchestra; Conductor, Toscanini: Symphony in D (Mozart); Variations on a Haydn Theme (Brahms); Symphony No. 7 in A (Beethoven). **10.5,** Concert by the Vienna Symphony Orchestra; Conductor, Schönherr: Fantasia, Bayreuther Visionen (Fucik); Polonaise (Bass); Andante from the Violin Concerto in minor (Roehrling); Suite (Recktenwald); Waltz, Frühlingsstimmen (Joh. Strauss); Mit hat amal vom Himmel trant (Kratzl); Das Glück is a Vogerl (Kratzl); Selection from Donauliebchen (Eysler); Hietzinger-Marsch (Eysler). In the Interval at **10.30,** News. **11.45,** Records. **1.0 a.m. (Friday),** Close Down.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.,** Hymn. **6.35,** Records. **6.38,** Gym. **6.53,** Records. **7.5,** News. **7.10,** Records. **7.20,** Hints for Housewives. **7.25,** Programme Announcements. **7.40,** Interval. **11.57,** Time. **12 Noon,** Fanfare from St. Mary's Church, Cracow. **12.3 p.m.,** Weather. **12.5,** Polish Press Review. **12.10,** Orchestral Concert, relayed from **Cracow, 986 kc/s (304.3 metres). 1.0,** News. **1.5,** Programme for Children. **1.20,** Records. **2.0,** News. **2.5,** Economic Notes. **2.15,** Interval. **4.0,** Musical Programme. **4.45,** Records. **5.0,** Letterbox. **5.15,** Chamber Music relayed from **Cracow. 6.0,** Talk. **6.15,** Dramatic Programme, relayed from **Lwów, 795 kc/s (377.4 metres). 7.0,** Announcements. **7.15,** Dance Music from the Gastronomja Café. **7.50,** Sports Notes. **8.0,** Great Thoughts. **8.2,** Theatre Revue. **8.12,** Orchestral Concert. Conductor: Gorzynski. Soloist: Laskowski (Songs); Overture (Lincke); Three Songs; Waltz (Volstedt); Two Songs; March (Blon). **8.50,** News. **9.0,** Fanfare. **9.2,** Notes for Farmers. **9.12,** Concert by a Station Orchestra. Conductor: Oziminski. Soloist: Wraga (Songs). March from The Prophet (Meyerbeer); Selection from La Juive (Halevy); Arias from Don Carlos (Verdi) and Lakmé (Delibes); Ballet Music from William Tell (Rossini); Aria from The Barber of Seville (Rossini); March from A Midsummer Night's Dream (Mendelssohn). **10.0,** Science Talk, relayed from **Cracow. 10.15,** Dance Music. **11.0,** Weather.

ZURICH.—Relays **Beromünster.**

FRIDAY
AUGUST THE TWENTY-FOURTH

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.**—**1.30 to 2.30 p.m.,** Time; Exchange; Weather; Records. **6.0,** Programme for Children. **6.45,** News. **7.0,** Literary and Dramatic Talk by Aod de Blacam. **7.15,** Gabriel Fallon (Anglo-Irish Poetry). **7.30,** Time. **7.31,** Irish Music by the Station Ensemble. **8.0,** Music of Irish Composers by Violet Pearson (Soprano). **8.15,** Music by the Station Ensemble. **8.45,** J. Ferguson (Tenor). **9.0,** Talk by P. O'Caoimh, Secretary of the Gaelic Athletic Association: The Irish Hurdling Final. **9.10,** Drama—presented by E. Young and Company. **9.40,** F. McCann (Accordion). **9.50,** P. McDonagh (Traditional Fiddle). **10.0,** Variety Programme. **10.30,** Time; Weather; News. **10.40,** Records. **11.0** (approx.), Close Down.

BASLE.—Relays **Beromünster.**

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.20,** See **Hamburg. 7.0,** News. **7.10,** See **Hamburg. 8.0,** Interval. **8.45,** Gym. for Women. **9.0,** Folk Songs. **9.40,** Reading. **10.0,** News. **10.10,** Report from the Ruhr Coalfields. **10.50,** Gym. for Schools. **11.15,** Weather. **11.30,** Interval. **11.55,** Weather. **12 Noon,** See **Stuttgart. 12.55 p.m.,** Time. **1.0,** Song Records; Weather. **1.45,** News. **2.0,** Interval. **2.45,** Greetings; Announcements. **3.0,** Weather; Exchange. **3.15,** Programme for Women. **3.40,** Records of Giannini and Gigli; Italian Serenades. **4.0,** See **Munich. 5.30,** Topical Talk. **5.40,** Reading. **6.10,** Pianoforte Trio (von Paszthory), the Composer at the Pianoforte. **6.40,** Recital of Pianoforte Music for the Left Hand by Rudolf Horn: Prelude and Fugue (Reger); Russian Wedding Song (Bortkiewicz). **6.55,** A Poem; Weather. **7.0,** Talk on Records: Frontier Towns. **8.0,** Motto; News. **8.10,** See **Breslau. 10.0,** Political Report (on Records). **10.25,** News. **10.45,** Weather. **11.0,** Concert from **Breslau. 12.55 a.m. (Saturday),** Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Hymn; Gym. **6.15,** Weather; Meditation. **6.20,** See **Hamburg. 7.0,** News. **7.10,** See **Hamburg. 8.0,** Gym. **8.20,** Records; Announcements. **9.0,** See **Berlin (Deutschlandsender). 9.40,** Programme for Women. **10.0,** News. **10.10 to 10.25,** Market Prices. **11.25 to 11.30,** Exchange. **12 Noon,** See **Hamburg.** In the interval at **12.30 p.m.,** Weather. **1.0,** News. **1.15,** Records. **2.0,** News. **2.15 to 6.0,** Programme from **Breslau.** In the interval at **3.0,** Exchange. **6.0,** Announcements. **6.5,** Book Review. **6.30,** Shoeck and Pfitzner Song Recital by Hans-Joachim Andresen (Baritone); Four Songs (Schoeck): (a) Ravenna, (b) Keine Rast, (c) Das Ziel, (d) Im Kreuzgang von St. Stefano; Four Songs (Pfitzner): (a) Wie Frühlingsahnung geht es durch die Lande, (b) Hast du von den Fischerkindern, (c) Ich und du, (d) Nachts. **7.0,** Topical Talk. **7.10,** Journalism a Hundred and Fifty Years ago—Sequence (Heinrich Boltze). **7.25,** Echoes of the Day. **7.45,** Political Review. **8.0,** News. **8.10,** Over the Waves—Concert from the Seeschloss Pichelsberge; Trumpeters, the Berlin Glee Club, the Small Station Orchestra, and Soloists; Conductor, Steiner. **10.20,** News. **10.50,** Cabaret with Dance Music (on Records). **1.0 a.m. (Saturday),** Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**6.15 to 5.30 a.m.,** Gym. **12 Noon,** Records: The Moldau (Smetana). **12.29 p.m.,** Time from Neuchâtel Observatory. **12.30,** News. **12.40,** Light Music. **1.25,** Time; Weather; Exchange. **3.30,** Dance Records. **3.59,** Time from Neuchâtel Observatory. **4.0,** Dance Music of the Nations by the Station Orchestra. **5.20,** Light Music. **6.0,** Programme for Children. **6.30,** Concert by an Accordion Band. **7.0,** Time; Announcements. **7.20,** Talk: Arabia. **7.50,** Choral Concert. **8.30,** Light Music. **9.0,** News. **9.10,** Symphony No. 21 in A (Haydn), by the Station Orchestra; Conductor, Gilbert. **9.30,** Recital of Twelve Chorales by Arthur Köst (Baritone). **10.15** (approx.), Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian. **10.30,** See **Moravská-Ostrava. 11.0,** Water Level. **11.5,** Record. **12.10 p.m.,** News in Slovak. **12.15,** Record. **12.20,** See **Prague. 1.40,** News and Weather in German and Hungarian. **1.50 to 2.0,** See **Prague. 3.15,** See **Moravská-Ostrava. 4.15 to 4.20,** See **Prague. 5.40,** Records. **5.50,** Talk: Modern Slovak Painters. **6.0,** Sports Notes. **6.10,** Hints for Housewives. **6.15 to 6.55,** Hungarian Transmission: Topical Talk; Song Recital by Zach; Reading. **6.55,** See **Prague. 7.10,** See **Moravská-Ostrava. 8.0,** Talk: The Danube Sample Fair. **8.15,** See **Prague. 10.45,** News in Hungarian. **11.0** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.**—**5.0 a.m.,** Hymn; Motto. **5.10,** Records. In the interval at **5.40,** Time; Weather. **6.0,** Time; Weather; Gym. **6.25,** Concert by the Halle Chamber Orchestra; Conductor, Zschiesing. **7.0,** Time; News. **7.10,** Concert (contd.). **8.0,** Cookery Talk. **8.10,** Records. **8.40,** Gym. for Women. **9.0,** Time; News. **10.10 to 10.40,** Programme for Schools. **11.30,** Time; News. **12 Noon,** Records. **1.0 p.m.,** Post Office Propaganda; Records. **1.30,** Time; News. **2.0,** Programme for the Berlin Radio Exhibition: The Station Orchestra, the Waldenberg and Bad Salzburn Orchestra, and Peasant Ensembles; Conductor, Prade. **6.0,** Topical Report. **6.20** (from **Gleiwitz**), Programme for Young People: Castles and Strongholds of Upper Silesia. **6.50,** Announcements; Report for Farmers. **7.0,** Mount Zobten—Sequence (Schenke and Wenzel), with Music by Sczuka. **7.45,** See **Berlin (Funkstunde). 8.0,** News. **8.10,** Silesian Programme for the Berlin Radio Exhibition: Orchestras, Peasant Ensembles, Dance Band, Choir and Soloists; Conductor, Prade. In the interval at **10.20,** Time; News. **2.0 a.m. (Saturday),** Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 10.30,** See **Moravská-Ostrava. 11.0,** See **Prague. 1.30 p.m.,** Social Notes. **1.40 to 2.0,** See **Prague. 3.15,** See **Moravská-Ostrava. 4.15 to 4.20,** See **Prague. 5.40,** Hints for Housewives. **5.45,** Record. **5.50,** See **Bratislava. 6.0,** Records. **6.20,** German Transmission: Sports Notes; Talk. **6.55,** See **Prague. 7.10,** See **Moravská-Ostrava. 8.0,** Talk: The Origin of the Nazdar Troop in Russia. **8.15,** Concert by a Salon Trio. **8.40,** See **Prague. 11.0,** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Orchestral Concert of English and American Music. March, Stars and Stripes (Sousa); Overture, Maritana (Wallace); Two Symphonic Rhapsodies (Coates); Carillon (Elgar); Selection from Tip-Toes (Gershwin); Negro Lullaby (Clutsam); Fanciful Etchings (Ketelbey). **1.0 p.m.,** News. **1.10,** Records. In the interval, Songs by Berthe Moortgat. **2.0,** Interval. **4.55,** Announcements. **5.0,** Nicolas Daneau Concert. Prelude to Linario; Walloon Caprice; Extracts from the Petite Suite for Strings; Remembrance; Prelude to Act IV of Myrthys; Adima et Heva; Mardi-gras. **6.0,** Talk: Motor Cars. **6.15,** Request Records. **6.30,** Sketch. **7.0,** Recitations with Pianoforte Accompaniment. **7.15,** Talk: The Flight of Insects. **7.30,** Legal Talk; Literary Review. **8.0,** Programme for Ex-Servicemen. **10.0,** News. **10.10,** Request Records. **10.25,** Dance Records. **11.0,** La Brabançonne.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW.—Programme in Flemish. **11.57 a.m.,** Weather. **12 Noon,** Records. **1.0 p.m.,** News. **1.10,** Orchestral Concert. Soloist: Loos (Songs); Suite, At the Circus (Armandola); Waltz, Unter den Linden (Jos. Strauss); Selection from A Waltz Dream (O. Straus); Songs; Overture (Luigini); Con sordina (Crabbe); Polka (Strauss). **2.0,** Interval. **4.55,** Announcements. **5.0,** Concert by the Radio Orchestra: Woodland Pictures (Fletcher); Suite rustique No. 2 (Gilson); Miniature Suite (Coppola); Selection from Die Teresina (O. Straus); Suite ancienne (Lacôme); Schubert Potpourri (Ralf); Ballet Music, Coppélia (Delibes). **6.0,** Les Erynnies (Massenet) and Pictures from an Exhibition (Mussorgsky-Ravel), on Records. **7.0,** Economic Review. **7.15,** Overture and Selection from Romeo and Juliet (Tchaikovsky). **7.30,** Wireless Notes. **8.0,** Concert by the Radio Orchestra. Soloist: Daisy Grace (Songs). Selection from Mascarade (Lacôme) and The Sleeping Beauty (Tchaikovsky); Songs from Aïcha (Lille-Vaxelaire) and A Waltz Dream (O. Straus); Suite, Americana (Turban). **8.40,** Recitation (Maurik). **9.0,** Concert relayed from the Casino, Knocke. **10.10,** News. **10.20,** Dance Music by the Lionel's Club Orchestra, relayed from **Blankenberghe.** Conductor: Clabeck. **11.0** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15,** Time; Weather; News. **1.40,** Records. **6.0,** Time; Weather. **6.5,** Concert by the Station Orchestra; Part I, Opera Music: Selections from Rigoletto (Verdi); Carmen (Bizet); The Queen of Spades (Tchaikovsky); Der Rosenkavalier (Strauss). **7.0,** Talk. **7.15,** Concert (contd.); Part II: Suite, Holiday Sketches (Foulds); Scandinavian Suite (Fredericksen); Prayer and Dance from Olaf Trygvason (Grieg). **8.0,** Talk. **8.15,** Violin Recital by Fliomen; La Guitare (Moszkowsky); Andante (Tchaikovsky); Introduction and Tarantella (Sarasate). **8.45,** Wireless Notes. **9.0,** French Song Recital by Nina Aurelina; Aria from Hérodiade (Massenet); Puisque l'aube grandit (Fauré); Green (Debussy); Sainte (Ravel); Three Songs from Le Bestiaire (Poulenc); Song (Honegger). **9.30,** Records. **10.0,** News. **10.30,** Programme relayed from the Piccadilly Restaurant.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym.; Records. **9.45,** News. **10.0,** Talk; Records. **12 Noon,** Chimes. **12.5 p.m.,** Concert by the Jároka Cigány Band. **1.30,** The Mándita Chamber Orchestra. **2.40,** Talk for Housewives. **3.30,** Programme for Students. **4.0,** Talk. **5.0,** Song Recital by Ica Leidenfrost. **5.40,** Medical Talk. **6.10,** Sports Notes. **6.35,** Concert by the Kalmár-Balázs Quintet relayed from the Café Rajna. **7.15,** Talk for Workers. **7.45,** Lecture Recital: The Less-known Pianoforte Pieces of Liszt. **8.45,** News. **9.0,** Concert by the Opera House Orchestra; Conductor, Rajter: Extracts from Bánk-Bán (Erkel); The Pearl-Fishers (Bizet); La Juive (Halévy); Eugene Onegin (Tchaikovsky). **10.15,** Weather. **10.20,** Records. **11.0,** Concert by the Csorba Cigány Band, relayed from the Hotel Britannia.

CASSEL.—Relays **Frankfurt.**

Little-known pianoforte works of Liszt will be broadcast from Budapest this evening. The photograph is of the Liszt memorial on the Budapest Musical Academy building.

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Hymn; Records. **6.5,** Gym. **6.25,** Talk for Housewives. **6.35,** Records. **6.50,** Time; News; Records. **8.0,** Time; Weather; Water Level. **8.5,** Gym. for Women. **10.0,** Time; News. **10.10,** Cinema Organ Solos. **10.30,** Topical Talks. **11.30,** Post Office Propaganda; Records. **12 Noon,** Concert by the Ruhrland Orchestra, from **Essen.** In the interval, at **12.45 p.m.,** Announcements; Greetings. **1.45,** Announcements. **2.0 to 2.45,** Chopin and Loewe Records. **3.15,** Talk: The National Socialist Régime. **3.30,** Exchange. **3.45,** Talk: A Visit to a Women's Agricultural College. **4.0,** Concert by the Station Schrammel Quartet. **4.30,** Karl Steinhauer Song Recital by the Rheingold Quartet. **5.0,** Reading. **5.15,** Concert by the Fröhliche Fünf: Schatzwalzer (Strauss); Birthday Serenade (Klose); Still wie die Nacht (Bohm); Potpourri (Fetras). **5.40,** Travelogue: From Hagen to Bad Wildungen. **6.0,** Talk: The Kraft durch Freude Society. **6.20,** English Conversation. **6.40,** Topical Talk. **6.50,** Exchange; Sports Report. **7.0,** Song and Pianoforte Recital by Elly Volkenrath (Soprano), Käte Erkert (Contralto), and Hans Haass: Soprano Solos, (a) Freudvoll und leidvoll (Beethoven), (b) Die Trommel gerühret (Beethoven), (c) In der Frühe (Wolf), (d) Erster Verlust (Schubert); Pianoforte Solo, Romance in F sharp (Schumann); Contralto Solos (Brahms), (a) An die Nachtigall, (b) O wüsst ich doch den Weg zurück, (c) Feldeinsamkeit, (d) Sandmännchen; Pianoforte Solo, Singende Fontäne (Niemann); Soprano Solos (Weismann), (a) Ritt zum Tajo, (b) In der Sierra, (c) Fieber, (d) Am Heiligenbild. (e) Reiselied. **7.45,** See **Berlin (Funkstunde). 8.0,** News. **8.10,** Concert of Operetta Music by the Small Station Orchestra; Conductor, Eysoldt; Soloists, Kläre Hansen (Soprano), Melitta Wittenbecher-Neumann (Soprano), and Friedrich Eugen Engels (Tenor). **9.30,** Talk: The Labour Struggle. **10.0,** Time; News. **10.20,** Film Review. **11.0,** Concert by the Station Chamber Orchestra; Conductor, Hartmann. **12 Midnight** (approx.), Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**11.30 a.m. to 12 Noon,** Programme in English, arranged by the International Broadcasting Company of London. **11.30,** Happy Half-Hour. Light Music. **12 Noon to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English by the I.B.C. **4.30,** Bournemouth, Weymouth, Southampton and Winchester Concert. Part 1, Glimpse Round the Kitchen. Part 2, Dance Music. **5.30,** Musical Comedy Memories. **6.0 to 11.0,** Programme in French. **11.0** till Close Down, Programme in English by the I.B.C. **11.0,** Talkie Time. Tunes from the Talkies and Shows. **11.30,** I.B.C. Member's Request Programme, compiled by Miss Barbara Ronald, of Burgess Hill, Sussex. A Channel Crossing. **12 Midnight,** Club Concert for Lowestoft Listeners. Dance Music. **12.30 a.m. (Saturday),** I.B.C. Time Signal. **12.31,** Dance Music. **1.0,** I.B.C. Goodnight Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.40,** Time; Announcements. **6.50,** Weather. **6.55,** Records. **8.10,** Water Level; Weather. **8.15 to 8.35,** Gym. **10.0,** News. **11.0,** Announcements; Records. **11.40,** Announcements; Exchange; Weather. **11.50,** Social Notes. **12 Noon,** Orchestral Concert; Conductor, Schum. **1.0 p.m.,** Time; News. **1.20,** Records: Folk Songs. **1.50,** Time; News. **2.0,** Records. **2.40,** Programme for Women. **3.20,** Weekly Art Review. **3.30,** Weather. **3.35,** Economic Notes. **3.50,** Time; Exchange. **4.0,** Concert of Light Music from **Glotterbad;** Conductor, Körner: March, Overture, Ilka (Doppler); Valse chromatique (Kockert); Leuchtkäferchens Stelldichein (Siede); Waltz, A Summer Evening (Waldteufel); March (Körner); Suite, Helvetia (Scassola); Overture, Morning, Noon and Night (Suppé); Oriental Ballet Suite (Popy); March. **5.30,** Literary Talk: Ewald Christian von Kleist. **5.45,** Recital of Operetta Songs by Helma Bohrmann (Soprano). **6.0,** Programme for Young People: Thomas Münzer—Play (René Wirtz). **6.25,** Talk on Astronomy. **6.45,** Weather; Exchange; Announcements; Time. **6.50,** Topical Talk. **7.0,** Folk Music by the Bockenheimer Mandoline Orchestra; Conductor, Ebert; Soloists, Grete Krüger (Soprano) and Karl Kleehammer (Guitar). **7.30,** The Kingdom of Heaven—Musical Sequence. **7.45,** See **Berlin (Funkstunde). 8.0,** News. **8.10,** See **Breslau. 9.0,** Marriage Customs of Four Centuries—Sequence (Marianne Westerlind). **10.0,** Literary Programme from **Kaiserslautern. 10.20,** Time; News. **10.35,** Local News; Weather; Sports Report. **10.45,** Programme to be announced. **11.0,** Scandinavia—Literary and Musical Sequence. **12 Midnight,** See **Stuttgart. 1.0 a.m. (Saturday),** Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg, and Hanover, 1,330 kc/s, 225.6 metres.**—**5.45 a.m.,** Time; Weather; Report for Farmers. **6.0,** Gym. **6.15,** Time; Weather. **6.20** (from **Kiel**), Orchestral Concert; Conductor, Döring. **7.0,** News. **7.10** (from **Kiel**), Concert (contd.). **8.0,** Weather; Talk for Housewives. **8.10,** Announcements; Records. **10.50,** News. **11.0,** The Fishes' S.O.S.—Play about the Chinese Crab Problem (Rudolf Kinau). **11.30,** Orchestral Concert; Conductor, Becker. **12 Noon,** Report for Housewives. **12.5 p.m.,** Time; Announcements. **12.15,** Concert (contd.). **1.0,** Exchange. **1.15,** Weather. **1.20,** Musical Programme. **2.15,** News. **2.30,** Records: Folk Music. **3.0,** Exchange. **3.40,** Shipping and Aviation Notes. **4.0,** See **Königsberg. 5.30,**

Talk: A Cruise to Norway. **5.45,** Musical Programme. **6.30,** Talk for Young People. **6.45,** Exchange. **6.55,** Weather. **7.0,** The Family Tree of a Factory Worker—Sketch (Paul T. Hoffmann). **7.45,** See **Berlin (Funkstunde).** **8.0,** News. **8.10,** Der lustige Krieg—Operetta in Three Acts (Joh. Strauss); Conductor, Secker. **10.0,** News. **10.20,** Musical Programme. **11.0,** Concert by the Zebisch Orchestra: Overture, Der Erlenhügel (Kuhlau); Prelude and Scenes from Der Evangelimann (Kienzl); Waltz, Die Glocken von St. Michael (Vollstedt); Indian Suite (Lüling); Intermezzo (Siede); Zigeunerständchen (Nehl); Ballet Suite (Armandola). **12 Midnight** (approx.), Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Kootwijk,** 50 kW., from **3.40 p.m.—7.40 to 9.40 a.m.,** Programme of the Workers' Radio Society (V.A.R.A.); Records. **9.40,** Religious Programme of the Liberal Protestant Radio Society (V.P.R.O.). **9.55 to 11.40,** V.A.R.A. Programme. **9.55,** Recitations. **10.10,** Organ Recital by Steyn. **10.40,** Recitations. **10.55,** Records. **11.40 to 3.40 p.m.,** Programme of the General Broadcasting Society (A.V.R.O.). **11.40,** Time; Records. **12.10 p.m.,** Concert of Light Music by the Kovacs Lajos Orchestra. In the Intervals, Records. **2.10,** Reading. **2.40,** Records. **3.40,** Interval. **3.55 to 7.40,** V.A.R.A. Programme. **3.55,** Records. **4.10,** Programme for Children. **4.40,** Concert by the V.A.R.A. Ensemble; Conductor, Bakels: March (Rosey); By the Sleepy Lagoon (Coates); He, Uch-la (Artok); Selection from Madame Sherry (Hoschna); Mazurka (Mlynarski); Selection from A Waltz Dream (O. Straus). **5.10,** Dance Music. **5.40,** Organ Recital by Jong. Selection from De Jantjes (Davids-Morris-Brookhouse); Solveig's Song (Grieg); There is a Home in Wyoming (Rose); Tausend Sterne leuchten (Rust). **6.0,** Records. **6.10,** Concert by the V.A.R.A. Orchestra; Conductor, de Groot. **7.10,** Talks and Records. **7.37,** S.O.S. Announcements. **7.40,** V.P.R.O. Programme: Religious Address. **8.10,** A.V.R.O. Programme. Concert by the Residence Orchestra, relayed from the Kurhaus, Scheveningen; Conductor, Carl Schuricht. In the interval at **8.40,** V.P.R.O. Talk. **9.55 to 10.40,** V.P.R.O. Programme; News; Church Notes. **10.10,** Recitations. **10.40,** V.A.R.A. Programme: Records. **11.40,** Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. (until **6.40 p.m.**); 20 kW. from **6.40 p.m.**—Programme of the Catholic Radio Society (K.R.O.). **7.40 a.m.,** Records. **8.55,** Interval. **9.40,** Records. **10.10,** Concert. **10.40,** Records. **11.10,** Programme for Invalids. **11.40,** Police Notes. **11.55,** Concert by Galatroni and his Soloists. **1.25 p.m.,** Interval. **1.40,** Organ and Song Recital by Evert Haak and Mile Tersteege (Soprano). **2.55,** Records. **3.10,** Pianoforte and Violin Recital by Mlle. Elsa Noltenius and Jan Helden. **4.25,** Records. **4.40,** Agricultural Talk. **5.10,** Concert by the KRO Boys: Hallo, daar is de KRO (de Leur); Moonlight on the Alster (Fetras); Piece (Brodzsky); Potpourri (Morena); Jazz-Echo (Golwyn); Rose-mousse (Bosc); Records; Hungarian March (Naef); Humoresque (Dvorak); Piece (Elliott); Andantino (Martini); Selection from Mariska (Lehár). **6.40,** Police Messages. **6.55,** Talk. **7.15,** Records. **7.25,** Concert by the KRO Boys: Paris en joie (Bastia); Potpourri (Dostal); Donausagen (Fucik); I wake up smiling (Leslie); Baby plays Soldiers (de Micheli); Finale. **8.10,** News. **8.15,** Records. **8.25,** Joh. Winnubst Commemoration Programme; The KRO Orchestra; Conductor, Haak; Soloist, Werner ('Cello); Adagio from the Symphony in E flat No. 3 (Beethoven); 'Cello Concerto (Winnubst). **9.10,** Records. **9.25,** Concert by the KRO Boys: March (Ertle); Hungarian Comedy Overture (Kéler-Béla); Blumengeflüster (v. Blon); In a Fairy Realm (Ketelbey); Donausagen (Fucik); Il pui hel sogno (Arezzo); Wien bleibt Wien (Schrammel). **10.10,** News. **10.15,** Records. **11.40** (approx.), Close Down.

INNSBRUCK.—Relays **Vienna.**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres;** and **Skamlebaek, 49.5 metres.**—**7.0 a.m.,** Gym. **7.27,** Weather. **8.30,** Service from Copenhagen Cathedral. **11.0,** Weather. **11.10,** Fish Prices. **12 Noon,** Chimes; Weather. **12.5 p.m.,** Concert by the Bendix String Ensemble, relayed from the Wivex. **2.0,** Interval. **2.40,** 'Cello Recital by Bernhard Madsen: Largo (Eccles); Adagio-Allegro (Boccherini); Pastorale (Couperin-Cassado); Scherzo (van Goens). **3.0,** Orchestral Concert from the Bellevue Strand Hotel. Conductor: Harald Andersen. **5.0,** Readings. **5.30,** Exchange. **5.45,** Talk: The Pygmies. **6.15,** German Lesson. **6.45,** Weather; Announcements. **7.0,** News. **7.15,** Time. **7.16,** Dialogue between the Mayor of Silkeborg and Jean Larsen: The Fireman's Regatta at Silkeborg. **7.30,** Medical Talk. **8.0** Time. **8.1,** Review by Per Knutzon. **8.10,** Concert of Polish Music by the Station Symphony Orchestra. Conductor: Tadescu Mazurkiewicz. Soloist: Irena Dubiska (Violin). A Winter's Tale (Moniuszko); Mona Lisa (Rozycki); Violin Concerto in A (Karlowicz). **9.0,** Talk: Polish Music. **9.15,** Records of Polish Music. Extracts from Halka (Moniuszko). **9.25,** Orchestral Concert (contd.). Mona Lisa (Rozycki); Stanislas and Anna Oswiecim (Karlowicz); Mazurka from Halka (Moniuszko). **10.16,** News. **10.25,** Dance Music from the Arena. In the interval at **12 Midnight,** Chimes. **12.30 a.m. (Saturday),** Close Down.

KIEL.—Relays **Hamburg. KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—**5.0 a.m.,** Records. **5.50,** Weather. **6.0,** Gym. **6.20,** See **Hamburg.** **7.0,** News. **7.10,** See **Hamburg.** **8.0,** Prayers. **8.30,** Gym. for Women. **9.0,** Talk in English: The English National Character. **10.40,** News. **11.0,** Concert for the Berlin Radio Exhibition. The Station Orchestra. Conductor, Wilcken. **12 Noon,** Records. **1.20 p.m.,** News; Records. **2.0,** News; Records. **2.30,** Post Office Propaganda; Records. **3.0,** Exchange. **3.15,** Programme for Children. **3.40,** Talk for Women. **4.0,** Concert by the Small Station Orchestra. Conductor, Wilcken. Ballet Suite, Sylvia (Delibes); Rhapsody No. 13 (Liszt); Romance (Haines); Im Zigeunerlager (Ferraris); Selection from The Bartered Bride (Smetana); March (Strauss); Tales from the Vienna Woods (Strauss); Potpourri (Reckvenner). In the Interval at **5.0,** Reading. **5.50,** Between Town and Country. **6.15,** Market Prices. **6.20, Dialogue. 6.45,** Weather. **6.50,** Flute and Pianoforte Recital by Walter Schulz and Adolf Schütz. Flute Suite (von Bartels); Beckelberger Suite in Old Style (von Zieritz). **7.20,** Topical Talk. **7.45,** See **Berlin (Funkstunde).** **8.0,** News. **8.10,** Military Band Concert. Conductor, Kraus. Part 1: March, Deutscher Gruss (Schifferl); Overture, Light Cavalry (Suppé); Wie berührt mich wundersam (Bendel); Selection from Der Bettelstudent (Millöcker); Russian Rhapsody (Heuser); March; Waltz on Themes from Der Obersteiger (Zeller); March (Ruprecht). **9.0,** News. **9.10,** Military Band Concert (contd.). Part 2: Three Centuries of Marches. **10.0,** News. **10.20,** See **Cologne. 12 Midnight** (approx.), Close Down.

KOSICE.—Relays **Prague. LAUSANNE.**—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden. 1,285 kc/s, 233.5 metres.**—**5.50 a.m.,** Notes for Farmers. **6.0,** Gym. **6.25,** Concert by the Halle Chamber Orchestra. **7.0,** News. **7.10,** Concert (contd.). **8.0,** Gym. **8.20 to 9.0,** Records. **9.40,** Exchange. **9.45,** Announcements. **10.10,** Programme for Schools. **11.0,** Announcements; Records. **11.30,** News. **11.40,** Weather. **11.50,** Programme for Farmers. **12 Noon,** Concert by the Leipzig Instrumental Quartet; Soloist, Erich Neumann (Cinema Organ): March, The Gladiators' Farewell (Blankenburg); Overture, Nakiris Hochzeit (Lincke); Das Zauberlied (Meyer-Helmund); Waltz, O Frühling, wie bist du so schön (Lincke); Der Jongleur (Groitzsch); Ein Morgen in Sanssouci (Kockert); Potpourri, Popular Songs of 1934 (Goldwyn); Intermezzo, Wedgwood Blue (Ketelbey); Rusticanella (Certopassi). **1.0 p.m.,** News. **1.10,** Records of Old Classical Music. **2.0 to 2.15,** News; Exchange. **2.40,** Talk for Women. **3.0,** Brahms Lieder Recital by Elizabeth Raymann Stein (Contralto). **3.35,** Exchange. **4.0,** (from **Dresden**), Concert by the Philharmonic Orchestra from the Weisser Hirsch; Conductor, Schestak: Overture, Banditenstreiche (Suppé); Moderner Orient (Rust); Meditation from Thäis (Massenet); Selection from Andrea Chenier (Giordano); Kaiser-Walzer (Joh. Strauss); Overture, Sicilian Vespers (Verdi); Rêverie (Vieuxtemps); Suite No. 1, from Carmen (Bizet); Mazurka from A Life for the Czar (Glinka); Potpourri (Yoshitome). **5.30,** Talk: Christian Ewald von Kleist, Soldier and Man of Letters. **5.50,** Exchange; Weather; Time. **6.0,** Talk: Freiherr von Shein as a Military Organiser. **6.20,** Specialities and Abnormalities — Humorous Play (Robert Vermes). **7.20,** Talk. **7.45,** See **Berlin (Funkstunde).** **8.0,** News. **8.10,** Concert by the Leipzig Symphony Orchestra; Conductor, Blumer; Soloists, Blumer and Weitzmann (Pianofortes), Krämer (Violin), and Patzak ('Cello): Aquarellen-Walzer (Jos. Strauss); Scherzo for 'Cello and Orchestral (van Goens); Tarantella in D (Liszt); Romance with Variations for Two Pianofortes, Op. 51 (Grieg); Overture, Djamileh (Bizet); Violin and Orchestra, Bourrée and Perpetuum mobile (Ries); Dudelsack Op. 30, for Eight Wind Instruments and Percussion Instruments (Nielsen); 'Cello and Pianoforte, Elf Dance (Popper); Violin and Orchestra, Dervishes' Dance (Zilcher). **9.10,** Hauptling Abendwind oder Das grauliche Festmahl—One-Act Play (Johann Nestroy). **10.20,** News. **11.0,** See **Cologne. 12 Midnight** (approx.), Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 150 kW.—**7.45 a.m.,** Records. **8.0,** News in French; Record; News in German; Record. **12 Noon,** Concert by the Station Orchestra; Conductor: Pensis; Overture, Stradella (Flotow); Waltz, Gold and Silver; Cherry Ripe (Scott); Selection from Faust (Gounod); Prelude (Rachmaninov); Dreaming (Haydn Wood); Suite pour mes petits Amis (Pierné); Gondoles vénitiennes (Leemans); Potpourri of Old and New Waltzes (Robrecht); March, Radio Luxembourg; in the interval, at **12.30 p.m.,** News in French and German; and at **1.0,** Exchange. **1.15,** Records; in the interval, at **1.30,** Exchange. **2.0,** Exchange. **3.45,** Exchange. **6.30** till Close Down—Dutch Evening. **6.30,** Variety Programme. **7.30,** Exchange. **7.35,** Concert by the Station Orchestra; Conductor: Pensis: Russian March (Ganne); Dynamidenwalzer (Strauss); Berceuse No. 1 (Pensis); Selection from Samson and Delilah (Saint-Saëns); Viennese Military March (Kreisler). **8.0,** News in French and German. **8.20,** Operetta Music by the Station Orchestra; Conductor: Pensis; Soloist: F. d'Antbourg (Songs); Overture, Die Fledermaus (Strauss), Air from The Geisha (Jones); Selection from Der Opernball (Heuberger); Selection from Le Petit Duc (Lecocq); Air from Die schöne Galathee (Suppé); Ballet Music from Frau Luna (Lincke); Waltz, The Czarevitch (Lehar); Waltz from A Kiss in Spring (Kalmán); March from The Three Musketeers (Benatzky). In the interval, at **8.30,** Exchange. **9.30,** Organ Recital by Leblanc, relayed from the Cathedral; Sonata eroica (Jongen); Allegretto (de Boeck); Toccata (Andriessen). **10.5,** Records. **10.20,** Dance Music by the Station Jazz Band; Conductor: Jusa.

LYONS

LA DOUA, 648 kc/s, 463 metres, 15 kW.—**8.0 a.m.,** See **Paris (Ecole Supérieure). 8.30 to 9.30,** Concert by the Station Orchestra. **10.30,** Concert from **Bordeaux-Lafayette. 12 Noon,** Airs from Adieu mein klein Gard-Offizier (Stolz) by the Station Orchestra. **12.5 p.m.,** News. **12.15,** See **Paris (Ecole Supérieure).** **2.0,** Concert by the Station Orchestra. **5.0,** Recital by Jean Bouvard (Organ), Mme. Russel (Songs) and Mme. Bouvard-Sperlé (Violin); Fantasia and Fugue in G minor (Bach); Sonata in E (Veracini); Aria (Schutz); Aria from The Wedding Cantata (Bach); Prelude, Fugue and Variation (Franck); Abendlied (Schumann); Aria (Franck); Madrigal (d'Indy); Cathédrales (Vierne). **6.0,** Programme for Women, relayed from **Paris (Ecole Supérieure).** **6.30,** News. **7.30,** Local News; Musical Item. **7.40,** Lottery Results. **7.50,** Veterinary Talk. **8.0,** Talk on Wine. **8.10,** Tourist Talk. **8.20,** Concert. **9.0,** Orchestral Concert relayed from the Evian Casino; Conductor, Hessé; Soloists, Panzera (Baritone), Derbessy (Violin); Overture, Coriolanus (Beethoven); Violin Concerto in B minor (d'Ambrosio); Selection from Figaro (Mozart); Serenade and Aria from Don Giovanni (Mozart); Schéhérazade (Rimsky-Korsakov); Two Arias from Tannhauser (Wagner). In the Interval, Light Music. After the Concert, News.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**9.0 a.m.,** News. **10.0,** Announcements. **10.30,** Interval. **2.0 p.m.,** Chimes; Weather; Light Music. **2.30,** Sextet Concert. **3.0,** Amusement Guide; Exchange; Light Music. **3.30,** Sextet Concert. **4.0,** Light Music. **4.15,** Sextet Concert. **4.50,** News. **5.0,** Interval. **6.0,** Chimes; Light Music. **7.0,** Announcements; Pianoforte Recital. **7.30,** Exchange; Concert: Part 1—Opera Music: Arias from Werther (Massenet), La Cena delle baffe (Giordano), Tosca (Puccini), Manon (Massenet), Iris (Mascagni) and Carmen (Bizet); Part 2—Orchestral Music: Campanone (Mazza), Barcarolle (Norton), Ballet Music from Sylvia (Délibes); Sicilienne from Pelléas et Mélisande (Fauré), Noche de Arabia (Arbós), Gopak (Mussorgsky). **8.30,** News; Programme for Women. **9.50,** Sports and Bullfighting Notes. **10.0,** Chimes; Talk. **10.30,** Symphony Concert on Records. **11.0,** News; Announcements; Records (contd.). **12.45 a.m. (Saturday),** News. **1.0,** Chimes; Close Down.

MADRID

EAQ, 10,000 kc/s, 30 metres; 20 kW.—**11.15 p.m.,** News. **11.30,** Spanish Music. **11.45,** News. **12 Midnight,** Orchestral Concert. **12.45 a.m. (Saturday),** Light Music. **1.0,** Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.**—**7.30 a.m.,** Gym. **7.45,** Time; News. **11.30,** Variety Music. **12.30 p.m.,** Records. **12.45,** News. **1.0,** Time; Announcements. **1.5 to 2.15,** Concert by the Malatesta Chamber Orchestra. In the Interval at **1.30,** Records; Exchange. **2.15 to 2.25,** Exchange. **4.35,** News. **4.45,** Programme for Children. **5.10,** Song Recital by Margherita Cisbani (Soprano) and Ugo Cantelmo (Tenor): Arias from A Masked Ball (Verdi); The Valkyrie (Wagner); Mignon (Thomas); Luisa Miller (Verdi); La Favorita (Donizetti); Chatterton (Leoncavallo); Il Trovatore (Verdi) and L'Amico Fritz (Mascagni). **5.55,** Weather. **6.0 to 6.10,** Report for Farmers. **7.0,** Announcements. **7.15,** News in Foreign Languages. **8.0,** Time; Announcements; Records. **8.30,** Government Notes. **8.45,** Si Operette Mascagni; Records. **11.0,** News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**12 Noon,** Announcements; Concert by the Radio Orchestra. March (Blankenburg); Waltz (Eilenberg); Overture, Don Giovanni (Mozart); The Old Chiming Clock (Humphries); Selection from Rienzi (Wagner); Waltz, Manon (Engelberger); A Festival in Bangkok (Norden). In the Interval at **12.29,** Time; Weather. **12.55,** News. **1.5,** Records. **1.30,** Interval. **3.59,** Time. **4.0,** See **Beromünster. 6.0,** Interval. **7.44,** Announcements. **7.45,** News. **8.0 to 10.0,** Request Programme. **8.0,** Opera Arias. **8.30,** Song Recital. **9.0,** Dance Music. **9.30,** Light Music. **10.0** (approx.), Close Down.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 10.30,** Brass Band Concert. **11.0 to 2 p.m.,** See **Prague. 3.15,** Concert by the Station Orchestra; Conductor, Divis: Overture, Ruslan and Ludmilla (Glinka); Ukrainian Potpourri (Leopold); Dance from The Fair at Sorotchinsk (Mussorgsky); Viennese Potpourri (Leopold); Poem (Fibich); March (Vackar). **4.15 to 4.20,** See **Prague. 5.40,** Records. **5.50,** Reading. **6.0,** Local News. **6.5,** Tourist Talk. **6.15,** Record. **6.20,** German Transmission: Cabaret Programme on Records. **6.55,** See **Prague. 7.10,** Vocal and Instrumental Concert. **8.0,** See **Bratislava. 8.15,** See **Prague. 8.40,** Concert by a Russian Balalaika Orchestra; Conductor, Cymljansky. **9.5,** See **Prague. 11.0** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.,** News. **5.30,** Fanfare. **5.45,** Gym. **6.15,** Programme Announcements. **7.30,** Records. **9.0,** Musical Programme. **9.55,** Time Signal. **10.0,** News. **10.15,** Concert. **12.30 p.m.,** Recitations; Records; Songs. **2.45,** News. **3.15,** Programme for Children. **3.55,** Time Signal. **4.0,** News. **4.30,** Comedy. **5.30,** Red Army Programme. **6.30,** Programme for Collective Farm Workers. **8.0,** Concert. **9.0,** Talk in Czech: Reminiscences of an old Bolshevik. **9.55,** Chimes: **10.5,** Talk in English and German: Soviet Commerce.

MOTALA.—Relays **Stockholm. MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nürnberg, 1,267 kc/s, 236.8 metres; and Kaiserslautern, 1,195 kc/s, 251 metres.**—**6.30 a.m.,** Gym. **6.45,** Motto; Records. **7.15,** Time; News. **7.25,** Recital by Tossy Deisinger (Soprano), Margarethe Simonsen-Patek (Mezzo-Soprano), and Arno Lehner-Schwed (Baritone). **9.50,** Gym. for Women. **10.55,** Market Prices. **11.5,** Programme for Farmers. **11.15,** Time; News. **11.30,** Post Office Programme; Records. **12 Noon,** Records: Light Music. **1.15 p.m.,** Time; News. **1.25,** Concert by the Small Station Orchestra; Conductor, Kloss. **2.0,** News. **2.20,** Talk: Building. **2.50,** Flowers in Story and Picture—Sequence (Steek). **3.30,** Reading. **3.50,** Weather; Programme for Farmers. **4.0,** Concert by the Small Station Orchestra; Conductor, Kloss. **5.30,** Talk: Rio Grande do Sul, Brazil. **5.50,** Recital by Isabella Schmitz (Violin) and Ludwig Schmidmeier (Pianoforte); Passacaglia (Sammartini); Sonata (Degen). **6.10,** Review of Periodicals. **6.30** (from **Nürnberg**), Holiday Hints. **6.50,** Time; Weather; Programme for Farmers. **7.0,** Chamber Music; The Augsburg Wind Instrument Society; Quintet for Five Wind Instruments (Haydn); Wind Instrument Quintet, Op. 56, in G minor (Danzi). **7.45,** See **Berlin (Funkstunde).** **8.0,** News. **8.15,** Concert by the Munich Small Symphony Orchestra; Conductor, G. V. Spallart; Soloist, Pauline Friess (Pianoforte): Overture, Genoveva (Schumann); Pianoforte Concerto in A minor (Grieg); German Dances (Schubert).

AUG. 24th FRIDAY *continued*

9.0, Programme from **Breslau.** In the interval at 10.0, Time; News. 12 **Midnight** (approx.), Close Down.

NAPLES.—Relays **Rome.** **NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jeløy, 6.990 kc/s, 42.92 metres.—10.0 a.m.,** Market Prices. **11.15,** Service. **11.50,** Exchange. **12.5 p.m.,** News. **12.55,** Nauen Time Signal. **1.0 to 2.0,** Records. In the intervals, Weather; Report for Farmers and Exchange. **2.0,** Exchange. **5.0,** A Visit to the Gausdal. **5.30,** Soloist Concert: Balchen ('Cello), Fotland (Pianoforte), and Karen Brandstrup (Songs): 'Cello Solos: (a) Rêverie (Hubay), (b) Air de Ballet (Massenet), (c) Elégie (Fauré), (d) Rhapsody (Salesski); Pianoforte Solos (Gershwin): (a) Swanee, (b) My One and Only, (c) The Man I Love; Three Old French Songs. **6.30,** Dramatic Programme relayed from **Bergen, 850 kc/s, (352.9 metres).** **7.0,** Announcements. **7.15,** Weather; News. **7.30,** Time; **7.31,** Talk for Farmers. **7.45,** Announcements. **8.0,** An Interview with Students. **8.30,** A Play (Gullvag), with Incidental Music by Björndal, relayed from **Bergen.** **9.15,** Recitation. **9.35,** Book Review. **9.40,** Weather; News. **10.0,** Topical Talk. **10.15,** Hungarian Music.

OSTERSUND.—Relays **Stockholm.**

PALERMO

565 kc/s, 531 metres; 4 kW.—**12.45 p.m.,** News. **1.0 to 2.0,** Light Music. In the interval, at **1.30,** Time; News; Weather. **5.30,** Chamber Music. **6.10,** Balilla Programme. **8.0,** Announcements; Programme for Farmers; News. **8.20,** Records. In the interval, at **8.30,** Time; News. **8.45,** Per la porta—Play in Three Acts (Felyne). In the intervals, Records. **11.0,** News.

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 a.m.,** News. **10.30,** Concert from **Bordeaux Lafayette.** **12 Noon** Tourist Report. **12.15 p.m.,** Concert by the National Orchestra; Conductor, Desormière; Soloist, Charle (Songs). In the interval at **1.0,** News. **2.0,** Records. **3.30 to 4.45,** Concert from **Vichy:** Overture, The Secret Marriage (Cimarosa); Two Pieces (Grieg): (a) To Spring, (b) Solveig's Song; Suite brève (Aubert); Pavane from Etienne Marcel (Saint-Saëns); Jota aragonesa (Saint-Saëns); Extracts from Cavalleria rusticana (Mascagni); Cortège burlesque (Chabrier). **5.45,** Talk. **6.0,** Programme for Women. **6.30,** News. **7.45,** Talk: National Museums. **8.0,** Records. **8.30,** L'Epreuve du Bonheur—Play (Clerc). After the Play, News. **10.30,** Dance Music.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.10 a.m.,** Fanfare; Records. In the intervals, News. **8.45,** Cookery Hints. **12.5 p.m.,** Records: Edith Lorand and her Orchestra. **12.25,** Interlude. **12.35,** Records. **1.0,** Exchange. **1.5,** Interval. **1.10,** Records: Songs of Brittany. **1.30,** Exchange. **1.35,** Records. **2.0 to 2.5,** Exchange. **3.15,** Exchange. **3.45,** Exchange. **4.50,** Exchange. **6.45,** Exchange. **6.49,** Programme for Farmers. **6.50,** Talk. **6.58,** Records. **7.10,** News. **7.30,** Records. **8.0,** Interlude. **8.10,** Announcements. **8.12,** Bizet, Massenet, Bruneau Concert by the Station Symphony Orchestra. Conductor: Mathieu. Selection from The Fair Maid of Perth (Bizet); Suite from L'Arlesienne (Bizet); Selection from Grisélidis (Massenet); Scènes alsaciennes (Massenet); Selection from L'Attaque du Moulin (Bruneau); Chansons à danser (Bruneau); Prelude to L'Enfant du roi (Bruneau). In the interval at **8.40,** Exchange. **10.20,** Exchange; News. **10.30 to 11.0,** Programme arranged by the International Broadcasting Company of London: Records. **11.0,** I.B.C. Good-night Melody and Close Down.

PARIS

RADIO PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.,** Gym. **7.0,** Records. **7.15,** News. **7.45,** Gym. **8.0,** Records. **10.15,** Concert from **Vichy:** March (Porret); Pâtres napolitains (d'Indy); Overture, L'Isola disabitata (Haydn); Romance (Aubert); Old Spanish Song (Aubert); Selection from Les Guelfes (Godard); Scènes foraines (Mignan); Aux bords du ruisseau (Epinat). **12 Noon,** Concert by the Goldy Orchestra. In the Steppes of Central Asia (Borodin); Selection from Paul et Virginie (Massé); Overture, Tutti in maschera (Pedrotti). In the Interval at **1.20 p.m.,** News. **3.45 to 3.50,** Exchange. **6.20,** Weather; Programme for Farmers; Exchange. **6.45,** Records: Eight Popular Russian Songs (Liadov). **7.0,** Talk: Hunting. **7.15,** Records: Selection from Le Grand Mogol (Audran). **7.25,** Assurance Societies' Report. **7.30,** Topical Talk. **8.0,** Readings (Duhamel). **8.30,** News. **8.45,** The Drum Major's Daughter—Operetta (Offenbach); Conductor, Labis. In the Interval at **9.15,** News; Review by Reboux. **10.30,** Dance Music.

AUG. 24th FRIDAY *continued*

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres,** and **25.27 metres.—3.0 p.m.,** Edward MacHugh. **3.15,** Sammy Fuller. **3.30,** To-day's Children. **3.45,** News; Cooking School. **4.0,** Marine Band Shut-in-Hour. **5.0,** Soloist. **5.15,** Fields and Hall. **5.30,** Vic and Sade. **5.45,** Hotel William Penn Orchestra. **6.0,** Market Reports. **6.15,** Hon. Archie and Frank. **6.30,** Farm and Home Hour. **7.30,** KDKA Home Forum. **8.0,** Jackie Heller and Orchestra. **8.15,** Visit to a Foreign Village. **8.30,** Temple of Song. **9.0,** Betty and Bob. **9.15,** Singing Stranger. **9.30,** Business News and Markets. **9.45,** Arm Chair Driver. **10.0,** Palmer Clark's Orchestra. **10.15,** KDKA Kiddies' Klub. **10.30,** To be announced. **10.45,** Little Orphan Annie. **11.0,** Time; Temperature; Weather. **11.14,** Baseball Résumé. **11.30,** Comedy Stars of Hollywood. **11.45,** Lowell Thomas. **12 Midnight,** Dan and Sylvia. **12.10 a.m. (Saturday),** News. **12.15,** To be announced. **12.30,** Nancy Martin. **12.45,** Frank Buck. **1.0 to 6.0 a.m.,** Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 to 7.15 a.m.,** Gym.; Music; News. **10.0,** Record. **10.5,** News. **10.20,** News in German. **10.25,** Record. **10.30,** See **Moravská-Ostrava.** **11.0,** Record. **11.55,** Programme for Farmers. **12 Noon,** Time. **12.1 p.m.,** Programme for Farmers. **12.10,** Records. **12.20,** News. **12.30,** Concert by the Tyl Theatre Orchestra: Conductor, Jankovec. **1.30,** Labour Exchange. **1.40,** Records. **1.50,** Exchange. **1.55 to 2.0,** Exchange and Weather in German. **3.15,** See **Moravská-Ostrava.** **4.15 to 4.20,** Exchange; Weather. **5.40,** Records. **5.50,** Report for Housewives. **5.55,** Reading. **6.5,** Record. **6.10,** Programme for Farmers. **6.20,** German Transmission: Talk; Talk for Workers. **6.55,** News in German. **7.0,** Time; News. **7.10,** See **Moravská-Ostrava.** **8.0,** See **Bratislava.** **8.15,** Sonata in E minor for Viola and Pianoforte (Clarke). **8.40,** A Sketch (Strindberg). **9.5,** Concert by the Station Orchestra; Conductor, Parik; Soloist, Otto Kubiš (Baritone): Credo from Othello (Verdi); Aria from The Devil's Rock (Smetana); Prologue to I Pagliacci (Leoncavallo); Symphonic Dances, Op. 64 (Grieg). **10.0,** Time; News. **10.15,** Records. **10.45,** Russian News. **11.0** (approx.), Close Down.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan (No. 2), 1,348 kc/s, 222.6 metres; Turin (No. 2), 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.—7.30 a.m.,** Gym. **7.45 to 8.0,** Time; News. **12.30 p.m.,** Records. **1.5 to 2.15,** See **Milan.** In the interval at **1.30,** Time; News. **4.30,** Children's Radio Review. **4.50,** News. **5.10,** Concert of Light Music. **5.55,** Weather. **6.0 to 6.10,** Wheat Market Prices. **7.0,** Announcements. **7.15,** News in Foreign Languages. **8.0,** Time; News. **8.10,** Records. **8.30,** Government Notes. **8.45,** Comedy. In the interval, Talk. **11.0,** News.

RUYSSELEDE

29.04 metres; 10,330 kc/s; 8 kW.—**7.45 p.m.,** News in French. **8.0,** Records: Fedora—Opera (Giardano). **9.0,** News in Flemish. **9.15,** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW.—Relayed at intervals by **W2XAF on 31.48 metres,** and by **W2XAD** on **19.56 metres.—7.0 p.m.,** Lanny Ross and Mary Lou. **11.35,** Exchange. **12 Midnight,** Concert. **12.30 a.m. (Saturday),** WGY Farm Forum. **1.0 to 3.0 a.m.,** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW.; and **Geneva, 401 kc/s, 748 metres.—12.29 p.m.,** Time from Neuchâtel Observatory; News. **12.40** (from **Geneva**), Records. **1.0,** Exchange. **1.5** (from **Geneva**), Records (contd.). **3.0,** Interval. **3.59,** Time from Neuchâtel Observatory. **4.0,** See **Beromünster.** **5.0** (from **Geneva**), Talk: The Inauguration of the Monument to Saussure at Chamonix. **6.30** (from **Geneva**), Film Review. **7.0** (from **Geneva**), Talk: Modern Decorations. **7.30** (from **Geneva**), Wireless Notes. **7.59,** Weather. **8.0** (from **Geneva**), Orchestral Concert. **8.30** (from **Geneva**), Talk: Mlle. Camargo. **8.50** (from **Geneva**), Song Recital. **9.0,** News. **9.15** (from **Geneva**), Cabaret Programme. **10.15** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 412.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.—7.45 a.m.,** Service. **8.0,** Weather. **12.30 p.m.,** Weather. **12.45,** Exchange. **12.55,** Time Signal. **1.0,** Reading. **1.25,** Concert. Achatz (Flute), Kjellström (Harpsichord). Sonata in C for Flute and Harpsichord (Bach); Sarabande and Gigue (Zipoli); Minuet (Mozart); Tambourin (Rameau). **2.15,** Concert of Light Music relayed from **Malmö, 1,312 kc/s (228.7 metres).** **3.0,** Interval. **3.30,** Reading. **5.0,** Weather. **5.5,** Programme for Children. **5.25,** Hagberg (Songs), Hahn (Accordion). **6.0,** Talk. **6.15,** Records. **7.15,** Weather; News. **7.30,** Concert of Chamber Music. Soloists, Garaguly (Violin), Blomquist (Viola), Dukstulsky ('Cello). Sarabande for Violin and Viola (Handel-Halvorsen); Trio in A Minor, Op. 77b (Reger). **8.0,** Talk. **8.30,** Records. **9.15,** Legal Talk. **9.45,** Weather; News. **10.0,** Concert. Andreasson (Violin), Bjorling (Songs), Vretblad (Organ). Prelude and Fuge in G Minor (Frescobaldi); Larghetto (Roman); Arioso (Bach); Four Songs (Brahms): (a) Denn es gehet dem Menschen, (b) Ich wandte mich, (c) O Tod wie bitter bist Du, (d) Wenn ich mit Menschen und mit Engelszungen redete; Three Songs (Ravanello): (a) Elegie, (b) Christus resurrexit, (c) Musette; Largo (Reger); Fugue and Choral (Vretblad). **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.30 a.m.,** Concert from **Bordeaux-Lafayette.** **12 Noon,** Records. **12.45 p.m.,** News. **1.0,** Time; Exchange. **1.5,** Records. **1.15,** Concert from **Paris (Ecole Supérieure).** **2.0,** Interval. **3.30,** Orchestral Concert, relayed from the Casino Park, **Vichy.** Conductor, Brouillac. **4.45,** Talk: The History of Jewish Art. **5.0,** Orchestral Concert of Viennese Music. Conductor: Roskam. **6.0,** Topical Talk in German. **6.15,** Elocution Lesson. **6.30,** Recital by Serres ('Cello) and Marianne Ricklin (Songs); Aria from Ottone (Handel); 'Cello: Elégie (Fauré); Aria from Don Giovanni (Mozart); 'Cello: (a) La fille aux cheveux de lin (Debussy), (b) Piece in C Sharp Minor (Boulanger); Three Songs (Missa): (a) Rien si ce n'est ton cœur, (b) La marchande de Lilas, (c) Sérénade aux bois; 'Cello: Piece (Ibert), (b) Saeta et Granadina (Nin). **7.30,** Time; News. **7.45,** Tourist Report. **8.0,** Press Review in German; Lottery Results; Announcements. **8.30,** Orchestral Concert, relayed from **Vichy.** Conductor: Cooper. **10.0,** News.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.35 a.m.,** Programme for Farmers. **5.45,** Hymn; Motto; Time; Weather. **5.50,** Gym. **6.15,** Records. **6.40,** Time; News. **6.55,** Records. **7.25,** Programme from **Munich. 8.10,** Weather. **8.15,** Gym. **8.35,** Interval. **9.0 to 9.15,** Programme for Women. **10.0,** News. **10.10,** Records: Scheherazade (Rimsky-Korsakov). **10.50,** Chopin Pianoforte Recital by Elisabeth Zimmermann: Ballad in G minor, Op. 23; Bolero, Op. 19; Fantaisie-Impromptu in C sharp minor, Op. 66; Waltz in C sharp minor. **11.25,** Post Office Propaganda; Records. **11.55,** Weather. **12 Noon,** Concert of Palatinate Peasant Music by the Annweiler Peasant Band, from **Mannheim;** Soloist, Else Wagner (Songs to the Lute). **1.0 p.m.,** Concert of Swabian Folk Music for the Berlin Radio Exhibition; The Philharmonic Orchestra; Conductor, Wallenborn; The Station Choir; Conductor, Hahn; Soloist, Hans Thaler (Accordion): Swabian Rhapsody (Kaempfert); Accordion Solos: (a) Waltz, (b) Polka; Choir: Swabian Dance Song; Ländler; Accordion Solo: Heimatlieder (Eisele); Waltz Potpourri (Egg); Accordion Solo: Auf geht's (Wachter); Choir: Folk Songs; Waltz (Kaulich); March (Rechling). **2.0 to 2.30,** Time; News. **3.15,** Recital of Seventeenth and Eighteenth Century Music by Margarethe Schleiermacher (Contralto), Gertrud Eyth (Harpsichord) and Längin (Viola da Gamba). **4.0,** See **Königsberg.** **5.30,** Talk: Mountaineering in the Andes. **5.45,** Records. **6.0,** Visit to a Printing Works. **6.30,** Community Singing from the Schillerplatz. **7.0,** Ehegluck—Peasant Sketch in One Act (Georg Lorenz) after a Comedy by Gorter. **7.30,** Time; Weather; Programme for Farmers. **7.45,** See **Berlin (Funkstunde). 8.0,** News. **8.10,** See **Berlin (Funkstunde). 10.20,** Time; News. **10.45,** Sports Review. **11.0,** Dance Music by the Waldmann-Gietmann Orchestra, from **Baden-Baden. 12 Midnight,** Serenade. **1.0 a.m. (Saturday),** Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.,** Dance Refrains. **8.30,** News. **8.35,** Orchestral Music. **8.45,** Popular Songs. **12 Noon,** Opera Arias. **12.15 p.m.,** Orchestral Music. **12.30,** News. **12.45,** Request Items. **1.0,** News. **1.5,** Songs from Sound Films. **1.15,** Music by a Viennese Orchestra. **1.30,** Songs. **1.45,** Opera Music. **2.0,** News. **6.0,** News. **6.15,** Opera Arias. **6.30,** Tourist Talk. **6.35,** Military Music. **6.45,** Musical Comedy Selection. **7.0,** Orchestral Pieces. **7.15,** Duets. **7.30,** News. **7.45,** Music by a Viennese Orchestra. **8.0,** A Fable. **8.15,** Choral Music. **8.30,** Medical Talk. **9.0,** Paris—A Fantasy. **9.30,** Operetta Music. **10.0,** Au Caveau de dix heures—Radio Fantasy. **10.15,** North African News. **10.30,** Operetta Songs. **11.0,** Opera and Operetta Music: Selection from The Gipsy Baron (Joh. Strauss); Selection from Mignon (Thomas); Extracts from Hamlet (Thomas). **11.15,** Light Music. **11.30,** Tangos. **11.50,** Folk Songs. **12 Midnight,** News. **12.5 a.m. (Saturday),** Duets from Romeo and Juliet (Gounod) and The Barber of Seville (Rossini). **12.15,** Songs from Sound Films. **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo.** **TURIN.**—Relays **Milan.**

VALENCIA

850 kc/s, 352.9 metres; 0.7 kW.—**2.0 a.m. to 3.0 (Saturday),** Programme in English, arranged by the International Broadcasting Company of London. **2.0,** Concert of Gramophone Records. **2.30,** Piccadilly Circus—Concert. **2.45,** Tango Band. **3.0,** I.B.C. Goodnight Melody and Close Down.

VATICAN CITY

15,120 kc/s, 19.84 metres; 10 kW. **(Morning); 5,970 kc/s, 50.26 metres (Evening).—11.0 to 11.15 a.m.,** Religious Information in German. **8.0 to 8.15 p.m.,** Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 885 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz** and **Salzburg, 1,294 kc/s, 231.8 metres.—9.0 a.m.,** News. **9.20,** Market Prices. **9.30,** Weather. **10.50,** Water Level. **11.30,** Records. **11.55,** Weather. **12 Noon,** Records. **1.0 p.m.,** Time; News. **1.10,** Records. **2.0,** Announcements. **3.30,** Time; Weather; Exchange. **3.50,** Programme for Women. **4.10,** News. **4.15,** Talk by the Bulgarian Commercial Attaché: Bulgarian Exhibits in the Vienna Autumn Fair. **4.25,** Reading for Women. **4.45,** Records. **5.30,** Animal Talk. **5.50,** Talk: Poultry Farming. **6.0,** Chopin Pianoforte Recital by Julius Vargha: Barcarolle in F sharp, Op. 60; Etude No. 12 in C minor, Op. 10; Etude No. 9 in G flat, Op. 25; Polonaise in A flat, Op. 53. **6.30,** Talk for Mountaineers. **6.55,** Talk on Photography. **7.10,** Time; News. **7.30,** Concert of Children's Music by the Vienna Symphony Orchestra; Conductor, Schönherr; Soloist, Maria Tauber-Proske (Soprano): The Children's Symphony (Haydn); Extracts from Kinderszenen (Schumann); Four Songs from Volkskinderliedern (Brahms); Children's Suite (Nedbal); Songs: (a) Schlafe, mein Prinzchen, schlaf ein (Mozart), (b) Guten Abend, gute Nacht (Brahms), (c) Su, su, du, Kindchen (Wolf), (d) Schlaf, Kindlein, bakle (Reger); Ballet Music from Peter und Paul im Schlaffenland (Lehár). **8.35,** Bunbury—Comedy in Two Acts (Oscar Wilde). **10.15,** News. **10.35,** Concert of Chamber Music by the Kamper-Kvarda Quartet: String Quartet in B flat, No. 4, Op. 76 (Haydn); String Quartet in D (Mozart). **11.15,** Records. **1.0 a.m. (Saturday),** Close Down.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.,** Hymn. **6.35,** Records. **6.38,** Gym. **6.53,** Records. **7.5,** News. **7.10,** Records. **7.20,** Programme for Housewives. **7.25,** Announcements. **7.40,** Interval. **11.57,** Time Signal. **12 Noon,** Fanfare from the Tower of St. Mary's Church, Cracow. **12.3 p.m.,** Weather. **12.5,** News. **12.10,** Records. **1.0,** News. **1.5,** Concert by the Adamska-Grossman Orchestra: Selection from The Duchess of Chicago (Kálmán); Petit ballet japonais (Goubliez); Sicilienne (Becce); Waltz (Joh. Strauss); Ukrainian Dance (Moszkowski). **1.55,** Labour Exchange. **2.0,** News. **2.5,** Talk on Economics. **2.15,** Interval. **4.0,** Records. **5.0,** Programme for Invalids, relayed from **Lwów, 795 kc/s (377.4 metres).** **5.30,** Pianoforte Recital by Guensberg: Concerto in A minor (Vivaldi-Bach); Thirty-two Variations in A minor (Beethoven). **6.0,** Report. **6.15,** Clarinet Concerto (Mozart), relayed from **Poznán, 868 kc/s (345.6 metres).** **6.45,** Talk: Ethnography. **6.55,** Hints for Sunday. **7.0,** Announcements. **7.15,** Recital by Mme. Hupert (Mezzo-Soprano); Two Songs (Lipski); Ballad from Rognieda (Sierow); Aria from The Snow Maiden (Rimsky-Korsakov); Sapphic Ode (Brahms); Gipsy Song (Dvorák). **7.35,** Records. **7.50,** Sports Notes. **8.0,** Great Thoughts. **8.2,** Answers to Correspondence. **8.12,** Concert by the Station Orchestra; Conductor, Wolfstaal; Soloist, Gimpel (Violin): Tragic Overture (Brahms); Violin Concerto in D minor (Wieniavski); Symphony No. 8 (Beethoven). In the interval at **8.50,** News; Fanfare; Notes for Farmers. **10.0,** Reading. **10.15,** Dance Music from the Paradise Dance Hall. **11.0,** Weather.

ZURICH.—Relays **Beromünster.**

SATURDAY

AUGUST THE TWENTY-FIFTH

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.**—**1.30 to 2.30 p.m.,** Time; Weather; Records. **6.0,** Records. **6.45,** News. **7.0,** Ida Gilbert: The Hound of Heaven. **7.15,** Irish Lesson. **7.30,** Time. **7.31,** Annie Fagan (Harp). **7.45,** Jean Thompson (Mezzo-Soprano). **7.55,** Music to Shakespearean Plays by the Station Ensemble. **8.15,** Shakespeare in Song by Denis Carey. **8.30,** Fay Sargent and Company in a Revue with the Station Orchestra. **9.15,** S. O'Mathgamhna (Traditional Fiddle). **9.30,** Music by the Station Ensemble. **10.0,** Variety Programme. **10.30,** Time; News; Weather. **10.40,** Records. **11.0** (approx.), Close Down.

BASLE.—Relays **Beromünster.**

BELGRADE

686 kc/s, 437.3 metres; 2.5 kW.—**10.45 a.m.,** Announcements. **10.50,** Water Level. **11.0,** Records. **11.59,** Time; Chimes. **12.5 p.m.,** Concert by the Station Orchestra. **12.45,** Exchange; Announcements. **1.0,** Concert by the Station Orchestra. **1.30,** News; Time. **5.55,** Time. **6.0,** Records. **6.50,** Announcements. **7.0,** Recital by Milan Dimitrijevic (Violin) and Dimitrije Grasimenko (Pianoforte): Sonata in D (Beethoven); Concerto in G Minor (Bruch). **7.45,** Records. **8.0,** Talk. **8.30,** Concert of Slav Music by the Station Orchestra: March (Brodil); Rhapsody No. 2 (Bosnjakovic); Romance (Tchaikovsky); Selection from Halka (Moniuszko). **9.15,** Talk. **9.45,** Time; News. **10.0,** Serbian Programme. **11.30,** Dance Records. **12 Midnight,** Close Down.

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.20,** See **Königsberg. 7.0,** News. **7.10** (approx.), See **Königsberg. 8.0,** Interval. **8.45,** Gym. **9.0,** Interval. **9.40,** Sports Notes. **10.0,** News. **10.10,** Fairy Play for Children. **10.55,** Programme for Children. **11.15,** Weather. **11.30,** Reading: Peter Klüts glücklicher Traum (Augustini). **11.45,** Talk: New Reich Geography. **11.55,** Weather. **12 Noon,** Military Band Concert, relayed from the Radio Exhibition; Conductor, Berdien: March, Die Freude gibt uns Kraft (Lautenschläger); Overture, Indra (Flotow); Gounod Potpourri (Wacek); The Artist's Waltz (Strauss); Military March; Overture, Fra Diavolo (Auber); Selection from The Bird Fancier (Zeller); Swabian Rhapsody No. 7 (Kaempfert); March, Sachsen-Treue (Schmidt); Overture, Il Guarany (Gomez); Lied, Still wie die Nacht (Bohm); Selection from Der Kuhreigen (Kienzl); Waltz, Hofballtänze (Lanner). In the interval at **12.55 p.m.,** Weather. **1.45,** News. **2.0,** Interval. **2.45,** Greetings; Programme Announcements. **3.0,** Weather. **3.5,** Economic Review. **3.20,** Programme relayed from the Radio Exhibition: Children at the Microphone. **5.50,** Commentary on the Start of the Graf Zeppelin from Friedrichshafen. **6.0,** Weekly Sports Review. **6.20,** Talk for Workers. **6.40,** Programme Announcements. **6.50,** The Language of Flowers—Humorous Dialogue (Krause), on Records. **8.0,** Motto; News. **8.10,** The Longer the Better!—Variety Programme by the Station Orchestra; Conductor, Libiszowski; Soloists: Erna Sack (Soprano), Groh (Tenor), Engel (Xylophone). **10.0,** Weather; News; Sports Notes. **10.25,** Talk on Records: German Art in Munich. **10.45,** Weather. **11.0,** See **Hamburg. 12.55 a.m. (Sunday),** Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Hymn; Gym. **6.15,** Weather; Meditation. **6.20,** See **Königsberg. 7.0,** News. **7.10** (approx.), See **Königsberg. 8.0,** Gym. **8.20,** Interval. **10.0,** News. **10.10,** Market Prices. **10.30,** Records; Announcements. **11.30,** Interval. **12 Noon,** Concert from **Königsberg.** In the interval at **12.30 p.m.,** Weather. **1.0,** News. **1.15,** Dance Records. **2.0,** News; Water Level. **2.15,** To be announced. **3.0,** Exchange; Market Prices. **3.20,** See **Berlin (Deutschlandsender). 6.0,** Announcements. **6.5,** Talk: Gymnastics in Italy. **6.20,** Trio in D minor, Op. 107 (Bossi) by Weinkauf (Pianoforte), Lutz (Violin), and Schaefer (Cello). **6.50,** A Captain Conquers—Sequence. **7.40,** Echoes of the Day. **7.50,** News. **8.0,** Festival Programme from the Radio Exhibition. In the interval at **10.20,** News; Sports Notes. **12 Midnight,** Concert from **Cologne. 1.0 a.m. (Sunday),** Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**6.15 to 6.30 a.m.,** Gym. **7.45,** Report: The Cycle Tour of Switzerland. **8.15,** Interval. **12 Noon,** Records. **12.29 p.m.,** Time, **12.30,** Weather; News. **12.40,** Records. **1.25,** Time; Weather; Exchange. **1.30,** Political Review. **1.45,** Commentary on the Trials for the Swiss Automobile Grand Prix. **2.0,** Concert. **2.30,** Reading for Children. **3.0,** Interval. **3.59,** Time. **4.0,** See **Monte Ceneri. 6.0,** Records. **6.30,** Talk: Children of Emigrants. **7.0,** Chimes from the Zürich Churches. **7.15,** Time; Weather; Market Prices. **7.20,** Light Music on Records. **7.45,** Report: The Cycle Tour of Switzerland. **8.0,** Song Recital by Knapp. **8.30,** Talk: Reminiscences of the Diplomatic World. **9.0,** Weather; News. **9.10,** Folk-Songs on Records. **10.15,** Dance Records. **11.0** (approx.), Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BORDEAUX-LAFAYETTE

1,077 kc/s, 278.6 metres; 12 kW.—**6.30 p.m.,** News from **Paris (Ecole Supérieure). 7.30,** Sports Notes. **7.40,** News. **7.45,** Records. **8.45,** See **Milan.**

BRATISLAVA

1,004 kc/s, 298.8 metres 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian. **10.30,** Records. **11.0,** Water Level. **11.5,** See **Prague. 12.5 p.m.,** Report for Farmers. **12.10,** News in Slovak. **12.15,** Record. **12.20,** See **Prague. 1.40,** News and Weather in German and Hungarian. **1.50,** Records. **2.0 to 2.5,** Shipping Report. **3.15,** See **Prague. 4.35,** See **Moravská-Ostrava. 5.40,** Topical Talk. **5.50,** Record. **5.55,** Talk for Workers. **6.10,** Hints for Housewives. **6.15,** Hungarian Transmission: My Father—Play in Five Acts (Ungvary). **6.55,** See **Prague. 7.30,** See **Brno. 8.20,** Reading. **8.35,** Song Recital by Bachlet. **9.5,** Orchestral Concert; Conductor, Haiser; Soloist, Topinka (Xylophone). **10.0,** See **Prague. 10.15,** News in Hungarian. **10.30,** See **Brno. 11.30** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.**—**5.0,** Hymn; Motto. **5.10,** Records. **6.0,** Time; Weather; Gym. **6.25** (from **Gleiwitz**), Concert by the Glück-Auf Band. **7.0,** Time; News. **7.15,** Concert (contd.). **8.0,** Cookery Hints. **8.15,** Concert (contd.). **9.0,** Time; News; Local News. **10.40 to 11.10,** Programme for Children. **11.30,** Time; News; Water Level Report. **12 Noon,** See **Berlin (Deutschlandsender). 2.0,** Time; News. **2.20,** Exchange. **2.25,** Post Office Propaganda; Records. **2.50,** Market Prices. **3.10,** Talk: Ewald Christian von Kleist, Prussian Soldier and Author. **3.30,** Book Review. **3.40,** Talk: Your Luck. **4.0,** See **Königsberg. 6.0,** Talk: Silesian Workers in Norway. **6.20,** Lieder Recital by Annemarie Gulau: (a) Vom Tode, (b) Busslied, (c) Die Trommel gerühret, (d) Freudvoll und leidvoll (Beethoven): (a) Mein Herz ist wie die dunkle Nacht, (b) Venus mater (Pfitzner): (a) Erinnerung, (b) Wunsch, (c) Schlafen, schlafen, (d) Sommerfäden (Trunk). **6.50,** Programme Announcements; Weather. **7.0,** Chimes. **7.5,** Dora Lotti Kretschmer recites her own Poems. **7.30,** Programme Announcements with Records. **8.0,** To-day's News. **8.10,** See **Hamburg. 10.20,** Time; News; Local News; Sports Notes. **10.45,** Concert, relayed from **Cologne. 1.0 a.m. (Sunday),** Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 1.30 p.m.,** Programme for Tradesmen. **1.40,** See **Prague. 2.0 to 2.5,** Market Prices. **3.15,** See **Prague. 4.35,** See **Moravská-Ostrava. 5.40,** Hints for Housewives. **5.45,** German Transmission: Programme of National Songs by Emmy Schefzik (Soprano), Klement (Violin), Kneifel (Guitar). **6.20,** Records. **6.45,** Talk for Farmers. **6.55,** See **Prague. 7.30,** Military Band Concert; Conductor, Zita. **8.20,** See **Prague. 9.35,** Pianoforte Recital by Anna Skalicka. **10.0,** See **Prague. 10.15,** Records. **10.30,** Concert by a Salon Orchestra of Unemployed Musicians; Conductor, Hanousek: March (Petzny); Waltz (Petzny); Overture, Two Savoyards (Offenbach); March Potpourri (Komzak); Song (Grieg); Czardas from Der Geist des Wojewoden (Grossmann); Waltz (Joyac); Serenade (Heykens); March (Kmoch). **11.30** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Orchestral Concert; Soloist, Rosasco (Accordion): Overture (Hirschmann); Waltz (Fahrbach); Enchantement (De Taeyé); Accordion Selection from The Fair Maid of Perth (Bizet); Suite, Week-end (Caludi); Scotto Potpourri (Salabert). **1.0 p.m.,** News. **1.10,** Records: Selection from I Pagliacci (Leoncavallo); Potpourri, Montery (Rose); Give me Liberty or give me Love (Robin); Melody in F (Rubinstein); Piece; Three Melodies (Green); Melody in Spring (Thompson); Buona notte, signora; Potpourri (Davids); Rosalie n'est pas partie (Mario-Olivier); Polka, Bitte schön (Joh. Strauss). **2.0,** Interval. **4.40,** Announcements. **4.45,** Talk. **5.0,** Dance Music relayed from the Continental Palace Hotel, Blankenberghe. **6.0,** Astronomy Talk: Jupiter. **6.15,** Song Recital by Mme. De Morane. **6.30,** Who's afraid of the Big, Bad Wolf? (Churchill-Ronell), by Famous Artists and Dance Bands (on Records). **6.45,** Science Review. **7.15,** See **Vienna.** After the Programme, News; Dance Music relayed from the Casino, Blankenberghe. **12 Midnight,** Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish.—**11.57 a.m.,** Weather. **12 Noon,** Tosca, Opera, Acts I and III (Puccini), on Records. **1.0 p.m.,** News. **1.10,** Orchestral Concert; Soloist, Rosasco (Accordion): Fantasia on Flemish Songs (Walpot); Intermezzo from Cavalleria rusticana (Mascagni); Waltz, Paris (Waldteufel); Bells across the Meadows (Ketelbey); Accordion Solo; Ballet Suite (Popy). **2.0,** Interval. **4.40,** Announcements. **4.45,** Talk: The Brussels Exhibition, 1935. **5.0,** Talk with Musical Illustrations: Jazz. **6.0,** Gramophone Concert; Tunisian Music: From Jazz to Rhythm; Kasbek. **6.30,** Orchestral Concert; Soloists, Verelst (Oboe), Ferari (Violin) and Gilman (Flute): Overture, Der Wildschütz (Lortzing); Waltz, Roses from the South (Joh. Strauss); Scènes écossaises, for Oboe and Orchestra (Godard); The Wedding of the Rose (Jessel); Selection for Violin from La favorita (Donizetti); Mazurka for Flute (Doppler); Selection from Scènes parnassiennes (Massenet). **7.30,** Notes for Farmers. **7.55,** News. **8.0,** Cabaret Programme by Grassin, Mme. Angenot, Vandermeulen and Lamoen. **9.0,** Concert from Ostend Kursaal. **10.10,** News. **10.20,** Concert by the Chass Remue Orchestra and Willy Ruhlmann's Tango Band, relayed from the Casino, Blankenberghe. **12 Midnight** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15,** Time; Weather; News. **1.40,** Records. **6.0,** Time; Weather. **6.5,** Concert by the Motzoi Orchestra. **7.30,** Talk. **7.45,** Records. **8.0,** Talk. **8.15,** Concert by the Station Orchestra: Overture (Lincke); Ballet Music from La Juive (Halévy); Selection from Tales of Hoffmann (Offenbach); Waltz (Komzák). **9.0,** Letter-box. **9.20,** Concert by the Station Orchestra; Soloist, Teodoru (Violin): Prayer and Dance from Olaf Trygvason (Grieg); Scherzino (D'Ambrosio); Violin Solo (Godard); Piece (Frederiksen); Suite (Ackermans). **10.30,** Programme relayed from the Restaurant Continentale.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym.; Records. **9.45,** News. **10.0,** Talk; Records. **12 Noon,** Chimes. **12.5 p.m.,** Concert by the Ilosváy Trio. **1.30,** Concert. **2.40,** Talk for Housewives. **4.0,** Programme for Children. **5.0,** Concert by a Workers' Choir. **6.0,** Letter-box. **6.35,** Records. **7.25,** Talk: Hungarian Nights. **8.0,** Concert of Béla Nagypál and Sigmund Vincze Operetta Music by the Budapest Orchestra, conducted by the Composers; Soloists: Kármán and Szedö. **9.20,** News. **9.40,** Concert by the Imre Magyari Cigány Band, relayed from the Hotel Hungaria. **10.10,** Weather. **10.50,** Concert of Light Music by the Bertha Orchestra.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Hymn; Records. **6.5,** Gym. **6.25,** Records. **6.50,** Hymn; Time; News. **7.5,** Records. **8.0,** Weather. **8.5 to 8.20,** Gym. for Women. **8.20 to 8.30,** Talk: German Folk Dances. **10.0,** Time; News. **10.10,** Kindergarten. **10.30,** Recital of Swedish Music by Emma Bampert (Soprano) and Lampert (Pianoforte **11.0,** Talk: The Sea. **11.30,** Post Office Propaganda; Records. **12 Noon,** Military Band Concert: March (Kutsch), Overture, Poet and Peasant (Suppé), Waltz (Waldteufel), Extracts from The Gipsy Baron (Joh. Strauss), Intermezzo (Rhode), Two Alsatian Peasant Dances (Merkling), March (Meissner). **12.45 p.m.,** Announcements. **1.0,** Concert by The Fröhliche Fünf and Küpper (Baritone), Piece (Rivelli), Slav Dance No. 6 (Dvorák), Waltz (Strauss), Herrlicher Rhein (Schlefenbruch), Mein Heimatland (Obermeyer), Wein her (Manla), Rheinländer (Schmidt-Hagen), Rendez-vous (Aletter), March (Frantzen). **1.45,** Announcements. **2.0,** Records. **2.45,** Variety Programme. **3.30,** Exchange. **3.45,** Talk: German Gas Equipment. **4.0,** See **Hamburg. 5.0,** Talk: Osnabrück Museum. **5.15,** Community Singing for Children. **5.50,** Talk in Dialect. **6.10,** Science Discussion. **6.40,** To-day's News. **6.50,** Exchange; Sports Notes. **7.0,** Dance Music by Leo Eysoldt and his Orchestra. **8.0,** Announcements. **8.15,** Popular Music by Leo Eysoldt and his Orchestra. **8.45,** Pennäler—Humorous Scenes (Halm) with Music by Ingebrand. **9.40,** Popular Music by Leo Eysoldt and his Orchestra. **10.0,** Time; News. **10.30,** Concert by the Station Chamber Orchestra. **1.0 a.m. (Sunday),** Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.** — Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**11.30 a.m. to 12 Noon,** Programme in English by the International Broadcasting Company of London. **11.30,** Happy Half-hour. Dance Music. **12 Noon to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English by the I.B.C. **4.30,** Tunbridge Wells, Isle of Thanet, Dover and Folkestone Concert. Part 1: Variety (Gramophone Records). Part 2: Dance Music. Part 3: Light Music. **6.0 to 11.0,** Programme in French. **11.0** till Close Down, Programme in English by the I.B.C. **11.0,** Dance Music relayed from the Etretat Casino. **11.30,** Concert arranged by the I.B.C. (Ireland), Ltd. **12 Midnight,** Dance Music relayed from the Etretat Casino. **1.0 a.m. (Sunday),** I.B.C. Goodnight Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.40,** Time; News. **6.50,** Weather. **6.55,** Records. **8.10,** Water Level Report; Weather. **8.15,** Gym. **8.35,** Interval. **10.0,** News. **10.10,** Programme for Schools. **11.0,** Announcements; Records. **11.40,** Programme Announcements; Exchange; Weather. **11.50,** Social Notes. **12 Noon,** Gramophone Concert: Du alter Stephansturm (Brandl); Tales from the Vienna Woods (Joh. Strauss); In Weidling am Bach (Leopold); March, Alt-Wien (Dietrich); Ich bin a echter Weaner (Sioly); An der Donau (Melichar); In einem kleinem Café (Leopold); March, Lustig und fidel! (Dietrich); Wenn der Werkelmann spielt (Leopold); Wien wird bei Nacht erst schön; Ich muss wieder einmal in Grinzing sein (Benatzky); Ich weiss auf der Wieden ein kleines Hotel (Benatzky); Nur was echt und weanerisch (Nützlader); Im Prater blühn wieder die Baüme (Stolz); Vogerl fliagst in d'Welt hinaus (Horning); Auf der Lahmgruahn (Strecker); Solang a junger Wein ist (Benatzky); Märchen aus Wien (arranged Markgraf). **1.0 p.m.,** Time; Local Review; News. **1.20,** Concert (contd.). **1.50,** Time; News. **2.0,** See **Stuttgart. 2.30,** Variety Programme with Records. **3.10,** See **Stuttgart. 3.30,** Weather. **3.40,** Industrial Review. **4.0,** Concert relayed from **Wiesbaden. 6.0,** Talk: Frontier Problems. **6.20,** Weekly Review. **6.35,** Surprise Programme. **6.50,** Time; Weather. **7.0,** Light Music on Records. **8.0,** Time; News. **8.5,** Local Review. **8.15,** Programme from **Berlin (Funkstunde). 10.20,** Time; News. **10.35,** See **Stuttgart. 10.45,** News; Weather; Sports Notes. **11.0,** Variety Programme by the Franz Renner Dance Band, Ria Urban (Soprano), and Rothe-Carey and Ebbekke (Comedians). **12 Midnight,** See **Stuttgart. 2.0 a.m. (Sunday),** Close Down.

FREDRIKSSTAD. — Relays **Oslo. FREIBURG.** — Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.** — Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg** and **Hanover, 1,330 kc/s, 225.6 metres.**—**5.45 a.m.,** Time; Weather; Talk for Farmers. **6.0,** Gym. **6.15,** Time; Weather. **6.20,** See **Königsberg. 7.0,** Time; Weather; News. **7.10,** See **Königsberg. 8.0,** Notes for Housewives; Cookery Hints. **8.30,** Announcements; Records. **10.50,** News. **11.0,** Records. **11.30,** Concert from **Königsberg. 12** Noon, Hints for Housewives. **12.5,** Time; Announcements. **12.15,** Concert from **Königsberg. 1.0,** Exchange. **1.15,** Weather. **1.20,** Musical Programme. **2.15,** News. **2.30,** Records. **3.0,** Wireless Notes. **3.15,** Exchange. **3.40,** Shipping and Aviation Notes. **4.0,** Programme of New German Dances by the Station Orchestra; Conductor, Maasz (Pianoforte); Seven German Dances and Fugues (Müller); Two German Dances (Unger); Holstein Folk Dance, for Pianoforte (Koster); German Dances (Wittenbacher); Two German Dances (Girnatis); East Prussian Fishers' Dance (Brust). **5.5,** New Songs to the Lute by Besemfelder. Four Songs: (a) Nachtmusikanten, (b) Mit Gottes Hilf, (c) Die goldene Wiege, (d) Der wandernde Musikant; Four Songs (Knab): (a) Zu Augsburg steht ein hohes Haus, (b) Wer ist denn draussen, (c) Der alte Garten, (d) Vorfrühling (Knab). **5.30,** Albert Wilkens reads from his own Works. **6.0,** Records. **6.35,** Naval Programme. **6.55,** Weather. **7.0,** Concert of National Dances relayed from **Kiel**; Conductor, Döring: Hungarian Dances (Brahms), English Folk Dances (Grainger), Russian Dances (Bortkiewicz), Norwegian Dances (Grieg), Slav Dances (Dvorák), German Dances (Mozart). **8.0,** News. **8.10,** Programme of Light Music and Dance Music. **10.0,** News. **10.20,** Light Music. **11.0,** Dance Music by the Heinemann Band. **1.0 a.m. (Sunday),** Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Kootwijk**, 50 kW. from **3.40 p.m.—7.40 a.m.**, Programme of the Workers' Radio Society (V.A.R.A.): Records. **9.40,** Religious Programme of the Liberal Protestant Radio Society (V.P.R.O.). **9.55,** V.A.R.A. Programme: Records. **11.40 to 4.40 p.m.,** Programme of the General Broadcasting Society (A.V.R.O.). **11.40,** Time; Concert by the A.V.R.O. Orchestra; Conductor, Treep: March (Marks-Vaughan); Overture, Si j'étais roi (Adam); Waltz, Etincelles (Waldteufel); Selection from Les Saltimbanques (Ganne); Records; In the Mystic Land of Egypt (Ketelbey); Autumn Shadows (Clarke); Narzissenmädel (Siede); Selection from Viktoria and her Hussar (Abraham); Records; Dream Waltz (Millöcker); Nights of Cairo (Gilbert); Poem (Caro); Suite (Ackermans); Leichtes Blut (Joh. Strauss). **1.40 p.m.,** Book Review. **2.10,** Concert by the Station Orchestra: Overture, Pique Dame (Suppé); Selection from Cavalleria rusticana (Mascagni). **2.40,** Records. **3.40,** Pictures from an Exhibition (Mussorgsky) by v.d. Griend (Pianoforte). **4.10,** Pali and his Orchestra. **4.40 to 7.40,** V.A.R.A. Programme. **4.40,** Concert by the V.A.R.A. Orchestra; Conductor, de Groot: Overture, La dame blanche (Boieldieu); Greenland Suite (Juel-Frederiksen); Extase (Bizet); Cantabile (Cui); Liszt Potpourri (Urbach). **5.20,** Literary Talk. **5.40,** Concert (contd.): Extracts from Rose Marie (Friml), Oh Kay (Gershwin), The Cat and the Fiddle (Kern); Records; Slav March (Tchaikovsky); Dance of the Merry Mascots (Ketelbey); Selection from The Love Parade (Scherzinger); Records; Overture, Die schöne Galathee (Suppé); Die Hydropathen (Gungl); Piece (Nobel); Piece (de Groot). **7.30,** Talk. **7.35,** Records. **7.40** till Close Down, A.V.R.O. Programme. **7.40,** Time; Weather; News. **7.45,** Records. **7.55,** Variety Programme with Kovacs Lajos and his Orchestra and Soloists. In the interval: Records. **9.55,** Records. **10.40,** News. **10.50,** Dance Music from the Hotel Hamdorf, Laren. **11.40,** Time; Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. until **6.40 p.m.,** 20 kW. from **6.40 p.m.**—Programme of the Catholic Radio Society (K.R.O.). **7.40 a.m.,** Records. **8.55,** Interval. **9.40,** Records. **10.10,** Concert. **10.40,** Records. **11.10,** Religious Address. **11.40,** Police Messages. **11.55,** Records. **12.10 p.m.,** Concert by the K.R.O. Boys. Conductor, Lustenhouwer. A couple of Pals (Gilbert); Waltzing in a Dream (Crosby); Potpourri (Krome); Es hat der Groszpapa (Roland); Overture, Die Landstreicher (Ziehrer); Night and Day (Porter); Selection from Gipsy Love (Lehár). **12.55,** Pigeon Flying Report; Records. **1.25,** Interval. **1.40,** Programme for Young People. **2.10,** Records. **2.40,** Programme for Children. **3.40,** Concert by the K.R.O. Orchestra. Conductor, van't Woud. Piece (Siede); Potpourri (Urbach); Military Waltz (Waldteufel); Pumpernickel (Siede); Selection from The Mikado (Sullivan); Records; Spanish Gipsy Dance (Marquina); Parade in Märchenwald (Noack); Viennese Folk Melodies (Drescher); Gavotte (Ganne); Extract from Der Geist des Wojwoden (Grossmann). **5.10,** Talk in Esperanto. **5.25,** Concert (contd.). Three Woodland Dances (Haines); Selection from Die Puppenfee (Bayer); Indian Lament (Dvorák); The Forge in the Forest (Eilenberg). **6.0,** Weekly Press Review. **6.25,** Records. **6.40,** Police Messages. **6.55,** Talk. **7.15,** Records. **7.40,** Concert by the K.R.O. Boys. Conductor, Lustenhouwer. Piece (de Leur); Piece (Borgmann); Wedding Dance of the Flamingoes (Robert); Melody (Theunissen); Bright-eyed Beauty (Gilbert-Nicholls); Piece (Borchmann). **8.10,** News. **8.15,** A Play. **9.0,** Records. **9.10,** Concert by the K.R.O. Boys. Conductor, Lustenhouwer. Potpourri (Ciere); Mütterlein (Reisfeld); Waltz Potpourri (Robrecht); Potpourri (Dostal); Elle est là (de Leur); Johann Strauss Potpourri (Pretsch). **9.55,** Records. **10.10,** News. **10.15,** Concert (contd.). Wenn das Glück Dir winkt (Gray); March Potpourri (Ciere); Foxtrot; Waltz Potpourri (Robrecht). **10.40,** Records. **11.40** (approx.), Close Down.

INNSBRUCK.—Relays **Vienna.**

JUAN LES PINS

1,249 kc/s, 240.2 metres; 2 kW.—**12.30 p.m.,** Amusement Guide; Orchestral Concert. **1.0,** News; Concert. **8.0,** Amusement Guide; Exchange; News. **8.10,** Film Review. **8.20,** Press Review; Orchestral Concert: Fantasy for Harp (Saint-Saëns); Berceuse russe (Cui); Waltz, La plus que lente (Debussy); Selection from The Merry Widow (Lehár). **8.45,** News; Weather. **9.0,** Orchestral Concert relayed from the Casino, Cannes.

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres;** and **Skamlebaek, 49.5 metres.**—**7.0 a.m.,** Gym. **7.27,** Weather. **8.30,** Service from Copenhagen Cathedral. **11.0,** Weather. **11.10,** Fish Market Prices. **12 Noon,** Time; Chimes. **12.5 p.m.,** String Ensemble Concert from the Ritz Restaurant; Conductor, Nielsen. **2.0,** Interval. **2.30,** Records. **3.0,** Concert by the Station Orchestra. Part I, Danish Music. Conductor Grön-

AUG. 25th SATURDAY *continued*

dahl: Overture (Scalabrini); Selection from The Death of Balder (Hartmann); Selection from Youth and Madness (Dupuy); Overture (Kuhlau). **3.50,** Reading: Ode to Denmark (Hermann), by the Author. **4.0** (approx.), Concert, Part II.: Overture, The Brewer of Preston (Adam); Selection from Bohemian Forests (Neruda); Serenade for English Horn and Viola (Saint-Saëns); Selection from The Mikado (Sullivan); Siamese Melodies (arr. Gröndahl); Waltz, Elves (Labitzky); Scottish Patrol (Williams). **5.0,** Programme for Children. **5.30,** Exchange; Fish Market Prices. **5.42,** Poem (Jensen). **5.45,** Talk, with Musical Illustrations: Don Giovanni (Mozart). **6.15,** French Lesson. **6.45,** Weather. **7.0,** News. **7.15,** See **Vienna.** **8.45,** Light Music by Preil's Instrumental Ensemble: March (Lake); Waltz Ballad (Lucas); Fantasy, The Selfish Giant (Coates); Serenade (de Micheli); Addio a Napoli (Murzilli); Fox-trot (Rawicz). **9.19,** Weather. **9.20,** Readings. **9.40,** Light Music (contd.). **10.10,** News. **10.25,** Dance Music by Preil's Dance Band; Soloist, Helge Rungwald (Songs). **11.20,** Artok Pianoforte Recital by Fischer. **11.35,** Dance Music (contd.). **12.30 a.m. (Sunday),** Close Down.

KAUNAS

155 kc/s, 1,935 metres; 7 kW.—**12 Noon,** Time; News. **6.30,** Concert. Overture, Carnival (Dvorák); Selection from The Bartered Bride (Smetana); Indian Lament (Dvorák). **7.0,** Talk. **7.30,** Time; News. **8.10,** Song Recital. **8.30,** Talk. **8.50,** Dance Music. **9.20,** Sports Notes. **9.30,** Concert. **10.30** (approx.), Close Down.

KIEL.—Relays **Hamburg.** **KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—**5.0 a.m.,** Records. **5.50,** Weather. **6.0,** Gym. **6.20** (from **Danzig**), Police Band Concert; Conductor, Stieberitz. **7.0,** News. **7.10** (approx.), Concert (contd.). **8.0,** Service. **8.30 to 9.0,** Gym. for Women. **10.40,** News. **10.55,** Weather. **11.30 to 1.0 p.m.,** Concert by the Opera House Orchestra; Conductor, Brückner: Comedy Overture (Fiedler); Hungarian Peasant Songs (Belá-Bartók); Concert Waltz (Glazunov); Invitation to the Dance (Weber); A Summer Night in Madrid (Glinka); Selection from I Pagliacci (Leoncavallo); Waltz Enfants de Printemps (Waldteufel). In the interval, at **12 Noon,** Weather. **1.1 p.m.,** Time; Weather. **1.5,** Records. In the interval, at **1.20,** News; Programme Announcements; at **2.0,** News. **2.30,** Post Office Propaganda; Records. **3.0,** Market Prices. **3.15,** Book Review. **3.30,** Riddles for Children. **4.0,** Concert by the Small Station Orchestra; Conductor, Wilcken: Overture, Czar and Carpenter (Lortzing); Folk Music Suite, Mit deutschem Klang in deutsches Land, for Orchestra, Mixed Choir and Soloists (Stadler); Marching Song (Schmalstich); Waltz, Ins Zentrum (Joh. Strauss); Selection from Das Pensionat (Suppé); Volk im Lied (Robrecht); Slav Rhapsody (Friedemann); Selection from Die Puppenfee (Bayer); March, Fanfarenklänge (Fucik). In the interval, at **5.0,** Road Report. **6.15,** Market Prices. **6.25,** Nach Adam Riese—Radio Play (Stunnel). **7.0,** Weather. **7.5,** Schubert, Schumann, and Brahms Recital by Friebel (Bass): Two Schubert Songs, (a) Der Einsame, (b) Prometheus; Three Schumann Songs, (a) Aus den östlichen Rosen, (b) Freisinn, (c) Hauptmann's Weib; Four Brahms Songs, (a) An die Nachtigall, (b) Sapphische Ode, (c) Im Waldeinsamkeit, (d) Wir wandelten. **7.35** (from **Danzig**), Reading: Hier sollten Rosen blühen (Jacobsen). **8.0,** Weather; News. **8.10,** Programme for Ex-Service Men. **9.10,** Concert of Operetta Music by the Danzig State Theatre Orchestra and Soloists, relayed from the Kurgarten, Zoppot; Conductor, Senff: Overture, Boccaccio (Suppé); Song from Boccaccio (Suppé); Love Song from Boccaccio (Suppé); Selection from Don Caesar (Dellinger); Selection from Wiener Blut (Joh. Strauss); Duet from Wiener Blut (Joh. Strauss). **10.0,** News; Weather; Sports Notes. **10.30,** Programme from **Hamburg.** **12.30 a.m. (Sunday),** Close Down.

KOSICE.—Relays **Prague.** **LAUSANNE.**—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.**—**5.50 a.m.,** Report for Farmers. **6.0,** Gym. **6.25,** See **Breslau.** **7.0,** News. **7.15** (approx.), See **Breslau.** **8.0,** Gym. **8.20 to 9.0,** Records. **9.40,** Exchange. **9.45,** Programme Announcements. **9.55,** Weather; Water Level Report. **11.0,** Post Office Propaganda; Records. **11.30,** News; Time. **11.40,** Weather. **11.50,** Talk for Farmers. **12 Noon** (from **Dresden**), Concert by the Dresden Philharmonic Orchestra; Conductor, Nerlich: Overture, Der Heideschacht (von Holstein); Mazurka brillante in A (Liszt); Allegretto from Symphony No. 3 in F (Brahms); Selection from the Goldoni Intermezzi (Bossi): (a) Prelude, (b) Gallard, (c) Minuet-Musette, (d) Burlesque (Bossi); Selection from Friedemann Bach (Graener); Prelude in C sharp minor (Rachmaninov); Irrlichter und Kobolde (Hofmann); Waltz, Arabian Nights (Joh. Strauss); Selection from Der Feldprediger (Millöcker); Two Swedish Folk Tunes (Svendsen); Waltz, Gebirgskinder (Ziehrer). In the interval at **1.0,** News; Time. **2.0,** News; Exchange; Weather. **2.20,** Talk: Nietzsche's Mother. **2.40,** Talk: Photography and Art. **3.0,** Fairy Tales for Children. **3.30,** Weekly Review. **3.45,** Exchange; Weather. **4.0,** See **Hamburg.** **5.0,** Talk: Forest Fire Prevention. **5.20,** Commentary on the Riding and Driving Competition, relayed from The Horse Show, Halle. **5.40,** A Modern Dictionary. **5.55,** Recital of Modern Dance Music on Two Pianofortes, by Gebhardt and Golwyn. **6.20,** Nietzsche—Literary and Musical Programme: Hymn to Life, for Orchestra and Choir; Readings from Last Letters; Das Feuerzeichen; Die Sonne sinkt (Mathiessen). **7.0.** East Prussian Folk Songs to the Lute by Hermann Munk. **7.35,** Talk: Growth of Plants. **7.55,** Announcements. **8.0,** News. **8.10.** Workers' Roll of Honour. **8.15,** See **Cologne.** **10.20,** News; Sports Notes. **10.50,** Report of the Lantern Festival on the Saale, at Halle, followed by Dance Music from **Cologne.** **1.0 a.m. (Sunday),** Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 150 kW.—**7.45 a.m.,** Records. **8.0,** News in French; Record; News in German; Record. **12 Noon,** Exchange. **12.5 p.m.,** Religious Address. **12.30,** News in French and German. **12.45,** Concert by the Station Orchestra; Conductor, Pensis: Rakoczy March (Strauss); Waltz, Dolores (Waldteufel); Selection from Mignon (Thomas); Indian Lament (Dvorák); Ballet Music from Undine (Lortzing); Rêverie du Soir (Saint-Saëns); Dance No. 5 (Granados); Selection from The Maid of the Black Forest (Jessel). **3.45,** Exchange. **6.30** till Close Down, French Evening. **6.30,** Variety Programme. **7.30,** Racing Results; Exchange. **7.35,** Song Recital by Mademoiselle Alessebel: Arias from Faust (Gounod), La Bohème (Puccini), Monsieur Beaucaire (Messager), Véronique (Messager); Mamzelle Nitouche (Hervé), The Merry Widow (Lehár), and Paganini (Lehár). **8.0,** News in French and German. **8.20,** Concert by the Station Orchestra; Conductor, Pensis: Overture, Zampa (Herold); Selection from Carmen (Bizet); Pastorale (Pierné). **9.0,** Economic and Social Notes. **9.5,** Concert (contd.): Scène champêtre corrèzienne (Cassadesus); Le Postillon du Roi (Brunel); Petite Suite (Debussy). **9.30,** Theatre Review. **9.35,** Concert by the Station Orchestra and Soloists; Conductor, Pensis. **10.40,** Dance Records.

LYONS

LA DOUA, 648 kc/s, 463 metres; 15 kW.—**8.0 a.m.,** News; Weather. **10.30,** Concert from **Marseilles, 749 kc/s (400.5 metres). 12 Noon,** Concert. **12.15 p.m.,** Concert by the Fusier Orchestra. In the Interval at **1.0,** News; Racing Notes. **3.50,** Concert from Vichy. **4.45,** Concert by the Station Jazz Band. **6.0,** See **Paris (Ecole Supérieure).** **6.30,** News. **7.45,** Local News. **7.50,** Racing Results. **8.0,** Report. **8.10,** Talk in Esperanto. **8.20,** Sports Notes. **8.30,** Dramatic Programme. **10.15,** Dance Music from the Evian Casino.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**9.0 a.m.,** News. **10.0,** Announcements. **10.30,** Interval. **2.0 p.m.,** Chimes; Weather; Light Music. **2.30,** Sextet Concert. **3.0,** Amusement Guide; Exchange; Light Music. **3.30,** Sextet Concert. **4.0,** Light Music. **4.15,** Sextet Concert. **4.40,** News. **5.0,** Interval. **6.0,** Chimes; Light Music. **7.0,** Announcements; Concert. Part I—Recital of Guitar Music; Part II—Choral Music; Part III—Orchestral Music: Overture, Morning, Noon and Night (Suppé); Mazurka. La verbena de la Paloma (Bretón); Selection, Tales of Hoffmann (Offenbach); Three Pieces (Granados); Selection from I Pagliacci (Leoncavallo); Piece (Francis): Scherzo (Mendelssohn). **8.30,** News; Sextet Concert. **9.50,** Sports and Bull-fighting Notes. **10.0,** Programme from **Barcelona.** In the interval at **11.0,** News. **12.45 a.m. (Sunday),** News. **1.0,** Chimes; Close Down.

MADRID

EAQ, 10,000 kc/s, 30 metres; 20 kW.—**7.0 to 8.0 p.m.,** Programme for the Canary Islands, Guinea and Europe. **7.0,** Spanish Music. **7.15,** Talk. **7.30,** Light Music. **11.15,** News. **11.30,** Spanish Music. **12.45 a.m. (Sunday),** Light Music. **1.0** till Close Down, Programme in English arranged by the International Broadcasting Company of London: Half an Hour with the Birds. **1.30,** I.B.C. Goodnight Melody and Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.**—**7.30 a.m.,** Gym. **7.45 to 8.0,** Time; News. **11.30,** Records. **12.45 p.m.,** News. **1.0,** Time; Announcements. **1.5,** Chesi-Zanardelli-Cassone Trio Concert. **1.30,** Records. **1.45,** Chesi-Zanardelli-Cassone Trio Concert. **2.15,** Interval. **4.30,** Balilla Programme. **5.0,** Records. **5.10,** Dance Music by the Tavazza Band, relayed from the Pagoda, **Turin.** **5.55,** Weather. **6.0 to 6.10,** Notes for Farmers; Wheat Market Prices; Lottery Results. **7.0,** Tourist Report; Announcements. **7.15,** News in Foreign Languages. **8.0,** Time; Announcements; News; Weather; Records. **8.30,** Sports Notes. **8.45,** Il Guarany—Opera in Four Acts (Gomez). In the intervals, Talk; Film News. After the Opera, News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**12 Noon,** Announcements; Concert by the Radio Orchestra: Overture, Die vier Menschenalter (Lachner); Selection from Carmen (Bizet); Prelude No. 17, Op. 28 (Chopin); Bohemian Songs and Dances (Fétras); A Sera (Catalini); In a Hong-Kong Street (Humphries). In the interval, at **12.29 p.m.,** Time. **12.55,** News. **1.5,** Records. **1.30,** Report for Motorists. **1.40,** Records. **1.50,** Hints for Housewives. **2.0,** Interval. **3.59,** Time. **4.0,** Orchestral Concert relayed from the Café Huguenin: Three Pieces (Bela Bartok); Adagio (Kodàly); Four Hungarian Melodies (Vaszy); Intermezzo, Hary Janos (Kodaly). **4.30,** Concert of Waltzes: Alpenrosen (Lanner); Künstlerleben (Joh. Strauss); Le Rose (Metra); Les Violettes (Waldteufel); Tesoro mio (Becucci); Carmen Sylva (Ivanovici); Amoureuse (Berger). **5.0,** Accordion Recital by Leopoldi Casella: Prelude (Pachelbel); Aria (Zipoli); Fughetta (Bach); Interlude (Corelli); Fughetta (Handel); Andante religioso (Mendelssohn); Romance (Reger). **5.30,** Song Recital. In the interval, at **5.45,** Sports Notes. **6.0,** Interval. **7.15,** See **Vienna.** In the interval, News; Talk: Mozart. **10.30,** Sports Notes. **10.35,** Dance Music. **11.0** (approx.), Close Down.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.0 to 7.15 a.m.,** See **Prague.** **10.0 to 2.0 p.m.,** See **Prague.** **3.15,** See **Prague.** **4.35,** Week-end in the Mountains—Literary and Musical Programme. **5.40,** Talk: The Ostravian Dialect. **5.50,** Records. **6.0,** Local News. **6.5,** Topical Talk. **6.15,** Brass Band Concert. **6.55,** See **Prague.** **7.30,** Summer—Comedy in Three Acts (Sramek). **9.10,** Records. **9.20,** Reading. **9.35,** See **Prague.** **10.15,** See **Brno.** **11.30** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.,** News. **5.30,** Fanfare. **5.45,** Gym. **6.15,** Programme Announcements. **7.30,** Records. **9.0,** Musical Programme. **9.55,** Time Signal. **10.0,** News. **10.15,** Literary Programme. **11.15,** Programme for Collective Farm Workers. **2.45,** News. **3.15,** Programme for Children. **3.55,** Time Signal. **4.0,** News. **4.30,** Communist Party Programme. **5.30,** Red Army Programme. **6.30,** Opening of the Authors' Conference; Musical Programme. **8.0,** Orchestral Concert. **9.0,** Talk in German: Gorky's Speech at the Authors' Conference. **9.55,** Chimes. **10.5,** Programme in French and Spanish: Weekly Review; Talk: The Authors' Conference.

MOTALA. — Relays **Stockholm.** **MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nürnberg, 1,257 kc/s, 236.8 metres;** and **Kaiserslautern, 1,195 kc/s, 251 metres.**—**6.30 a.m.,** Gym. **6.45,** Motto; Records. **7.15,** Time; Weather; News. **7.25,** Concert from **Stuttgart.** **10.40,** Programme for Farmers. **10.50,** Market Prices. **11.0,** Talk for Farmers. **11.20,** News. **11.30,** Announcements; Records. **12 Noon** (from **Nürnberg**), Orchestral Concert; Conductor, Böhm. **1.15,** Time; Weather; News. **1.25,** Records. **2.0,** News; Sports Notes; Programme Announcements; Exchange. **2.20,** Programme for Young People. **2.45** (from **Nürnberg**), Chess Lesson. **3.15,** Readings. **3.35,** Weather; Notes for Farmers. **3.50,** Labour Exchange Report. **4.0,** See **Königsberg.** **5.30,** Talk: Munich Arts and Crafts. **5.50,** Chamber Music by the Huber Quartet and Elisabeth Voigt (Soprano). **6.10,** Programme for Girls. **6.30,** Talk: Commercial Credit. **6.50,** Weekly Programme Review. **7.0,** See **Hamburg.** **8.0,** News. **8.10,** Easy Luck—A Romantic Play (Hartung), with Music (Eichhorn); Conductor, Kloss. **9.15,** Dance Music by the Station Orchestra; Conductor, Aulich. **10.0,** Time; Weather; News; Sports Notes. **10.20,** Dance Music. **11.0** (from **Nürnberg**), Orchestral Concert. **12 Midnight** (approx.), Close Down.

NAPLES.—Relays **Rome.** **NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jeloy, 6,990 kc/s, 42.92 metres.**—**11.15 a.m.,** Service. **11.50,** Exchange. **12.45 p.m.,** News. **12.55,** Nauen Time Signal. **1.0 to 2.0,** Records. In the intervals, Weather; Report for Farmers; Exchange. **5.0,** Concert. **6.0,** Programme for Children. **6.45,** Talk on Economics. **7.0,** Announcements. **7.15,** News. **7.30,** Time. **7.31,**

Concert of Popular Norwegian Music. **8.0,** Talk. **8.30,** Concert by the Station Orchestra; Conductor, Kramm. **9.25,** Sports Notes. **9.35,** Book Review. **9.40,** News. **10.0,** Topical Talk. **10.15,** Light Music. **11.0,** Dance Records. **12 Midnight** (approx.), Close Down.

OSTERSUND.—Relays **Stockholm.**

PALERMO

565 kc/s, 531 metres; 4 kW.—**12.45 p.m.,** News. **1.0 to 2.0** Light Music. In the interval at **1.30,** Time; News; Weather. **4.30,** Special Programme for Children's Holiday Camps and Hostels. **5.30,** Records. **6.10 to 6.30,** Balilla Programme. **8.0,** Announcements; Programme for Farmers; News. **8.20,** Sports Notes. **8.30,** Time; News; Records. **8.45,** Ideale—Opera in Three Acts (Tosti); Conductor: Militelo. In the intervals, Literary Talk and News. **11.0,** News.

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 a.m.,** News. **10.30,** Concert from **Marseilles, 749 kc/s (400.5 metres). 12 Noon,** Tourist Report. **12.15 p.m.,** Quintet Concert: Overture, Tutti in maschere (Pedrotti); Extracts from La Source (Delibes); Minuet (Boccherini); Extracts from Le Jongleur de Notre-Dame (Massenet); Le Baiser d'Eunice (Nouguès); Waltz (Strauss); Selection from Pas sur la Bouche (Yvain). In the Interval at **1.0,** News. **2.0,** Records. **2.30,** The Song in all its forms—Concert. **3.15,** Wireless Competition Audition. **6.0,** Literary and Science Notes. **6.30,** News. **7.33,** Gardening Talk. **7.45,** Legal Talk. **8.0,** See **Warsaw. 8.30,** Variety Programme with Orchestra: Conductor: André; Suite carnavalesque (Razigade); Valse des Fleurs (Tchaikovsky); Norwegian Song (Fourdrain); Berceuse (Clutsam); Extrême Orient (de la Presle); Lolita (Buzzi-Peccia); Interlude by Camia (Diseuse); Les Violons de Monsieur Conti (Wormser); Interlude by Mériel (Comedian); Selection from Phryné (Saint-Saëns); Overture, Héloise et Abélard (Litolff); La Provençale (Bérardy); Pour toi, Madona (Schmitt-Neuville); Melody (Roger-Scots); Si la femme du matelot (Boyer-Learsi); Interlude by Jeanine Carlyse; Miniature Ballet, Les Pupazzi (Rénaud); Interlude by Bergeret; Viennese Waltz (Fétras); Melody (Clérice). After the Concert: News. **10.30,** Dance Music by the Locatelli Orchestra.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.10 a.m.,** Fanfare; Records. In the intervals at **7.30** and at **8.30,** News. **12 Noon,** Exchange. **12.5 p.m.,** Records. **12.25,** Interlude. **12.35,** Records. **1.5,** Exchange. **1.10,** Concert by the Station Orchestra; Overture, Zampa (Hérold); Waltz, Plus légère (Messier); Spring Song (Mendelssohn); Selection from Gypsy Love (Lehár); Mimosa (Ewing); Petite Suite d'Antan (Février); Waltz, Les Patineurs (Waldteufel). **1.20,** Exchange. **1.45,** Exchange. **2.0 to 2.5,** Exchange. **3.15,** Exchange. **6.45,** Exchange. **6.49,** Records. **7.2,** Topical Talk. **7.10,** News. **7.30,** Records: Tangos and Waltzes. **8.0,** Interval. **8.10,** Topical Review. **8.20,** Accordion Music by Ferrero and his Ensemble. **8.40,** Exchange. **8.50,** Interval. **9.0,** Records. **10.0** till Close Down, Programme in English arranged by the International Broadcasting Company of London. **10.0,** Carroll Gibbons and his Band, relayed from the Deauville Casino. **11.0** (approx.), Close Down.

PARIS

RADIO PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.,** Gym. **7.0,** Records. **7.15,** News.. **7.45,** Gym. **8.0,** Records. **10.15,** Concert from **Vichy:** March from the Prophet (Meyerbeer); Vieux Page (Epinat); Escapade (Epinat); Overture, Madame Favart (Offenbach); Sérénade mutine (Gabriel-Marie); Folie de bergers (Drigo); Selection from La Cigale et la Fourmi (Audran); Valse alsacienne (Fourdrain); Savoyarde Suite (Chanaud). **12 Noon,** Symphony Concert. Conductor: Letombe. **3.0,** Programme for Children. **6.20,** Weather; Programme for Farmers; Racing Results. **6.50,** Talk. **7.15,** Latin Press Review. **7.30,** Topical Talk. **8.0,** Modern French Music—Recital by Jean Doyen (Pianoforte). **8.30,** News. **8.45,** See **Milan.** In the Interval at **9.15,** Sports Results; News; Review.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK on 48.86 metres,** and **25.27 metres.**—**3.0 p.m.,** Edward MacHugh. **3.15,** KDKA Home Forum. **3.30,** Singing Strings. **3.45,** News; Originalities. **4.0,** Bobby and Sue—Helen Irwin. **4.15,** KDKA Kiddies' Klub. **5.0,** Genia Fonariova. **5.15,** Fields and Hall. **5.30,** Vic and Sade. **5.45,** Hotel William Penn Orchestra. **6.15,** Songfellows. **6.30,** Farm and Home Hour. **7.30,** Royal Hawaiian Orchestra. **8.0,** Tommy Tucker's Orchestra. **8.30,** Saturday's Songsters. **9.0,** Terrace Gardens Orchestra. **9.15,** Platt and Nierman. **9.30,** Chicago Symphony Orchestra. **10.30,** A Recreo—Bill and Alex. **10.45,** Orphan Annie. **11.0,** Time; Temperature; Weather. **11.15,** Goodrich Baseball Résumé. **11.30,** Twenty Fingers Harmony. **11.45,** John Herrick (Baritone). **12 Midnight,** Al Williams. **12.15 a.m. (Sunday),** News. **12.20,** Hotel William Penn Orchestra. **12.45,** Don Bestor's Orchestra. **1.0 to 6.0 a.m.,** Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 to 7.15 a.m.,** Gym.; Music; News; Weather. **10.0,** Record. **10.5,** News. **10.20,** News in German. **10.25,** Records. **11.5,** Concert by the Muzik Instrumental Quartet. Romantic Waltz (Heinecke); Fantasia (Komzák); Song (Dvorák); Potpourri of Czech Songs (Händl); Air from The Secret (Smetana); Turkish March (Mozart). **12 Noon,** Time; Report for Farmers; Exchange; Weather. **12.10 p.m.,** Records. **12.20,** News. **12.30,** Concert by the Station Orchestra. Conductor, Parik. Elegy and Rondino (Axman); Gavotte in Old Style (Jirák); Ballet Music (Kovarovic); Waltz (Sebor). **1.30,** Industrial Review. **1.40 to 2.0,** Records. **3.15,** Light Music by the Osten Jazz Band. **4.15,** Educational Talk. **4.35,** See **Moravská-Ostrava. 5.40,** Announcements. **5.45,** Record. **5.50,** Talk for Farmers. **5.55,** Record. **6.0,** Talk for Workers. **6.10,** German Transmission. Concert by the Municipal Orchestra from Marienbad. Conductor, Kunz. **6.55,** News in German. **7.0,** News. **7.10,** Record. **7.15,** Talk. **7.30,** See **Brno. 8.20,** Reminiscences of Prague in 1880. **9.0,** Time. **9.5,** Vocal Concert, relayed from Hronov. **9.35,** Records. **10.0,** Time; News; Review; Sports Notes. **10.15,** Records. **10.30,** See **Brno. 11.30** (approx.), Close Down.

REYKJAVIK

208 kc/s, 1,442 metres; 16 kW.—**12 Noon,** Weather. **2.15 p.m.,** Variety Programme. **5.0,** Weather. **9.10,** Weather. **9.25,** Music. **9.50,** Announcements. **10.0,** Time; Concert by the Station Trio. **10.30,** Reading. **11.0,** News. **11.30,** Records; Dance Music. **2.0 a.m.** (approx.), Close Down.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan (No. 2), 1,348 kc/s, 222.6 metres; Turin (No. 2), 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.**—**7.30 a.m.,** Gym. **7.45 to 8.0,** Time; News; Weather. **12.30 p.m.,** Records. **1.30,** Time; Announcements; News. **1.45,** Records. **4.20,** News; Exchange. **4.30,** See **Milan. 5.10,** Vocal and Instrumental Concert by Berengo-Gardin (Violin), Dolores Ottani (Soprano), Castello (Baritone), and Puliti-Santoliquido (Pianoforte): Adagio and Rondo from the Sonata in A for Violin and Pianoforte (De Guarnieri); Arias from Manon (Massenet), Lodoletta (Mascagni), and La rondine (Puccini); Short Story, for Violin and Pianoforte (Gershwin); Finale from Sonatina transatlantica, for Violin and Pianoforte (Tansman); Three Songs: Arias from I puritani (Bellini), Nero (Rubinstein), and Carmen (Bizet). **5.55,** Weather. **6.0,** Wheat Market Prices. **6.10 to 6.15,** Lottery Results. **7.0,** Tourist Notes; Report of the Royal Geographical Society; Announcements. **7.15,** News in Foreign Languages. **8.0,** Time; Announcements; News; Sports Notes. **8.10,** Records. **8.30,** Sports Notes. **8.45,** A Night in Harlem. **9.30,** Symphony Concert relayed from the Basilica di Massenzio.

RUYSSELEDE

10.330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.,** News in French. **8.0,** L'heure espagnole (Ravel) on Records. **9.0,** News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by **W2XAF** on **31.48 metres and by W2XAD on 19.56 metres.**—**7.0 p.m.,** Green Brothers Novelty Orchestra. **7.30,** Week-End Revue. **11.45,** Stock Reports. **12 Midnight,** Variety Programme. **12.30 a.m. (Sunday),** Hands across the Border. **1.0 to 3.0 a.m.,** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW.; and **Geneva, 401 kc/s, 748 metres.**—**7.45 to 8.15 a.m.,** See **Beromünster. 12.29 p.m.,** Time from Neuchâtel Observatory. **12.30,** News. **12.40** (from **Geneva**), Records. **1.0,** Exchange. **1.5** (from **Geneva**), Records (contd.). **2.30,** Commentary on the Cycle Tour of Switzerland. **3.0,** Interval. **3.59,** Time from Neuchâtel Observatory. **4.0,** See **Monte Ceneri. 6.0** (from **Geneva**), Talk: Canoes, Kayaks and Collapsible Boats. **6.15** (from **Geneva**), Talk for Amateur Photographers. **6.45** (from **Geneva**), Commentary on the Cycle Tour of Switzerland. **7.15,** See **Vienna. 8.45,** News. **10.25** (from **Geneva**), Dance Records. **11.30** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW.—Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.**—**7.45 a.m.,** Service. **8.0,** Weather. **12.30 p.m.,** Weather. **12.45,** Exchange. **12.55,** Time Signal. **2.0,** Concert of Light Music relayed from **Malmö, 1,312 kc/s, 228.7 metres. 3.0,** Reading. **3.30,** Light Music relayed from **Ostersund, 3.50,** Organ Recital by Gösta Berlin. **4.15,** Programme for Children. **5.0,** Weather. **5.5,** Records. **6.0,** Report of a Sports Contest—Sweden v. Norway—in Oslo. **7.15,** Weather; News. **7.30,** Talk. **9.0,** Old-time Dance Music. **9.45,** Weather; News. **10.0,** Dance Music. **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.30 a.m.,** Orchestral Concert relayed from **Marseilles (PTT), 749 kc/s, 400.5 metres. 12 Noon,** Records: Overture, Iphigenia in Aulis (Gluck); Ballet Music from Les petits riens (Mozart); Romance from the Concerto in E minor (Chopin); Mazurkas (Chopin); Si mes vers avaient des ailes (Hahn); Il pleure dans mon cœur (Debussy); Bohemian Dances (Zanacek); Liebestraum (Liszt); Prelude in C sharp minor (Rachmaninov); Granada Cataluna (Albeniz). **12.45 p.m.,** News. **1.0,** Time; Records. **1.15,** Orchestral Concert relayed from **Lille, 1,213 kc/s, 247.3 metres. 2.0,** Records. **2.45,** Music Talk. **3.0,** Interval. **3.30,** Orchestral Concert relayed from the Casino, **Vichy;** Conductor: Brouillac. **4.45,** Talk for Women. **5.0,** Schumann Concert; Conductor: de Villers; Soloist: Serres ('Cello); Selection from Manfred; 'Cello Concerto; Overture, Genoveva. **6.0,** French Lesson. **6.15,** Gardening Talk in German. **6.30,** Concert relayed from **Radio Coloniale (Paris), 11,905 kc/s (25.20 metres);** Soloists: Fanny Lancret (Songs), Petit (Pianoforte) and Lefèvre (Flute). **7.30,** Time; News. **7.45,** News. **8.0,** Press Review in German; Lottery Results; Announcements. **8.30,** Orchestral Concert; Conductor: de Villers. In the interval at **9.30,** News. **10.30** (approx.), Close Down.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.35 a.m.,** Talk for Farmers. **5.45,** Hymn; Motto; Time; Weather. **5.50,** Gym. **6.15,** Records. **6.40,** Time; News; Weather. **6.55,** Concert by the Philharmonic Orchestra, relayed from **Mannheim;** Conductor, Becker. **8.10,** Weather. **8.15,** Gym. **8.35,** Interval. **10.0,** News. **10.10,** Franz Abt Lieder Recital by Lingot (Tenor): Ave Maria; O Schwarzwald, O Heimat; Wenn die Schwalben heimwärts ziehen; In den Au gen liegt das Herz; O Jugend, wie bist du so schön; Soldatenart. **10.30,** Records. **11.25,** Post Office Propaganda. **11.55,** Weather. **12 Noon,** See **Leipzig. 1.0 p.m.,** Time; Local News. **1.5,** News; Weather. **1.20,** Records. **1.50,** Time; News. **2.0,** Gramophone Concert: Steckenpferd und Puppe (Theiss); Die alte Spieluhr (Reisfeld-Marbot); Komm mein Mädel (Kermbach); Ein Schäferstundchen (Siede); Sogni (Toselli); Selection from Der Kellermeister (Zeller); Potpourri (Leuschner); March, Wien bleibt Wien (Schrammel). **2.30,** Ali Baba and the Forty Thieves—Play for Children (arr. Wehrle). **3.10,** Morse Lesson. **3.30,** Folk Songs by the Bechtheim Choir: Ade (Werth); Treue Liebe (Hirsch); Die Spinnerin (Schauss); Folk Song (Rebbert); Acht wie ist's möglich dann (Werth). **4.0,** See **Königsberg. 5.45,** Commentary on a Procession. **6.0,** See **Frankfurt. 6.20,** Ten Poems (Mühlen), with Music (Dressel), by Anton Maria Topitz (Tenor). **7.0,** Soprano, Tenor and Pianoforte Recital. **8.0,** News. **8.5,** See **Frankfurt. 8.10,** See **Munich. 10.20,** Time; News. **10.35,** Announcements. **10.45,** News; Weather; Sports Notes. **11.0,** See **Hamburg. 12 Midnight,** Serenade. **2.0 a.m. (Sunday),** Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.,** Dance Refrains. **8.30,** News. **8.35,** Popular Songs. **8.45,** Bal Musette. **12 Noon,** Operetta Music. **12.15 p.m.,** Orchestral Pieces. **12.30,** News. **12.45,** Request Items. **1.0,** News. **1.5,** Music by a Viennese Orchestra. **1.15,** Opera Arias: Extracts from Werther (Massenet), The Pearl Fishers (Bizet), Carmen (Bizet) and Manon (Massenet). **1.30,** Orchestral Pieces. **1.45,** Songs from Sound Films. **2.0,** News. **8.0,** News. **6.15,** Opera Music: Selection from Carmen (Bizet); Chorus from Cavalleria rusticana (Mascagni); Extract from Ramuntcho (Pierné). **6.30,** Songs. **6.45,** Orchestral Music. **7.0,** Tyrolese Music. **7.15,** Operetta Music. **7.30,** News. **7.45,** Balalaika Music and Russian Songs. **7.50,** Talk. **8.15,** 'Cello Recital; Ständchen (Schubert); Melody (Rubinstein); Allegro appassionata (Saint-Saëns); Romance sans Paroles (Fauré); Largo (Chopin). **8.30,** Humorous Scenes. **9.0,** Concert of Opera Music; Extracts from Don Quichotte (Massenet), The Dusk of the Gods (Wagner), Tristan and Isolda (Wagner), Manon (Massenet), Werther (Massenet), Thaïs (Massenet), Boris Godunov (Mussorgsky). **9.30,** Cinema Organ Recital; Bells across the Meadows (Ketelbey); Blumenlied (Lange); O Donna Clara (Petersbursky); La Paloma (Yradier). **10.0,** Songs from Sound Films. **10.15,** North African News. **10.30,** Solos. **11.0,** Request Items. **11.15,** Music by a Viennese Orchestra. **11.30,** Operetta Music. **11.50,** Miltiary Music. **12 Midnight,** News. **12.5 a.m. (Sunday),** Au Caveau de minuit—Radio Fantasy. **12.15,** Orchestral Introduction to Cavalleria rusticana (Mascagni). **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo. TURIN.**—Relays **Milan.**

VATICAN CITY

15,120 kc/s, 19.84 metres; 10 kW. **(Morning); 5,970 kc/s, 50.26 metres (Evening).**—**11.0 to 11.15 a.m.,** Religious Information in Various Languages. **8.0 to 8.15 p.m.,** Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz** and **Salzburg, 1,294 kc/s, 231.8 metres.**—**9.0 a.m.,** News. **9.20,** Market Prices. **9.30,** Weather. **10.50,** Water Level Report; Weather. **11.30,** Programme for Women. **11.55,** Weather. **12 Noon,** Orchestral Concert; Conductor, Philipp de la Cerda. **1.0 p.m.,** Time; Weather; News; Programme Announcements. **1.10,** Concert (contd.). **2.0,** Announcements. **2.10,** Gramophone Concert: Petite valse (Carreno); Caro mio ben (Giordani); Romance, Op. 50 (Beethoven); Moment musical (Schubert). **3.0,** Time; Weather; Exchange. **3.15,** Talk in English: English Provincial Life. **3.45,** Song Recital by Fukar (Bass Baritone). **4.20,** News. **4.25,** Reading: Gartenglück (Kretschmer). **4.50,** Talk: Bad Kufstein. **5.15,** Concert by the Vienna Symphony Orchestra; Conductor, Holzer: Soloists, Anny Dampf (Soprano), Ranek (Tenor). **6.30,** Topical Talk. **6.55,** Time; Programme Announcements; Weather; News; Sports Notes; Home Hints. **7.15,** Don Giovanni—Opera in Two Acts (Mozart), relayed from the Festspielhaus, **Salzburg;** Conductor, Bruno Walter. **10.30,** News; Announcements. **10.50,** Orchestral Concert; Conductor, Silving: March (Kastner-Krogner); Overture, Der Vogelhändler (Zeller-Bauckner); La mattinata (Leoncavallo); American Song Potpourri, In the Sunny South (Lampe); Reverie, The Wanderer's Return (Ketelbey); Intermezzo, The Japanese Screen (Ketelbey); Suite, In einem Spielwarenladen (Engleman); Waltz, Tanzklänge aus Berchtesgaden (Pachernegg); Flower Song Potpourri (Ketelbey); Evening Bells (Williams); Im Reiche Buddhas (Armandola); Serenade of the Elfs (Rayners); Second Waltz Potpourri (Robrecht); March Potpourri (Woitschach); Song and Dance Suite from The Little Café (Benatzky); Waltz, Wilde Rosen (Ganglberger); Selection from Carmen, (a) Duet, (b) Song, (c) Seguedilla, (d) Bohemian Song (Bizet-Choudens); Waltz Song, Ich hab'einen Gusto auf Wien (Silving); Dance Song, Am Sommerheidenweg (Silving); March, Ein Wiener Mädel (Sueczynski). **1.0 a.m. (Sunday),** Close Down.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.,** Hymn. **6.35,** Records. **6.38,** Gym. **6.53,** Records. **7.5,** News. **7.10,** Records. **7.20,** Hints for Housewives. **7.25,** Programme Announcements. **7.30,** Miscellaneous Items. **7.40,** Interval. **11.57,** Time. **12 Noon,** Fanfare from the Tower of St. Mary's Church, Cracow. **12.3 p.m.,** Weather. **12.5,** News. **12.10,** Dance Music. **1.0,** News. **1.5,** Records. **2.0,** News. **2.5,** Talk on Economics. **2.15,** Interval. **4.0,** Light Music. **5.0,** Play for Children. **5.25,** Song Recital by Olgina (Soprano) and Weissis (Tenor). **6.0,** Reading. **6.15,** Violin Recital, relayed from **Poznan, 868 kc/s, 345.6 metres. 6.45,** Talk: The Air Pageant. **6.55,** Art Notes. **7.0,** Miscellaneous Items. **7.10,** Programme Notes. **7.15,** Records. **7.50,** Sports Notes. **8.0,** Chopin Pianoforte Recital by Rabcewicz: Ballad in F, Op. 38, No. 2; Two Etudes in E flat minor, Op. 10, and in F minor, No. 1; Impromptu; Polonaise in F sharp, Op. 44. **8.30,** Talk in English: Pilsudski. **8.40,** Song Recital by Szabranska. **9.0,** Fanfare. **9.2,** News. **9.12,** Concert of Light Music. **10.0,** Topical Talk. **10.10,** Dance Music from the Café Europe, Ciechocinek. **11.0,** Weather. **11.5,** Programme from **Wilno, 536 kc/s, 559.7 metres.**

ZAGREB

1,086 kc/s, 276.2 metres; 0.7 kW.—**12.20 p.m.,** Cookery Hints. **12.30,** Records. **1.0,** Programme Announcements. **1.5,** Records. **1.40 to 1.50,** News. **4.45,** News. **5.0,** Trio Concert. **7.35,** Sports Notes. **7.50,** Announcements. **8.15,** Recital on Two Pianofortes. **8.45,** Concert by a Wind Instrument Orchestra. **9.45,** Records. **10.0,** News; Weather; Programme Announcements. **10.15,** Dance Music from the Hotel Esplanade. **11.0** (approx.), Close Down.

ZURICH.—Relays **Beromünster.**

AUG. 25th SATURDAY *continued*

PRINCIPAL BROADCASTING STATIONS OF EUROPE

Arranged in Order of Frequency and Wavelength

(Stations with an aerial power of 50 kW. and above in heavy type)

Station.	kc/s.	Tuning Positions.	Metres.	kW.
Kaunas (Lithuania)	155	.....	1935	7
Brasov (Roumania)	160	.....	1875	20
Hilversum (Holland). (*Kootwijk*, 50 *kW. after* 3.40 *p.m.*)	160	.....	1875	7.5
Lahti (Finland)	166	.....	1807	40
Moscow, No. 1, RW1 (Komintern) (U.S.S.R.)	174	.....	1724	500
Paris (Radio Paris) (France)	182	.....	1648	75
Madrid, No. 3 (Telecommunicaciones) (Spain)	183	.....	1639	1
Istanbul (Turkey)	186	.....	1613	5
Berlin (Deutschlandsender Zeesen) (Germany)	191	.....	1571	60
Daventry National	200	.....	1500	30
Minsk, RW10 (U.S.S.R.)	208	.....	1442	35
Reykjavik (Iceland)	208	.....	1442	16
Paris (Eiffel Tower)	216	.....	1389	13
Motala (Sweden). (*Relays Stockholm*)	216	.....	1389	30
Warsaw, No. 1 (Raszyn) (Poland)	223	.....	1345	120
Ankara (Turkey)	229	.....	1310	7
Luxembourg	230	.....	1304	150
Kalundborg (Denmark)	238	.....	1261	75
Leningrad, No. 1, RW53 (Kolpino) (U.S.S.R.)	245	.....	1224	100
Oslo (Norway)	260	.....	1154	60
Madona (Latvia)	262	.....	1145	20
Moscow, No. 2, RW49 (U.S.S.R.)	271	.....	1107	100
Rostov-on-Don, RW12 (U.S.S.R.)	355	.....	845.1	20
Sverdlovsk, RW5 (U.S.S.R.)	375	.....	800	50
Smolensk, RW24 (U.S.S.R.)	364	.....	824.2	10
Geneva (Switzerland). (*Relays Sottens*)	401	.....	748	1.3
Moscow, No. 3 (RCZ) (U.S.S.R.)	401	.....	748.1	100
Voroneje, RW25 (U.S.S.R.)	413.5	.....	725.5	10
Oulu (Finland)	431	.....	696.1	1.5
Oufa, RW22 (U.S.S.R.)	436	.....	688.1	10
Hamar (Norway)	519	.....	578	0.7
Innsbruck (Austria). (*Relays Vienna*)	519	.....	578	0.5
Ljubljana (Yugoslavia)	527	.....	569.3	5
Viipuri (Finland)	527	.....	569.3	10
Bolzano (Italy)	536	.....	559.7	1
Wilno (Poland)	536	.....	559.7	16
Budapest, No. 1 (Hungary)	546	.....	549.5	120
Beromunster (Switzerland)	556	.....	539.6	60
Athlone (Irish Free State)	565	.....	531	60
Palermo (Italy)	565	.....	531	4
Stuttgart (Mühlacker) (Germany)	574	.....	522.6	100
Riga (Latvia)	583	.....	514.6	15
Agen (France)	583	.....	514.6	0.6
Vienna (Bisamberg) (Austria)	592	.....	506.8	120
Rabat (Radio Maroc) (Morocco)	601	.....	499.2	6.5
Sundsvall (Sweden). (*Relays Stockholm*)	601	.....	499.2	10
Florence (Italy). (*Relays Milan*)	609	.....	492.6	20
Cairo, No. 1 (Abu Zabal) (Egypt)	620	.....	483.9	20
Brussels, No. 1 (Belgium). (*French Programme.*)	620	.....	483.9	15
Lisbon (Bacarena) (Portugal)	629	.....	476.9	20
Tröndelag (Norway)	629	.....	476.9	20
Prague, No. 1 (Czechoslovakia)	638	.....	470.2	120
Lyons, P.T.T. (La Doua) (France)	648	.....	463	15
Cologne (Langenberg) (Germany)	658	.....	455.9	60
North Regional (Slaithwaite)	668	.....	449.1	50
Sottens (Radio Suisse Romande) (Switzerland)	677	.....	443.1	25
Belgrade (Yugoslavia)	686	.....	437.3	2.5
Paris, P.T.T. (Ecole Supérieure) (France)	695	.....	431.7	7
Stockholm (Sweden)	704	.....	426.1	55
Rome, No. 1 (*Short-wave station*, 25.4 *metres*)	713	.....	420.8	50
Kiev, RW9 (U.S.S.R.)	722	.....	415.5	36
Tallinn (Esthonia)	731	.....	410.4	20
Madrid, No. 1, EAJ2 (Radio España) (Spain)	731	.....	410.4	0.8
Munich (Germany)	740	.....	405.4	100
Marseilles, P.T.T. (France)	749	.....	400.5	1.6
Katowice (Poland)	734	.....	408	16
Midland Regional (Daventry)	767	.....	391.1	25
Toulouse, P.T.T. (France)	776	.....	386.6	0.7
Leipzig (Germany)	785	.....	382.2	120
Barcelona, EAJ1 (Spain)	795	.....	377.4	5
Lwow (Poland). (*Relays Warsaw*)	795	.....	377.4	16
Scottish Regional (Falkirk)	804	.....	373.1	50
Milan (Italy)	814	.....	368.6	50
Bucharest (Romania)	823	.....	364.5	12
Moscow, No. 4, RW39 (Stalina) (U.S.S.R.)	832	.....	360.6	100
Berlin (Funkstunde Tegel). (*Short-wave Stations*, 16.89, 19.73, 25.5, 31.38 *and* 49.83 *metres.*)	841	.....	356.7	100
Bergen (Norway)	850	.....	352.9	1
Valencia (Spain)	850	.....	352.9	1.5
Simferopol, RW52 (U.S.S.R.)	859	.....	349.2	10
Strasbourg, P.T.T. (France)	859	.....	349.2	15
Poznan (Poland)	868	.....	345.6	20
London Regional (Brookmans Park)	877	.....	342.1	50
Graz (Austria). (*Relays Vienna*)	886	.....	338.6	7
Limoges, P.T.T. (France)	895	.....	335.2	0.5
Helsinki (Finland)	895	.....	335.2	10
Hamburg (Germany)	904	.....	331.9	100
Toulouse (Radio Toulouse) (France)	913	.....	328.6	60
Brno (Czechoslovakia)	922	.....	325.4	32
Brussels, No. 2. (*Flemish Programme*)	932	.....	321.9	15
Algiers, P.T.T. (Radio Alger) (Algeria)	941	.....	318.8	12
Göteborg (Sweden). (*Relays Stockholm*)	941	.....	318.8	10
Breslau (Germany)	950	.....	315.8	60
Paris (Poste Parisien) (France)	959	.....	312.8	100
Grenoble, P.T.T. (France)	968	.....	309.9	15
West Regional (Washford Cross)	977	.....	307.1	50
Cracow (Poland)	986	.....	304.3	1.7
Genoa (Italy). (*Relays Milan*)	986	.....	304.3	10
Huizen (Holland). (7 *kW.* till 6.40 p.m.)	995	.....	301.5	20
Bratislava (Czechoslovakia)	1004	.....	298.8	13.5
North National (Slaithwaite)	1013	.....	296.2	50
Barcelona, EAJ15 (Radio Asociación) (Spain)	1022	.....	293.5	1
Königsberg (Heilsberg Ermland) (Germany)	1031	.....	291	60
Parede (Radio Club Portugues) (Portugal)	1031	.....	291	5
Leningrad, No. 2, RW70 (U.S.S.R.)	1040	.....	288.5	10
Scottish National (Falkirk)	1050	.....	285.7	50
Bari (Italy)	1059	.....	283.3	20
Tiraspol, RW57 (U.S.S.R.)	1068	.....	280.9	4
Bordeaux, P.T.T. (Lafayette)	1077	.....	278.6	12
Zagreb (Yugoslavia)	1086	.....	276.2	0.7
Falun (Sweden)	1086	.....	276.2	0.5
Madrid, No. 2, EAJ7 (Union Radio) (Spain)	1095	.....	274	7
Naples (Italy). (*Relays Rome*)	1104	.....	271.7	1.5
Alexandria, No. 1 (Egypt)	1122	.....	267.4	11
Belfast	1122	.....	267.4	1
Nyiregyhaza (Hungary)	1122	.....	267.4	6.2
Hörby (Sweden). (*Relays Stockholm*)	1131	.....	265.3	10
Turin, No. 1 (Italy). (*Relays Milan*)	1140	.....	263.2	7
London National (Brookmans Park)	1149	.....	261.1	50
West National (Washford Cross)	1149	.....	261.1	50
Kosice (Czechoslovakia). (*Relays Prague*)	1158	.....	259.1	2.6
Moravska-Ostrava (Czechoslovakia)	1158	.....	259.1	11.2
Monte Ceneri (Switzerland)	1167	.....	257.1	15
Copenhagen (Denmark). (*S.-w. Stn.*, 31.51 m.)	1176	.....	255.1	10
Kharkov, RW4 (U.S.S.R.)	1185	.....	253.2	20
Frankfurt (Germany)	1195	.....	251	17
Prague, No. 2 (Czechoslovakia)	1204	.....	249.2	5
Lille, P.T.T. (France)	1213	.....	247.3	1.3
Trieste (Italy). (*Relays Milan*)	1222	.....	245.5	10
Gleiwitz (Germany). (*Relays Breslau*)	1231	.....	243.7	5
Cork (Irish Free State)	1240	.....	241.9	1
Nice (Juan-les-Pins) (France)	1249	.....	240.2	2
Rome, No. 3 (Italy)	1258	.....	238.5	1
San Sebastian (Spain)	1258	.....	238.5	0.6
Nürnberg and Augsburg (Germany)	1267	.....	236.8	2
Norwegian Relay Stations	1276	.....	235.1	0.5
Dresden (Germany)	1285	.....	233.5	0.25
Aberdeen	1285	.....	233.5	1
Austrian Relay Stations	1294	.....	231.8	0.5
Danzig. (*Relays Heilsberg*)	1303	.....	230.2	0.5
Swedish Relay Stations	1312	.....	228.7	1.25
Magyarovar (Hungary)	1321	.....	227.1	1.25
German Relay Stations	1330	.....	225.6	1.5
Montpellier, P.T.T. (France)	1339	.....	224	0.8
Lodz (Poland)	1339	.....	224	1.7
Dublin (Irish Free State)	1348	.....	222.6	1
Milan, No. 2 (Italy)	1348	.....	222.6	4
Turin, No. 2 (Italy). (*Relays Rome*)	1357	.....	221.1	1
Warsaw, No. 2 (Poland)	1384	.....	216.8	10
Lyons (Radio Lyon) (France)	1393	.....	215.4	0.7
Tampere (Finland)	1420	.....	211.3	1.2
Newcastle	1429	.....	209.9	1
Béziers (France)	1429	.....	209.9	0.3
Paris, (Radio LL)	1429	.....	209.9	0.8
Miskolc (Hungary)	1438	.....	208.6	1.25
Fécamp (Radio Normandie)	1456	.....	206	10
Pecs (Hungary)	1465	.....	204.8	1.25
Bournemouth	1474	.....	203.5	1
Plymouth	1474	.....	203.5	0.3
Antwerp (Belgium)	1492	.....	201.1	0.1

SHORT-WAVE STATIONS OF THE WORLD

(N.B.—Times of Transmission given in parentheses are approximate only and represent G.M.T.)

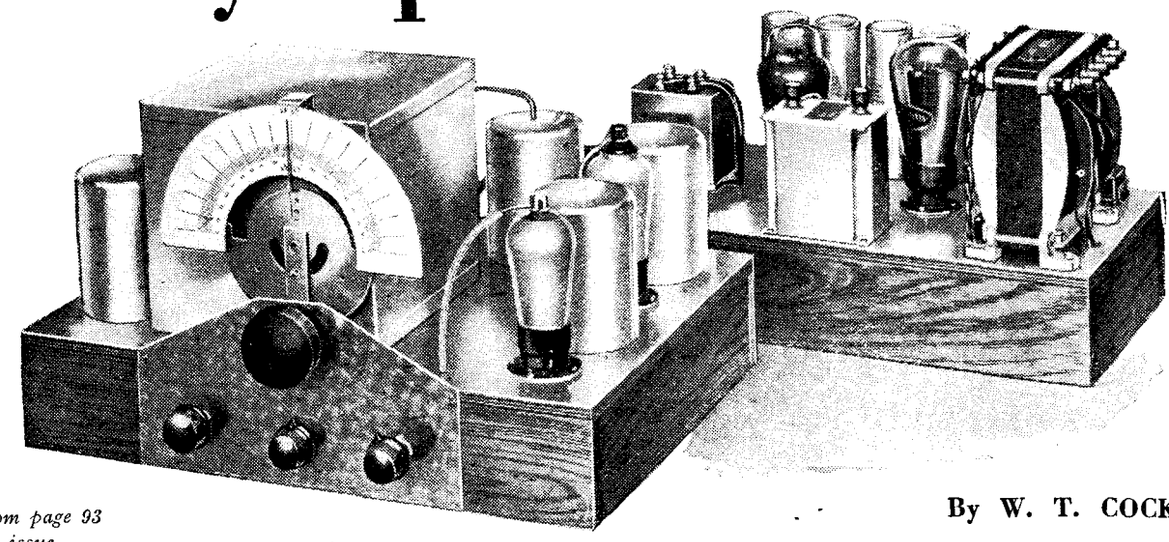
Metres.	kc/s.	Call Sign.	Station.	Tuning Positions.
62.56	4,795	VE9BY	London, Ont. (Canada). (*Sun.* 06.0) ...	.....
58.31	5,145	OK1MPT	Prague (Czechoslovakia). (*Tues. an Fri.* 19.30)	.....
50.26	5,970	HVJ	Vatican State, Rome. (*Daily* 19.00) ...	.....
50.0	6,000	RW59	Moscow. (*Relays No. 1 Stn.*)	.....
50.0	6,000	EAR25	Barcelona, Radio Club (Spain). (*Sat.* 20.00)	.....
49.83	6,020	DJC	Zeesen (Germany). (*Daily* 18.00 *and* 01.00)	.....
49.67	6,040	W1XAL	Boston, Mass. (U.S.A.)	.....
49.67	6,040	W4XB	Miami Beach, Florida (U.S.A.)	.....
49.58	6,050	GSA	Empire Broadcasting	.....
49.5	6,060	W3XAU	Philadelphia, Pa. (U.S.A.). (*Relays WCAU*)	.....
49.5	6,060	VQ7LO	Nairobi (Kenya Colony). (*Daily* 16.30)...	.....
49.5	6,060	W8XAL	Mason, Ohio (U.S.A.). (*Relays WLW*) ...	.....
49.43	6,069	VE9CS	Vancouver, B.C. (Canada)	.....
49.34	6,080	W9XAA	Chicago, Ill. (U.S.A.). (*Relays WCLF*)...	.....
49.22	6,095	VE9GW	Bowmanville, Ont. (Canada). (*Daily* 20.00)	.....
49.18	6,100	W3XAL	Bound Brook, N.Y. (*Relays WJZ*) ...	.....
49.18	6,100	W9XF	Downers Grove, Ill. (U.S.A.)	.....
49.1	6,110	VUC	Calcutta, India. (*Daily* 13.00)	.....
49.02	6,120	W2XE	Wayne, N.J. (U.S.A.). (*Relays WABC*)...	.....
49.0	6,122	ZTJ	Johannesburg (S. Africa). (*Weekdays* 09.00) 14.00 [*Sat.* 14.30] *and* 17.00, *Sun.* 13.00 *and* 16.30.)	.....
48.86	6,140	W8XK	East Pittsburg, Pa. (U.S.A.). (*Relays KDKA* 21.19–06.00)	.....
48.0	6,250	CN8MC	Casablanca (Morocco). (*Relays Rabat*) ...	.....
47.97	6,250	HJ3ABF	Bogota (Colombia). (*Daily* 15.00) ...	.....
47.0	6,382	HC1DR	Quito, Ecuador. (*Daily* 01.00)	.....
46.69	6,425	W3XL	Bound Brook, N.J. (U.S.A.). (*Relays WJZ*)	.....
45.38	6,610	RW72	Moscow. (*Relays Stalin Stn.*)	.....
45.0	6,667	FM8KR	Constantine (Algeria). (*Mon. and Fri.* 22.00)	.....
45.0	6,667	TGW	Guatemala City (Central America). (*Daily* 03.00)	.....
43.75	6,860	—	Radio Vitus, Paris. (*Daily* 20.30) ...	.....
43.0	6,970	EAR110	Madrid. (*Tues. and Sat.* 22.30)	.....
42.92	6,990	LCL	Jelöy (Norway). (*Relays Oslo*)	.....
41.7	7,195	VS1AB	Singapore (Malay States). (*Sun. and Wed.* 15.30)	.....
40.3	7,443	HBQ	Radio Nations, Prangins (Switzerland) (*Sun.* 22.00–22.45)	.....
38.47	7,797	HBP	Radio Nations, Prangins (Switzerland). (*Sat.* 22.30–23.15)	.....
37.33	8,936	CNR	Rabat (Morocco). (*Sun.* 20.00)	.....
37.04	8,110	HCJB	Quito (Ecuador)	.....
33.50	8,955	TGX	Guatemala City (S. America)	.....
31.58	9,500	PRBA	Rio de Janeiro (Brazil). (*Daily* 21.30) ...	.....
31.55	9,510	VK3ME	Melbourne (Australia). (*Wed. and Sat.* 10.00)	.....
31.54	9,510	GSB	Empire Broadcasting	.....
31.51	9,520	OXY	Skamlebaek (Denmark). (*Relays Copenhagen*)	.....
31.48	9,530	W2XAF	Schenectady, N.Y. (U.S.A.). (*Relays WGY*)	.....
31.38	9,560	DJA	Zeesen (Germany). (*Daily* 11.45–14.45) ...	.....
31.35	9,570	W1XAZ	East Springfield, Mass. (U.S.A.). (*Relays WBZ*)	.....
31.29	9,585	GSC	Empire Broadcasting	.....
31.28	9,590	W3XAU	Philadelphia, Pa. (U.S.A.). (*Relays WCAU*)	.....
31.28	9,590	VK2ME	Sydney (Australia). (*Sundays*)	.....
31.27	9,595	HBL	Radio Nations, Prangins (Switzerland). (*Sat.* 22.00–22.45)	.....
31.25	9,598	CT1AA	Lisbon (Portugal). (*Tues. and Fri.* 22.00–00.00)	.....
31.0	9,675	T14NRH	Heredia (Costa Rica). (*Daily* 22.00 *and* 02.00)	.....
30.0	10,000	EAQ	Aranjuez (Spain). (*Daily* 22.30, *Sat.* 18.00)	.....
28.98	10,350	LSX	Buenos Aires (Argentina). (*Daily* 20.00)	.....
26.83	11,180	CT3AQ	Funchal (Madeira). (*Tues. and Thurs.* 10.30–12.30)	.....
25.63	11,705	FYA	Pontoise (France). (*Colonial Stn. E-W, daily* 20.30)	.....
25.6	11,720	VE9JR	Winnipeg (Canada). (*Daily* 14.30) ...	.....
25.57	11,730	PHI	Eindhoven (Holland)	.....
25.53	11,750	GSD	Empire Broadcasting	.....
25.5	11,760	DJD	Zeesen (Germany) (*Daily* 01.00–04.00) ...	.....
25.45	11,790	W1XAL	Boston, Mass. (U.S.A.)	.....
25.4	11,810	2RO	Prato Smeraldo, Rome. (16.15–23.30) ...	.....
25.36	11,830	W2XE	Wayne, N.J. (U.S.A.). (*Relays WABC*)...	.....
25.36	11,830	W9XAA	Chicago, Ill. (U.S.A.). (*Relays WCFL*) ...	.....
25.28	11,865	GSE	Empire Broadcasting	.....
25.27	11,870	W8XK	East Pittsburg, Pa. (U.S.A.). (*Relays KDKA* 21.19–03.00)	.....
25.20	11,905	FYA	Pontoise (France). (*Colonial Stn. N-S*) ...	.....
25.0	12,000	RNE	Moscow. (*Relays No. 2 Stn.*)	.....
23.38	12,830	CNR	Rabat (Morocco). (*Sun.* 12.30)	.....
19.84	15,120	HVJ	Vatican State, Rome. (*Daily* 10.00) ...	.....
19.81	15,140	GSF	Empire Broadcasting	.....
19.73	15,200	DJB	Zeesen (Germany). (*Daily* 05.35 *and* 11.45)	.....
19.72	15 210	W8XK	East Pittsburg, Pa. (U.S.A.). (*Relays KDKA* 15.00–21.18)	.....
19.68	15,244	FYA	Pontoise (France). (*Colonial Stn. E-W*)...	.....
19.64	15,270	W2XE	Wayne, N.J. (U.S.A.). (*Relays WABC*)...	.....
19.57	15,330	W2XAD	South Schenectady, N.Y. (U.S.A.). (*Daily* 20.00)	.....
16.89	17,760	DJE	Zeesen (Germany)	.....
16.88	17,770	PHI	Eindhoven (Holland)	.....
16.87	17,780	W3XAL	Bound Brook, N.J. (*Relays WJZ*) ...	.....
16.87	17,780	W9XAA	Chicago, Ill. (U.S.A.). (*Relays WCFL*) ...	.....
16.87	17,780	W9XF	Downers Grove, Ill. (U.S.A.)	.....
16.86	17,790	GSG	Empire Broadcasting	.....
13.97	21,470	GSH	Empire Broadcasting	.....
13.92	21,540	W8XK	East Pittsburg. (12.00–19.00)	.....
12.30	24,380	VE9GW	Bowmanville, Ont. (Canada)	.....

PRINCIPAL BROADCASTING STATIONS OF THE WORLD

(OUTSIDE EUROPE.)

Metres.	kc/s.	kW.	Station.	Tuning Positions.
			U.S.A.	
468.8	640	50	KFI, Los Angeles, Calif. (E. C. Anthony Inc.)	.....
450.5	660	50	WEAF, New York (N.B. Co., Inc.)	.....
447.8	670	5	WMAQ, Chicago, Ill. (N.B. Co., Inc.) ...	.....
441.2	680	50	KPO, San Francisco, Calif. (Chronicle Pub Co.)	.....
428.6	700	500	WLW, Cincinnati, Ohio (Crosley Radio Corp.). (*Short Wave Station, W8XAL*, 49.5 *m.*)	.....
422.5	710	50	WOR, Newark, N.J. (Bamberger B/c Service)	.....
416.7	720	25	WGN, Chicago, Ill. (Tribune Co.)	.....
405.4	740	50	WSB, Atlanta, Ga. (Atlanta Journal Co.) ..	.....
394.7	760	30	WJZ, New York (N.B. Co., Inc.). (*Short-wave Stations, W3XAL*, 49.18 *m., and W3XL*, 46.69 *m.*)	.....
379.7	790	50	WGY, Schenectady, N.Y. (General Electric Co.). (*Short-wave Stations, W2XAD*, 19.57 *m., and W2XAF*, 31.48 *m.*)	.....
379.7	790	7.5	KGO, San Francisco, Calif. (N.B. Co., Inc.)..	.....
367.4	810	50	WCCO, Minneapolis, Minn. (North-Western B/cg., Inc.)	.....
361.4	830	12.5	KOA, Denver, Colo. (N.B. Co., Inc.).. ..	.....
348.8	860	50	WABC, New York (Atlantic B/cg. Corp.). (*Short-wave Station, W2XE*, 49.02 *m.*)	.....
344.8	870	50	WENR, Chicago, Ill. (N.B. Co., Inc.). (*Short-wave Station, W9XF*, 16.87 *m.*)	.....
306.1	980	50	KDKA, Pittsburgh, Pa. (Westinghouse Co.). (*Short-wave Station, W8XK*, 13.92 *m.*, 19.72 *m.*, 25.27 *m. and* 48.86 *m.*)	.....
303.0	990	25	WBZ, Boston, Mass. (Westinghouse Co.). (*Short-wave Station, W1XAZ*, 31.35 *m.*)	.....
300.0	1000	50	WHO, Des Moines, Iowa (Central B/cg. Co.)	.....
294.1	1020	10	KYW, Philadelphia, Pa. (Westinghouse) ..	.....
285.7	1050	25	KNX, Hollywood, Calif. (Western B/c. Co.)..	.....
280.4	1070	50	WTAM, Cleveland, Ohio (N.B. Co., Inc.) ..	.....
275.2	1090	50	KMOX, St. Louis, Mo. (Voice of St. Louis)..	.....
256.4	1170	50	WCAU, Philadelphia, Pa. (Universal B/cg. Co.). (*Short-wave Station, W3XAU*, 49.5 *m.*)	.....
252	1190	50	WOAI, San Antonio, Texas. (Southern Equip. Co.)	.....
204.1	1470	5	KGA, Spokane, Wash. (North-West B/cg. System).	.....
			ARGENTINE.	
423	710	5	LS1, Nuncz, Buenos Aires (Municipality of B.A.)	.....
361.4	830	20	LR5, Florida, Buenos Aires ("Excelsior")	.....
330	910	5.5	LR2, Florida, Buenos Aires (A. Schroeder)	.....
252	1190	5.5	LS2, Florida, Buenos Aires (T. Prieto) ..	.....
240	1230	20	LS8, Mantanzas, Buenos Aires ("Sarmiento")	.....
			AUSTRALIA.	
535.7	560	7.5	2CO, Corowa, N.S.W.	.....
492	610	5	3AR, Melbourne, Victoria	.....
472	635	7.5	5CK, Crystal Brook, S. Australia	.....
451	665	5	2FC, Sydney, N.S.W.	.....
435	690	5	6WF, Perth, W. Australia	.....
411	730	5	5CL, Adelaide, S. Australia	.....
395	760	5	4QG, Brisbane, Queensland	.....
375	800	5	3LO, Melbourne. Victoria	.....
			BOLIVIA.	
240	1230	5	CPX, La Paz (Costoz y hnos)	.....
			CANADA.	
556	540	5	CKLW, Windsor, Ont. (Essex Broadcasting Corp.)	.....
411	730	5	CKAC, Montreal, Quebec (La Presse Publishing Co.)	.....
357	840	5	CKGW, Toronto, Ont. (Gooderham and Worts, Ltd.)	.....
328	910	5	CKY, Winnipeg, Man. (Manitoba Telephone System)	.....
291	1030	10	CFCN, Calgary, Alta. (W. W. Grant and H. G. Love)	.....
			CHINA.	
455	659	75	XGOA, Nanking	.....
			DOMINICAN REPUBLIC.	
254	1180	15	HIJK, S. Domingo (Dir. Gen. de P. and T.)	.....
			FRENCH INDO CHINA	
358	840	12	F3ICD, Saigon (Cie Franco-Indochinois)..	.....
			HONG KONG.	
365	845	12	ZBW, Victoria Peak (Govt.)	.....
			JAPAN.	
448	670	10	JFAK, Taihoku..	.....
390	770	10	JOHK, Sendai	.....
380	790	10	JOGK, Kumamoto	.....
370	810	10	JOCK, Nagoya	.....
361	830	10	JOIK, Sapporo	.....
353	850	10	JOFK, Hiroshima	.....
345	870	10	JOAK, Tokio (*Short-wave Station*, 25 *and* 49.31 *m.*)	.....
277	1085	10	JOBK, Osaka	.....
			MEXICO.	
408	735	500	XER, Villa Acuna (Cia. Radiodifusion de V. Acuna. S/A.)	.....
400	750	5	XEAN, Ciudad Juarez (Cia. Radiodifusion Nacional)	.....
330	910	5	XEW, Mexico (Cadena Radiodifusion Mexico)	.....
319	940	5	XFO–XEFO, Mexico (Partido Nac. Revolucinario)	.....
311	965	10	XEAW, Reynosa (Cia. Internat. Difus. de Reynosa S/A.)	.....
			NEW ZEALAND.	
416.7	720	5	2YA, Wellington	.....
			SOUTH AFRICA.	
465	645	12.5	ZTJ, Johannesburg (*Short-wave Station*, 49.4 *m.*)	.....
371	808.6	15	ZTC, Capetown	.....
			URUGUAY.	
462	650	5	CX6, Montevideo (Min. of Public Instruction)	.....
			VENEZUELA.	
312	960	5	YV1BC, Caracas (S/A Almacen)	.....

Olympic S-S Six



Concluded from page 93 of last week's issue.

By W. T. COCKING

The Construction and Adjustment of the New Single-span Superheterodyne

MECHANICAL construction of the new receiver offers very little difficulty, and it follows well-tried lines. The chassis is built of metal-covered plywood fitted with supporting battens, and if desired this may be obtained with the large holes ready drilled. Each of the six I.F. coils is individually screened, and although the oscillator tuning coil and condenser are screened, the whole of the early circuits are included in a metal box.

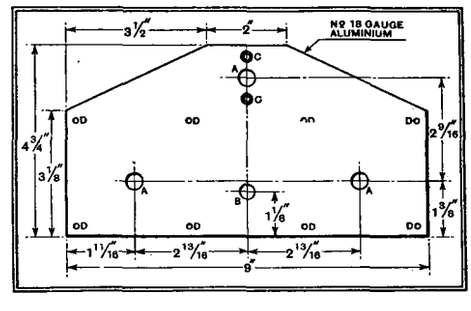
The aerial filter, frequency-changer, and tuning components are fitted into a large box in order to prevent any risk of instability, for a high degree of amplification is used in the I.F. circuits, and for the sake of a symmetrical panel layout the tuning control must appear in the middle of the receiver. Individual screening of the oscillator circuits is necessary, however, in order to prevent radiation from the aerial.

Construction

The screening box must be secured to the chassis in its appropriate position, and the heptode valve-holder and the resistances, condensers, and coils comprising the aerial filter secured to the small baseboard belonging to the screening box. The internal wiring should be completed as far as possible, and it can then be screwed down in the box. The next step is to drill the holes through baseboard, screen, and chassis for the few leading-out wires. It is a wise plan to attach long wires to the various points in the box and to bring them out through the holes, even although the time has not arrived for their connection at the other end.

The tuning unit should next be assembled. Three holes will be found in the frame of the tuning condenser, and two of these are used for mounting the coil, L3, with two nuts and bolts. The third hole is used to secure the grid condenser, C3, with a single 6 B.A. nut and bolt. The condenser must be mounted on the underside of the frame, and as this is flanged a thick washer, for which a 2 B.A. nut will serve, must be placed between condenser and frame. The base of the screen should now be placed over the one-hole fixing bush of C4 and the nut temporarily tightened. C5 must now be mounted on the screen base in such a position that its adjusting screw will be accessible through one of the slots in the screen cover. The internal wiring of this unit is the next step, and four long leads should be left for the connections to other components in the frequency-changer screening box.

THE principles underlying the design of the new receiver were described in last week's issue, and the present article deals with the construction and adjustment of the set. Since accurate matching of the coils is unnecessary, winding details are given for those who wish to make them.



The front plate of the receiver, which supports the dial and tuning controls. The diameters of the holes are : A = 7/16 in., B = 3/8 in., C = 5/32 in., D = 1/8 in

The tuning unit is now ready for mounting in the box, and the whole unit is secured by the one-hole fixing of the condenser. The four connections external to the unit can be made, and this portion of the receiver is completed when one hole has been drilled through both the box and the oscillator screen cover to permit a projecting bolt on the dial to pass inside the screens.

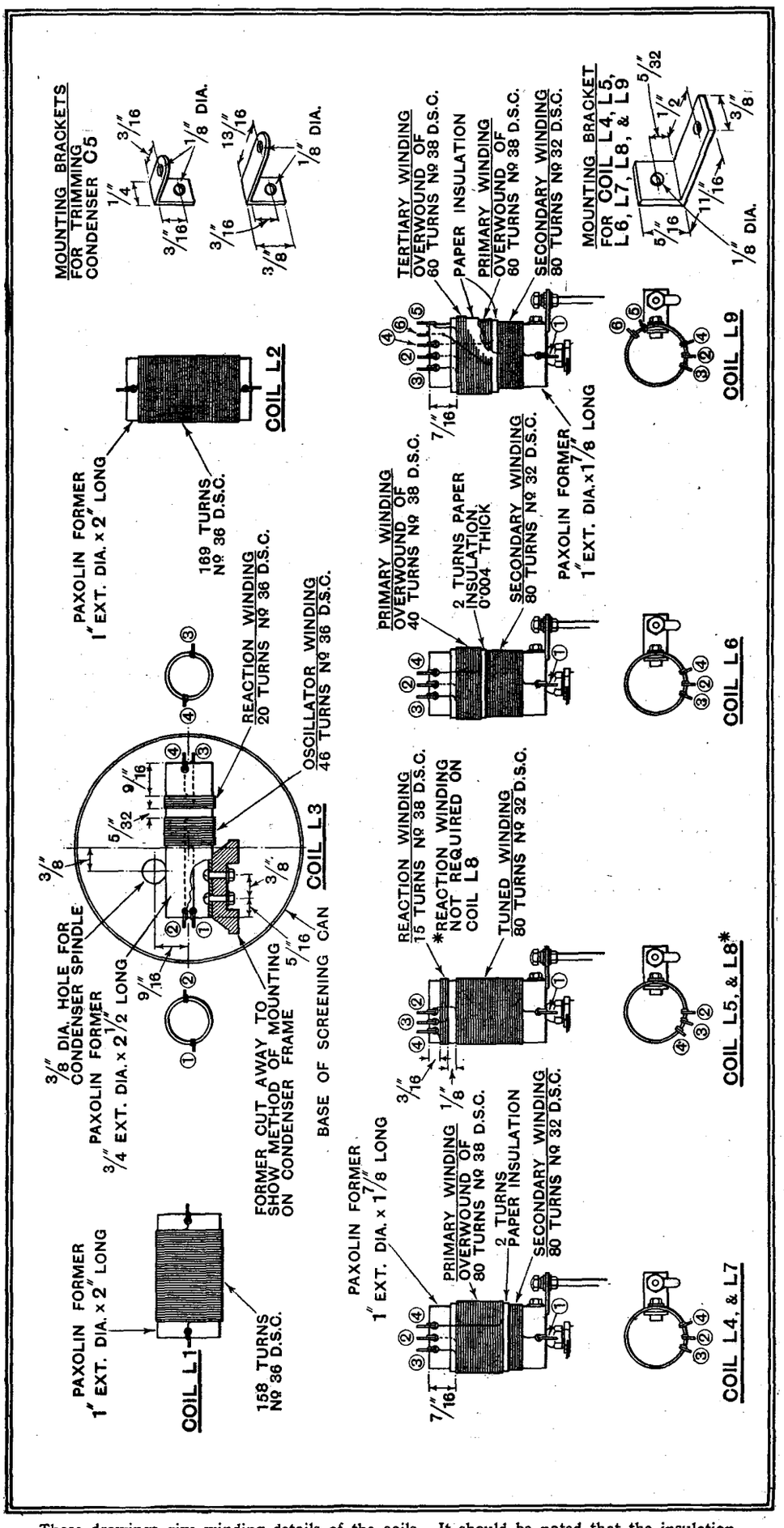
The I.F. Coils

The I.F. circuits are all identical except for the particular coils employed. In each case the trimming condenser is mounted on the screen case by its one-hole fixing bush; a one-inch diameter hole is drilled in the chassis, and the screen base mounted over this by three small screws. The appropriate holes for wires can then be drilled through screen base and chassis. The coil is mounted on the condenser terminal for the moving-plates by a bracket.

The coils themselves are not difficult to construct, and details are given in one of the drawings accompanying this article. The I.F. coils may differ from one another in detail, but in each case the basis is a winding of 80 turns of No. 32 D.S.C. wire on a one-inch diameter tube having a length of 1 7/8 in. Connecting tags are made at the appropriate points by the simple expedient of threading a length of tinned copper wire through a hole in the former, twisting the ends together, and running it solid with solder.

L8 consists only of this winding, but

HOW TO MAKE SINGLE-SPAN COILS



These drawings give winding details of the coils. It should be noted that the insulation between primaries and secondaries is obtained by two layers of thin hard paper.

L5 carries a reaction coil in addition. This is merely 15 turns of the same wire wound in the same direction at the earth end of the main winding. L6 carries a primary having one-half the turns of the secondary. Two layers of a thin hard paper should be wrapped round the earth end of the main winding and the outer turn secured with two tiny blobs of sealing wax in the corners. The primary wire should now be soldered to its terminating tag and run loosely on to the prepared winding surface and secured at the start of the winding by a small blob of sealing wax. The appropriate number of turns should now be wound and the finish secured with sealing wax, after which the wire can be looped back to the connecting tag.

Care should be taken to see that the primary winding or its connections is not allowed to come into contact with the secondary, otherwise there will be a breakdown sooner or later, for there is a potential of 200 volts between the windings in most cases. L4 and L7 are constructed in exactly the same way as the other coils, but 80 turns are wound for the primaries. L9 is also similar, but the primary has 60 turns and there is a tertiary of the same number of turns wound outside the primary and insulated from it by two layers of paper.

Adjustments

L1 and L2 are simple single-layer coils wound on 1in. diameter formers. L3, however, is wound on a ¾in. diameter former and consists of two separate windings. Care should be taken to wind all coils in the same direction and to connect to the right terminals. If a mistake be made in L3, the frequency-changer will not oscillate and no signals will be secured. In the case of L5, an error will make the selectivity control reduce, instead of increase, selectivity. The leads brought out of certain screening cans for the anode connections to valves should be only just long enough to reach their destinations, otherwise instability may be found.

There is no other point in the construction of either receiver or power unit which calls for special comment, and the details should be clear from the various drawings. It may be remarked, however, that in operation the chassis of the two units are at slightly different potentials, so that they should not be allowed to come into contact.

When setting up the receiver, a check of the voltages and currents should be made to see that the operating conditions are correct. Exact agreement with the figures in the table should not be expected, owing to the variations between valves and components.

The lining-up of the I.F. circuits is not difficult if carried out correctly. Each I.F. trimmer should be set with its plates fully enmeshed and a pencil mark made opposite the pointer on its controlling knob. This mark should be taken as 180 degrees on an imaginary scale, and the knob moved in an anti-clockwise

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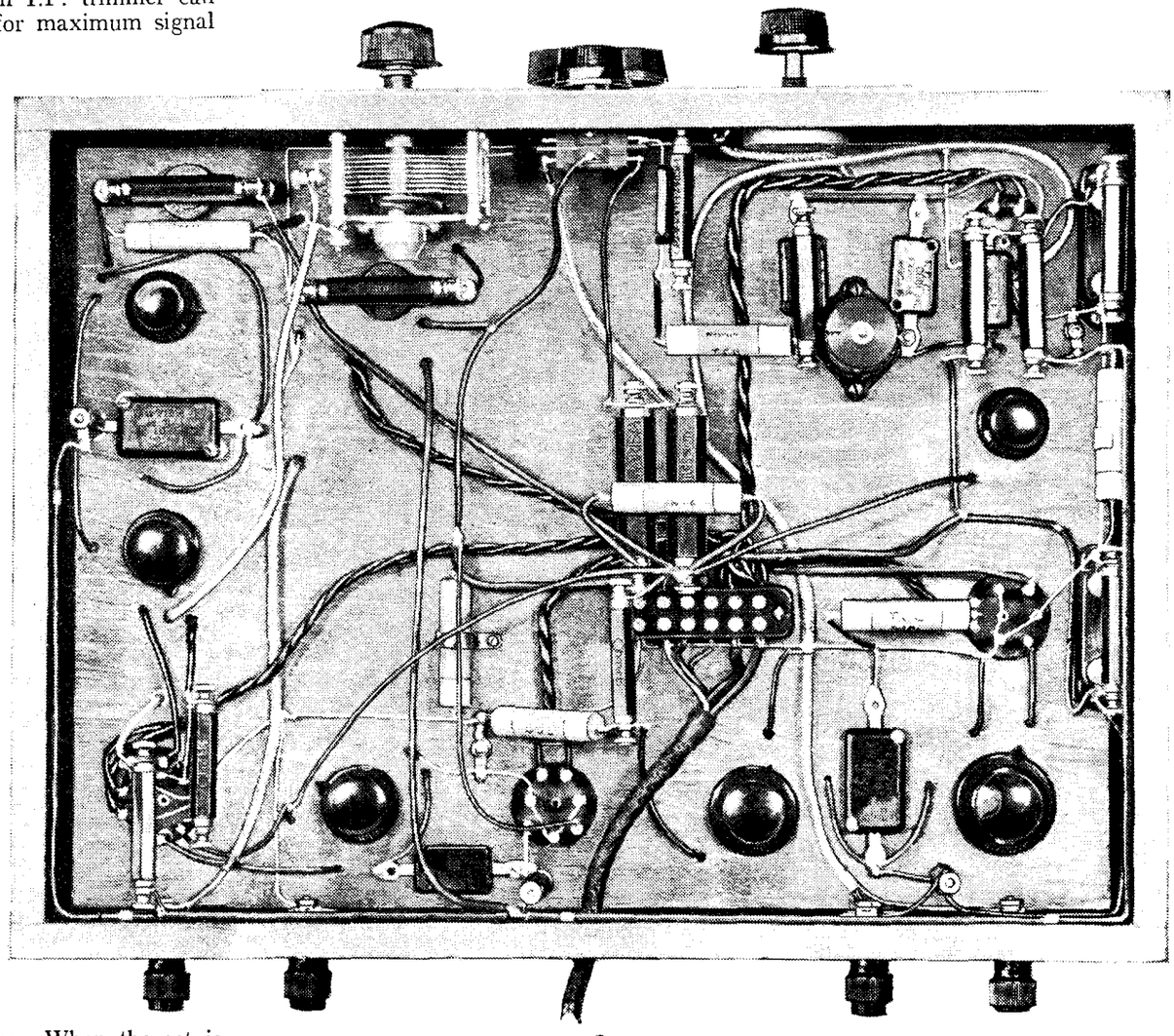
direction to its appropriate setting given in the table. A rough estimation by eye is sufficiently accurate. C5 should then be fully screwed up and unscrewed one complete turn.

It should now be possible to tune in some signal, and each I.F. trimmer can be adjusted in turn for maximum signal strength. Unless the station is very weak, no precise setting will be discernible by ear, however, for A.V.C. will counteract the variations in volume. A milliammeter or voltmeter should be used as a tuning indicator, therefore, and trimming carried out for minimum meter reading, since this corresponds to maximum signal strength. A milliammeter used for this purpose should be connected in the anode circuit of one of the controlled valves, and on the H.T. side of R7 is probably the most convenient point. A voltmeter, on the other hand, should be connected across R18.

When each circuit has been accurately adjusted a fairly weak station should be tuned in and reaction advanced while retrimming C10 slightly. When the set is just short of oscillating the other circuits should be retrimmed, starting with C20 and working backwards towards C9. As the circuits come into exact resonance with one another it will probably be necessary to slack off reaction slightly to prevent oscillation.

The only other adjustment is to C5, and this affects only the dial readings. When C4 is set at maximum, morse transmissions should just appear when C5 is correctly adjusted, and Huizen should tune in at a slightly lower dial setting. An increase in the capacity of C5 will make all stations tune in at lower dial settings and vice versa. Should it be found, however, that the full waveband of 200-2,000 metres occupies far too small a proportion of the total dial spread, no adjustment of C5 will effect a cure, for it is due to the I.F. circuits having been adjusted as a whole to too high a frequency. The performance of the set is unlikely to be affected by this, but the correct spread of stations on the dial may be obtained by retrimming the I.F. circuits, using a little more capacity in each trimmer.

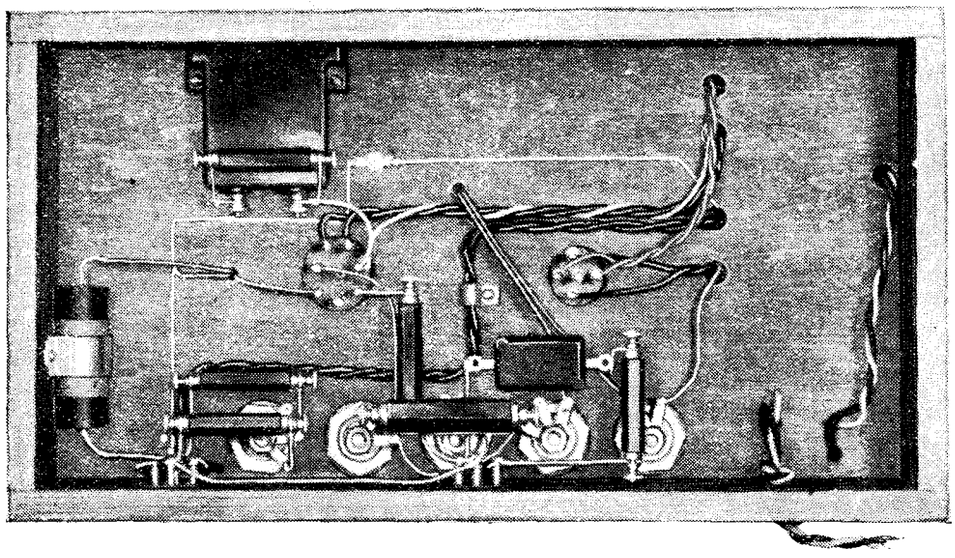


An underneath view of the receiver chassis showing the disposition of the components.

TRIMMER SETTINGS.

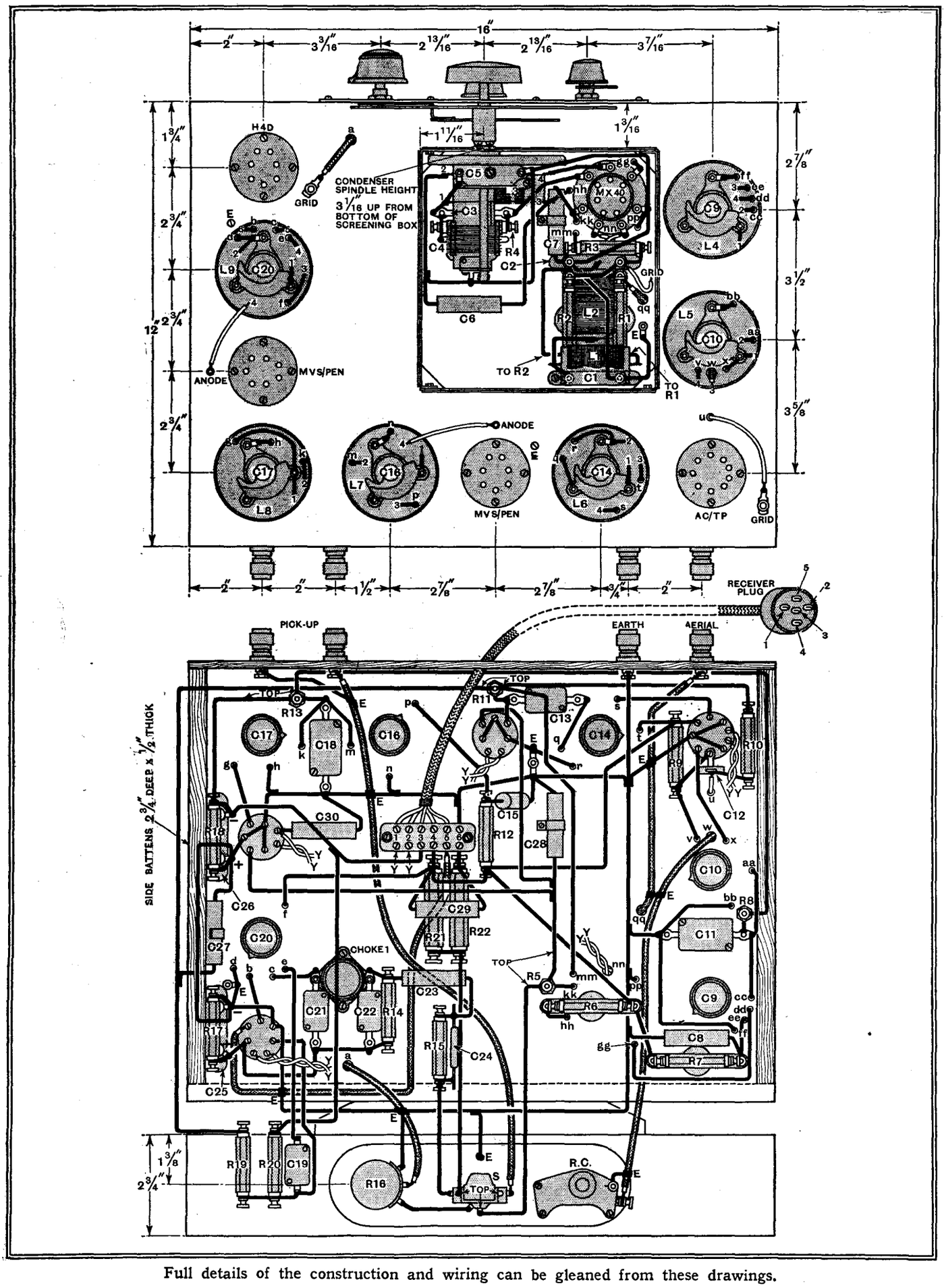
Condensers.	Setting.
C 9	90°
C 10	130°
C 14	100°
C 16	95°
C 17	135°
C 20	95°

It may be remarked that if it should prove impossible to obtain any signal, the most probable cause is that the frequency-changer is not oscillating. A very simple test will show definitely whether this is the case or not. Connect a milliammeter in series with R6 on the H.T. side and note the reading. Then short-circuit either the reaction coil (terminals 3 and 4) or the tuned winding (terminals 1 and 2) of L3



The components mounted beneath the power chassis are few in number.

PRACTICAL WIRING DIAGRAM



Full details of the construction and wiring can be gleaned from these drawings.

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and again note the current. The valve cannot oscillate with one winding short-circuited, so that if the current is the same in both cases the valve is not oscillating. If the valve normally oscillates, the current with a winding short-circuited will increase, and this indicates that everything is in order. The most probable cause of non-oscillation is a faulty coil assembly, L3, or incorrect connections to it.

A full-size blue print of the combined wiring diagrams is available from the Publishers, Dorset House, Stamford Street, London, S.E.1. Price 1s. 6d. post free.

On test the receiver proved capable of a very satisfying performance indeed, being outstanding in regard to the quality of reproduction obtainable. The selectivity proved sufficiently high for all normal requirements and the sensitivity was also adequate. Background hiss and mains hum also proved to be of negligible proportions. The volume obtainable is adequate for most domestic purposes, for the output valve is rated to deliver about 3.5 watts to the loud speaker.

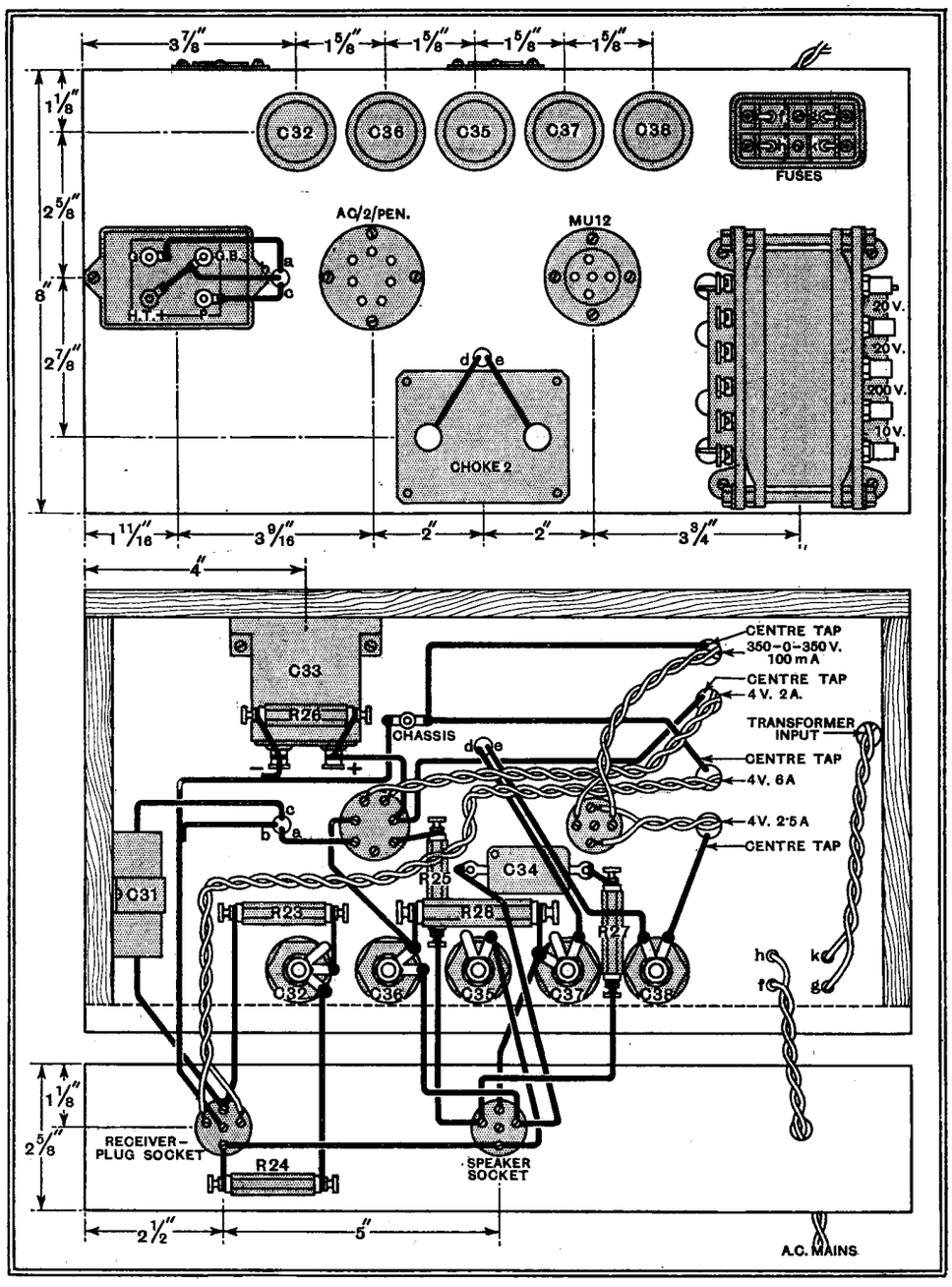
The Performance

Automatic volume control gives a sufficiently wide range of control to reduce the volume variations of fading to negligible proportions in most cases, and it also prevents overloading on a local station without the necessity for a local-distance switch. Although the volume increases somewhat in local reception, it is under complete control by means of the manual volume control, which functions equally well on both radio and gramophone. It should be noted that a break-through of radio on gramophone is prevented by arranging the change-over switch to break the screen connection to the I.F. valves when the pick-up is thrown in circuit.

Under all conditions of test the receiver has been found to function admirably and to be free from all whistles, except, of course, those due to stations working off their correct frequencies. Recent articles in *The Wireless World* have shown single-span tuning to be remarkably free from all forms of whistle production. There are, however, two possible causes of whistles which might possibly occur under abnormal receiving conditions—usually the proximity of a powerful transmitter or the use of an unusually efficient aerial. Should it be found that a whistle occurs on all stations and that the pitch of the whistle varies with the setting of the tuning dial, then it is probable that by accident the I.F. circuits have been adjusted to a frequency which is two or three times that of a local station. It will be found that readjusting the circuits to a slightly different frequency will completely remove the trouble.

The other possible cause of interference will occur only if there are two powerful stations near-by, not necessarily both broadcasting stations. If it be found that the same station causes interference on two different wavelengths, one on each side of the local, this trouble should be suspected. In the South of England, only long-wave morse transmissions are likely to give rise to this effect, but in the Midlands it might occur through Daventry National. The remedy is simple, and consists merely in connecting a wavetrap in

WIRING OF THE POWER UNIT



These drawings clearly show the details of the power unit.

VOLTAGES AND CURRENTS.

Valves.	Anode Volts.	Screen Volts.	Grid Bias.	Anode Current.	Screen Current.
				mA.	mA.
F.C. MX 40 tet.	200	100	— 4.6	5.6	1.9
osc.	170	—	—	2.95	—
I.F. AC/TP Buffer	150	—	— 4.6	0.7	—
I.F.	210	210	— 4.6	5.0	2.0
2nd I.F. MVS-Pen	210	110	— 4.6	1.9	1.2
3rd I.F. MVS-Pen.	210	110	— 4.6	1.75	1.1
Det. H4D	140	—	— 2.5	1.75	—
Output AC2/Pen.	260	275	— 5.9	35.0	8.0

Volts across C 38 = 385 volts
C 37 = 340 volts
C 35 = 210 volts.

Current through Ch2 = 89 mA.
Speaker field = 46 mA.

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the aerial lead to the set and tuning it to the local. Since there are often two local stations, two wavetraps are advisable, and details of a suitable unit appeared in *The Wireless World* for January 26th, 1934.

It may be remarked that the use of these wavetraps decreases the spread of the locals somewhat and also lightens the strain on the A.V.C. system, so their use leads to other advantages.

It should not be thought that these interference questions are likely to arise in most cases, for in the majority of locations the receiver is quite free from whistles and wavetraps are unnecessary. There is no doubt, however, that in a few districts their use may be found advisable.

Little need be said about the selection of a cabinet, for this will depend more upon the constructor's taste than upon technical considerations. It may be remarked, however, that the Peto-Scott Co., Ltd., is marketing a cabinet designed for this receiver. This has been examined and found to be quite suitable. It should be mentioned, however, that when using certain loud speakers it will be advisable to alter slightly the position of the choke Ch2 on the power unit in order that the field may overlap the chassis.

The sockets to take the leads from the receiver unit and loud speaker to the power unit are conveniently situated in the side of the chassis.

A specimen receiver built to the specification described in this article is available for inspection on the "Wireless World" Stand (No. 6) at Olympia.

The Diary of an Ordinary Listener

A Feast of Wagner: Light Relief from Paris

GERMANY and Austria have certainly attracted their quota of public attention during the past week, for, apart from political and historical events, the Salzburg and the Bayreuth Festivals have undoubtedly been the most important happenings in the musical realm. In fact, I must ashamedly confess that much as I admire Wagner's music, I feel at present inclined to echo the words of the goat in the fairy tale: "I am satisfied quite, no more can I bite."

Friday and Saturday, August 3rd and 4th, offered us the usual varied selection of programmes, of which I chose the Symphony concert from Milan in which the orchestra, under the baton of Gennai, gave a good rendering of Beethoven's Symphony No. 2 in D, and the Overture to "The Mastersingers." Rome, meanwhile, was transmitting an excellent performance of "Lilac Time," which is undoubtedly pleasing to listen to, though it seems almost profanity to garble Schubert's music in the form of light opera. The following evening I found the Concert version of Offenbach's "La Vie Parisienne" from Radio Toulouse most attractive, and, as an alternative, the Algäu Festival programme broadcast from Munich, of which I heard the last two movements of Tchaikovsky's 4th Symphony. I had previously listened to a part of "Tristan and Isolda," relayed from Salzburg by Bucharest.

On Sunday the Wagnerian feast began with a performance of "Lohengrin" from Vichy, which was transmitted by Paris P.T.T., Bordeaux Lafayette and Strasbourg. I listened to the first act wishing that I could see the action and especially the spirited encounter between Lohengrin and the misguided Telramund. My sympathy, of course, went out to the persecuted Elsa, who really deserved a better fate than to be wedded, if only for a day, to such a pompous prig as Lohengrin. Earlier in the afternoon I had heard a part of "The Rhinegold," which was transmitted by Munich and all German stations.

By way of contrast I turned to Hilversum, where a concert by the Residenz Orchestra was relayed from the Kurhaus, Scheveningen, and, later, a most entertaining programme of male-voice part-singing by the Comedian Harmonists who seemed equally at home in serious and humorous music. They were unusually well balanced, and their alto singer was really pleasing to hear, even in solo parts, a very rare thing. This was followed by a selection of light music played by the A.V.R.O. orchestra, which included Bucalossi's "Grasshopper's Polka" and the overture to Offenbach's "Orpheus in the Underworld."

Rome was giving a performance of Mozart's opera "Il Seraglio," so there was no lack of variety in the Sunday evening entertainment.

On Monday Wagner again predominated. In fact, I had considerable difficulty in steering clear of Act III of "The Valkyrie," which was being transmitted from all the German stations. I must again make a humble confession that I find the almost interminable back-chat between Wotan and Brünnhilde rather boring. Each seems to get more and more argumentative as the Act progresses and endeavours to shout the other down until one longs for the welcome relief of the Fire Music and to feel that Brünnhilde is comfortably tucked up until it is her fate to be awakened by the beefy and bucolic Siegfried. I eventually settled down to Radio Paris, where a miscellaneous Wagner concert was relayed from Vichy, having been first attracted by the strains of the Overture to "Tannhäuser." This was followed by Elizabeth's greeting to the Hall of Song at the Wartburg and the popular March during which the guests arrive and the Landgrave and Minstrel Knights take their places. The remainder of this interesting programme included the "Forest Murmurs" from "Siegfried," and the Good Friday Music from "Parsifal."

On Tuesday I avoided all temptation to listen to "Siegfried," which was being relayed from Bayreuth by all German stations, and sought more varied entertainment, first, Delibes' light opera "Le Roi l'a dit," transmitted by Paris P.T.T. and Strasbourg, having been chiefly attracted to this programme by the fact that the National orchestra was performing. I certainly saw no reason to alter the opinion I had already formed about the excellence of this orchestra under the able leadership of Inghelbrecht. After listening awhile I went over to Poste Parisien for Grieg's Sonata in G Minor for Violin and Pianoforte, which was charmingly played by MM. Saury and Gendron, and thence to Radio Toulouse for the Concert version of Oscar Straus' "Waltz Dream" with its gay and tuneful melodies, finishing up the evening at Stockholm, where some very good records of "The Yeoman of the Guard" were being transmitted.

CALIBAN.

The Radio Industry

HALFORD RADIO, LTD., announce the introduction of two new models: a small universal A.C.-D.C. superheterodyne and a larger set with signal-frequency amplification and push-pull output, which is available either for A.C. or D.C.

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Since our test report (published August 3rd) of the Cossor Battery H.F. pentodes went to press, the price of both types has been reduced from 15s. 6d. to 13s. 6d.

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As the result of an action brought by Tungsram before the Czechoslovak Patent Court at Prague, the well-known Schottky Patent, sometimes called the Screen Grid Patent, has been annulled as from June 21st, 1934.

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Muirhead and Co., Ltd., Elmers End, Beckenham, Kent, have issued a new catalogue describing Measuring and Testing Equipment for the Electrical and Communicational Industry. This publication is primarily of interest to technicians and laboratory workers.

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A new abridged list of wireless components and accessories has been issued by Graham Farish, Ltd., Bromley, Kent.

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The address of W. Andrew Bryce and Company's London office is 3-4, Ashland Place, Paddington Street, London, W.1. Telephone: Welbeck 1521.

BROADCAST BREVITIES

By Our Special Correspondent

A Radiolympic Revelation

DO not be misled into thinking that Rosalind Wade's sixteen Radiolympia girls are cousins of the Eight Stepsisters. I confess that a qualm of doubt assailed me on the point, but on enquiry at Broadcasting House I was assured that the Radiolympia girls are not step dancers.

They are *tap* dancers.

Emphatic Dancing

Apparently the difference is that whereas the Stepsisters came under the bantamweight category, Rosalind Wade's troupe are, as it were, members of the cruiserweight class.

The importance of this will be realised during the coming winter, when the girls will contribute regularly to the variety programmes. Their dancing, although not visible to the listener, will be of the emphatic type which gets over the loud speaker.

The First Droitwich Programme

THE Programmes Department is beginning to fret over the lack of news from the Engineering Department concerning the opening of the Droitwich transmitter. It is felt that the occasion demands something special in the way of broadcast fare, but so long as the engineers continue to suggest one date after another, ranging from September 3rd to October 7th, no definite arrangements can be made.

Late Dance Music

There seems to be no doubt that, technically speaking, Droitwich will be a huge success. The quality is beyond reproach and the signal strength in the London area is considerably greater than that of Daventry.

It is possible that the late dance music may be broadcast for the first time from Droitwich on September 3rd.

Broadcasting Film Excerpts

MR. CLAYTON HUTTON, whose success with the new feature, "Picture People," may secure him fame as the Christopher Stone of the talkies, emphasises the point that listeners hear the film excerpts just as clearly as if they were in the local cinema.

I beg leave to doubt this. The B.B.C. amplifiers through which the sound impulses are passed are superior to those of the average cinema and the sound reproduction is definitely better.

The Difference

If the reproduction were only as good as that in the cinema, listeners would pronounce it inferior. In the cinema the presence of the screen picture dulls the critical ear. Quality seems better than it really is.

In Town To-night

I AM glad that Eric Maschwitz has changed his mind on the subject of "In Town To-night." This exciting feature, which was introduced last autumn, was so extensively copied by films, music-halls and dance bands that the B.B.C. Variety Director had begun to feel that the idea could be exploited *via* the microphone no farther.

Listeners have thought differently, however, and, following upon a flood of requests, it has been decided to broadcast a second series of "In Town To-night," starting on October 6th, and continuing on succeeding Saturdays.

The aim will be to bring before the microphone all that is brightest and best in London's week-end life.

Competition for Listeners

A GUESSING competition (without prizes) will be provided for National programme listeners on September 8th by an anonymous variety show entitled "Guess Who It Is." Those taking part will consist of well-known and less well-known radio artists whose names—contrary to the usual practice—will be announced after they have broadcast instead of before. The programme will be *compèred* by John Watt.

Better Provincial Orchestras

THERE has been some heart-burning in the Midland, Scottish and West Regions over the decision to increase the size of the Northern Studio Orchestra from nine to thirty-five players—all of them members of the Hallé Orchestra. It is felt that if North Regional is promoted to higher musical status the others should share the honour.

Birmingham City Orchestra

I understand that the B.B.C. will eventually accord the same treatment to all stations. Indeed, Midland Regional music is already receiving special attention and negotiations are in progress with the Birmingham City Orchestra, some members of which may combine to form a new orchestra of thirty-five players for the new medium-wave Droitwich station.

Wales and Scotland

The National Orchestra of Wales may be similarly approached with the object of augmenting the West Regional Orchestra.

Scotland has several important orchestras which might contribute members to an enlarged Scottish broadcasting combination.

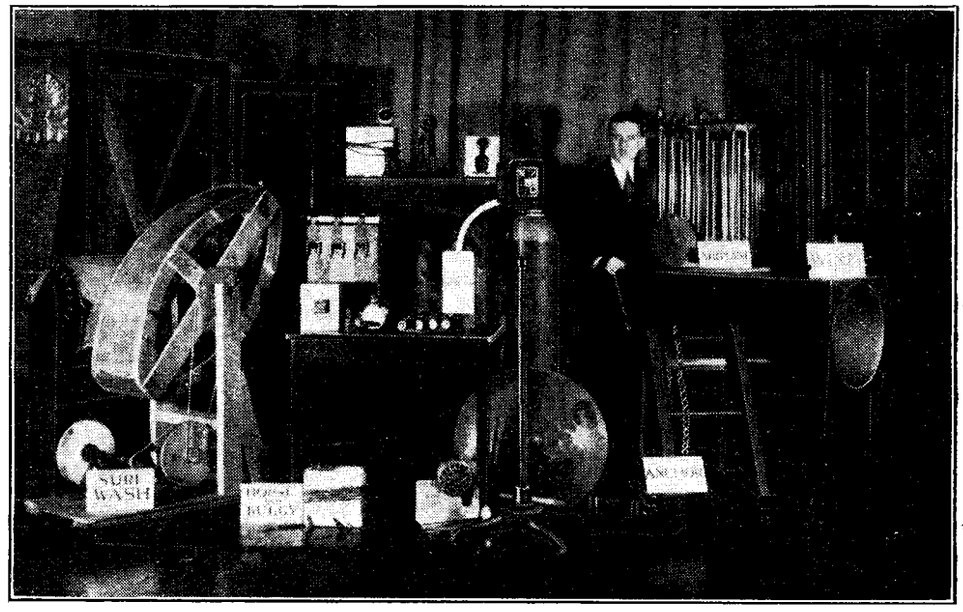
Play in News Items

"CRISIS in Spain, 12th April-15th April, 1931," which is to be revived Nationally on August 22nd and Regionally on August 24th, is the first English example of the reporting in radio form of contemporary events. The Spanish revolution, precipitated by the Municipal Elections of April, 1931, will be presented in terms of news items broadcast at the time all over the world by wireless and the Press.

The Coming Talks

THE new season of broadcast talks will not begin until the end of September. The programme is by no means complete, but I hear that A. J. Cronin, author of "Hatter's Castle," will alternate with G. K. Chesterton in the early evening Book Talks, while a newcomer, Alistair Cooke, will be heard in cinema talks.

Monsieur E. M. Stéphan begins a new two-year French course on Tuesday evenings, while Herr Max Kroemer will begin the second year of his popular German course, which is given on Thursdays.



AN "EFFECTS" MUSEUM which the American National Broadcasting Company has established in New York. All the familiar contrivances can be seen, in addition to one or two novelties, such as the elaborate surf wash mechanism on the left and the combined "horse and buggy."

Things We Want to Know

WHETHER the delay in preparing the forthcoming talks programme is due to big developments in the offing.

Whether Mr. Siepmann, the Talks Director, aims at producing a microphone journal, magazine, gazette, or whatnot.

The Measurement of Receiver Performance

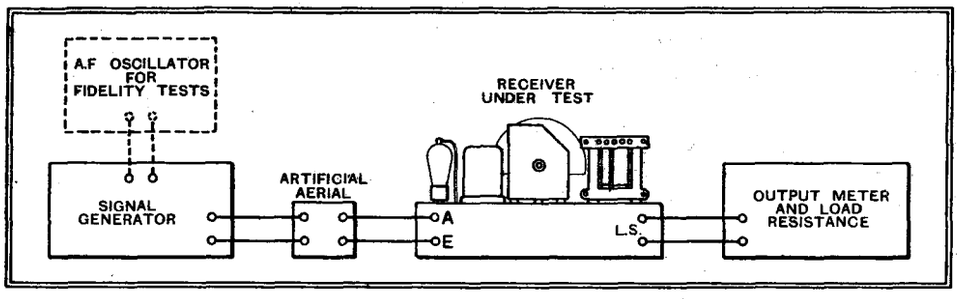
A Simple Explanation of Current Practice

DURING the past few months an increasing number of manufacturers have published figures relating to the performance of their receivers, and in the near future this practice is likely to become general. It is essential, therefore, that prospective purchasers should grasp the significance of the terms used and the methods by which the figures are obtained.

"WHEN you can measure what you are speaking about and express it in numbers, you know something about it, and when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind."

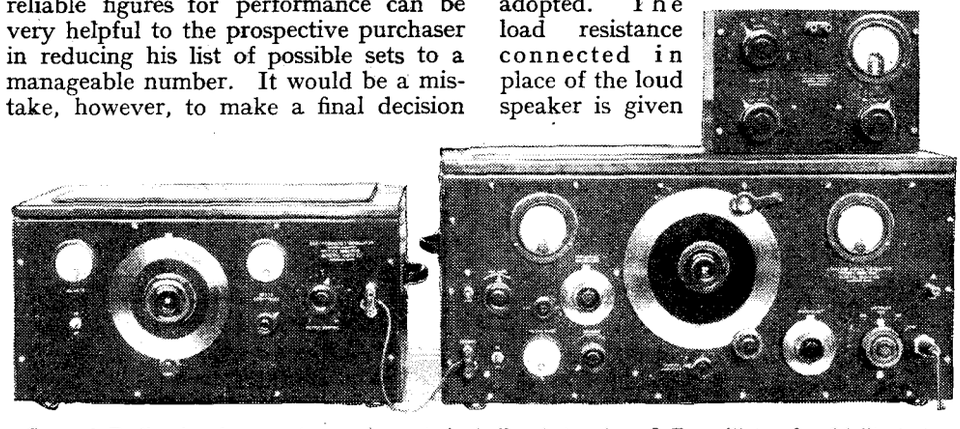
The force of Lord Kelvin's dictum is nowhere more apparent than in the sphere of wireless receiver measurements. It is fairly easy to get some idea of the relative performance of two receivers or loud speakers by switching rapidly from one to the other, but if it is a question of comparing one of this year's models with one of last, or finding the change in performance due to alterations in the circuit constants, the memory of the ear—which can only be relied upon for a few seconds—is quite useless.

Some method of obtaining quantitative measurements is, therefore, a necessity to the designer and production engineer, and reliable figures for performance can be very helpful to the prospective purchaser in reducing his list of possible sets to a manageable number. It would be a mistake, however, to make a final decision solely on the evidence of performance figures, as there are a number of considerations such as appearance, workmanship, and probable reliability, which must still remain a matter of personal judgment. Quality of reproduction should also be assessed apart from the curves, as up to the present it has not been customary to include the loud speaker itself in overall measurements of fidelity. Thus an apparently bad response curve may have been made so to compensate for irregularities in the loud speaker output.



Schematic layout of apparatus used in measuring receiver performance.

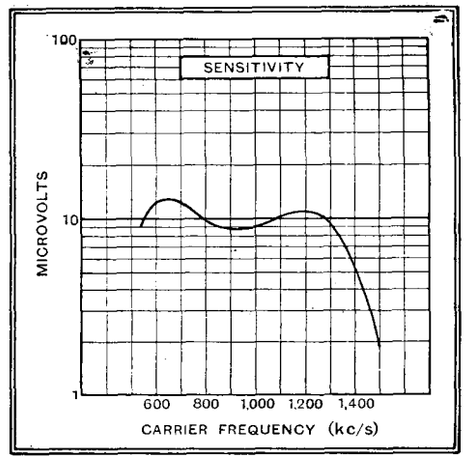
The basis of the majority of receiver measurements lies in the application of a small calibrated signal to the aerial and earth terminals and the measurement of the power developed in a resistance connected in place of the loud speaker. For the results to be of any comparative value, standardisation of the conditions of test is essential, and the recommendations of the Institution of Radio Engineers are now universally adopted. The load resistance connected in place of the loud speaker is given the value required to obtain the maximum undistorted power output according to the valve maker's figures, but the standard output is fixed at the comparatively low power of 50 milliwatts. The sensitivity is then defined as the voltage of the radio-frequency input to the aerial and earth terminals, modulated to a depth of 30 per cent. at 400 cycles, required to produce 50 milliwatts at the output load resistance. Thus it is customary to speak of the sensitivity of a receiver as "750 microvolts" or "25 millivolts," the standard modulation and output being assumed.



General Radio signal generator equipment, including heterodyne L.F. oscillator for fidelity tests and separate output meter.

Sensitivity at Maximum Power

It is not always fair to compare receivers for sensitivity on the 50 mW. output alone, and a supplementary test at maximum power output should also be taken. The necessity for this will be apparent if we consider the case of two similar sets, one with a PX4 and the other with a PX25 valve in the output stage.

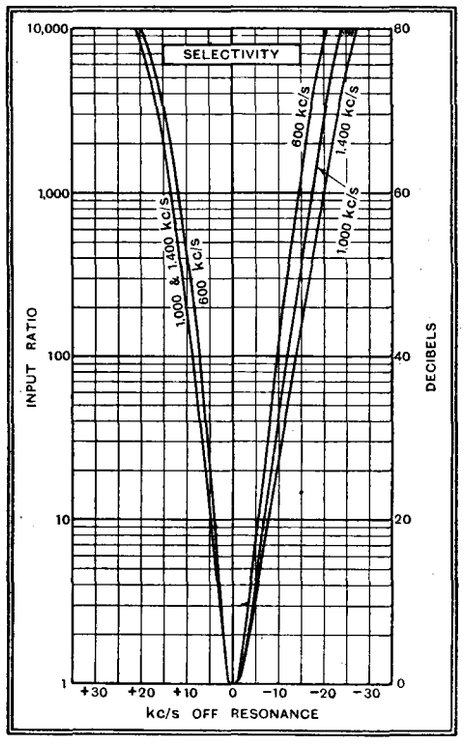


Curve showing variation of sensitivity of a receiver over the medium waveband.

At maximum power output these valves require approximately the same input volts so that the sensitivity in the earlier stages would have to be the same to give maximum power from a given station. If the measurements were taken at an output level of 50 mW. the set with the higher-powered output valve would require a much smaller input to produce 50 mW. and the apparent sensitivity would be

The Measurement of Receiver Performance—

correspondingly greater. It is also desirable to plot input volts against power output up to and beyond the rated power output of the set. This should give a straight line inclined to the axes and the



Typical selectivity curves of a superheterodyne receiver.

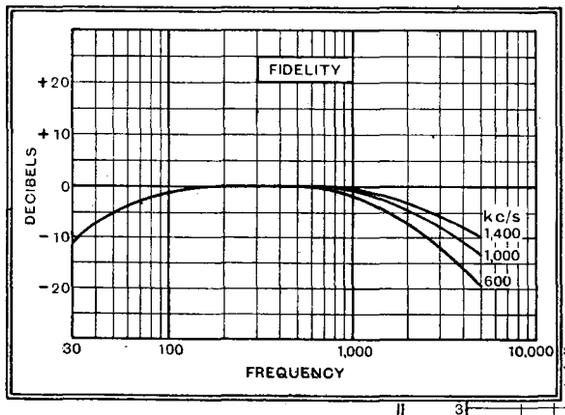
point at which the curve shows a tendency to fall off at the upper end will indicate the commencement of overloading and the development of harmonics.

It is customary to make measurements of sensitivity at three points on the medium and long wavebands, but a full curve covering the whole of each waveband is preferable as it often reveals faulty ganging, resonances in H.F. chokes, etc.

Selectivity

Selectivity can also be expressed as a number, namely, the band-width in kilocycles between the settings of the signal generator tuning scale on either side of resonance for a standard reduction of sensitivity in the receiver. This figure is not as informative as it might be, and it is customary to plot full resonance curves at three points on the medium- and long-wave ranges. The signal input is modulated 30 per cent. at 400 cycles, and a standard output of 50 mW. is used as in the sensitivity measurements. Having noted the input in microvolts required to give 50 mW. at resonance, the signal generator is mistuned by small fixed steps on either side and the increased input required to maintain the output at the standard level is read off at each point. The *ratio* of each input voltage to the input at resonance is then plotted on a vertical logarithmic scale against the number of kilocycles off tune on a horizontal linear scale. From the shape of the curve it is possible to judge not only the degree of sideband cutting likely to be present, but also from the shape of the "skirt" of the curve, the probable spreading of the local station over the tuning scale. Since the input ratios are plotted on a logarithmic scale it is equally convenient to give ratios in decibels, and some manufacturers of signal generators calibrate their attenuators in decibels for this purpose.

The third fundamental measurement is of fidelity, and for this purpose a separate low frequency oscillator covering a range of at least 50—10,000 cycles must be used to modulate the signal generator. The modulation depth and standard output are the same as for the sensitvity and selectivity tests. This time the frequency is plotted on a horizontal logarithmic scale and the relative inputs are invariably expressed in decibels relative to the input required at 400 cycles. Since the fidelity will be dependent on selectivity it is necessary to plot curves for carrier frequencies equivalent to those at which the selectivity curves were taken. While the fidelity curves do not form an adequate basis for estimating quality,

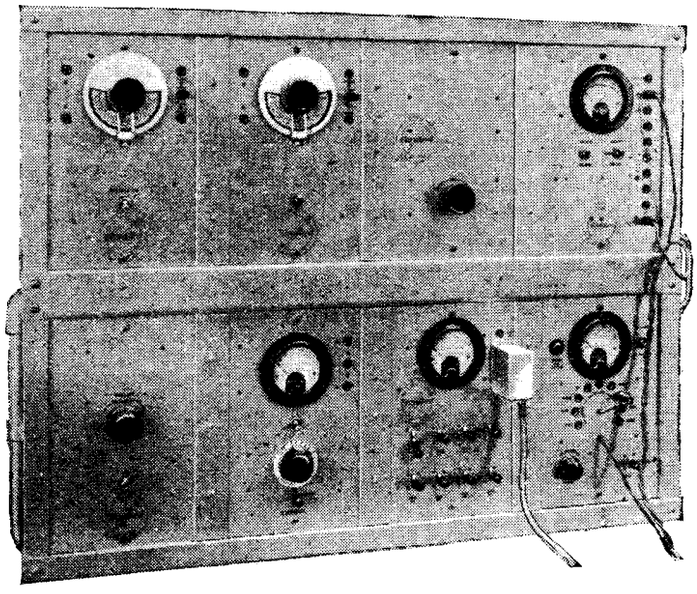


Fidelity curves showing sideband cutting in tuned circuits at different frequencies.

since the loud speaker is not included, they do at least show obvious shortcomings in the design of the L.F. components and also sideband cutting in the tuned circuits.

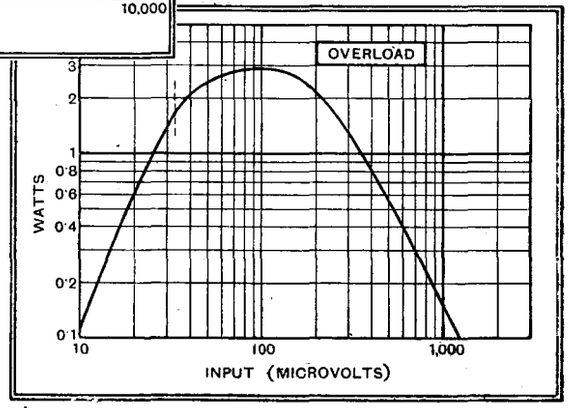
Assuming that the receiver has acquitted itself creditably in the three fundamental tests, there are several supplementary investigations which are capable of yielding information in numerical form. With the aid of a harmonic analyser distortion of waveform, which does not show in the fidelity curves, can be determined, while the behaviour of the detector at different depths of modulation and in the presence of a strong interfering carrier could also be investigated. Noise level, including mains hum, can be measured by the output power meter with the receiver set to maximum sensitivity and is generally expressed as a percentage of the standard output of 50 mW.

Valuable as all these figures are to



Standard Telephones signal generator and output meter. Power is derived from A.C. mains and the attenuator is calibrated in decibels.

those responsible for the development and improvement of receiver design, it must be some time before the layman can acquire the experience necessary to visualise the performance of a set from a perusal of the curves. The skill of a trained musician who hears mentally the full orchestra as he reads through the score of a symphony is often admired, but this is less difficult of attainment than the knack of interpreting receiver measurements, since the performance will be dependent on the locality in which the set is to be operated. On the other hand,



Overload characteristic. The set is reasonably free from distortion up to 1.5 watts output.

if a set in the neighbourhood gives a performance which falls short of one's own

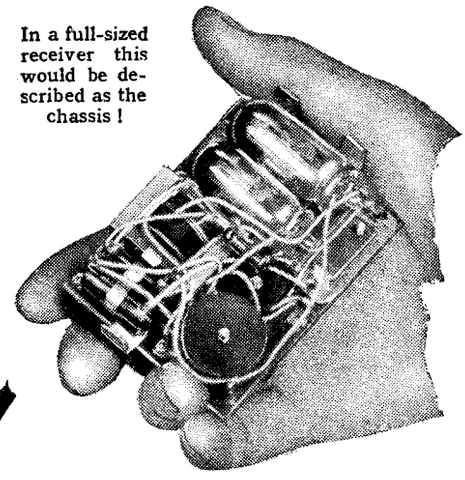
The Measurement of Receiver Performance—requirements either in range or selectivity and its characteristics have been published, it will enable one to approach one's dealer armed with figures indicating the minimum standard of performance required. The problem of suitable alternative sets will then be greatly simplified.

A REAL PORTABLE AT LAST

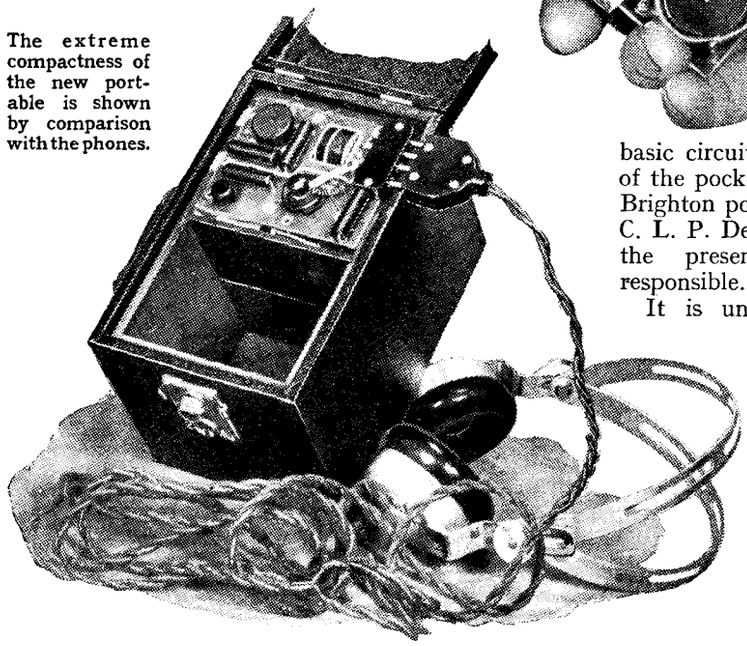
IN spite of "silly season" paragraphs in the lay Press a true portable receiver has never appeared, at any rate as a commercial actuality, in this country—and probably not in any other. A set weighing between 20 and 30 lb. is hardly portable except by courtesy, and anything of appreciably lighter weight and smaller dimensions than the conventional "portable" generally needs an external aerial; thus it is no longer self-contained or really practicable for many purposes.

We have recently had an opportunity of examining and testing what would appear to be the first commercially available lightweight portable—a set weighing about 3lb. and contained in a box measuring 4⅜in. wide, 6¼in. long, and 4½in. high, which is about the size and shape of a Brownie box camera.

Two Marconi midget valves are used in a self-quenching super-regenerative circuit followed by a stage of L.F. amplification. A double filter eliminates the quenching frequency, and current for L.T. and H.T. circuits is supplied respectively by a 3 A.H. accumulator cell and by a miniature 45-volt dry battery. The medium broadcast waveband is covered, and the claimed range of 70-100 miles on the tiny built-in frame aerial would appear to be conservative. Naturally, headphones are used for listening. The basic circuit is similar to that of the pocket sets used by the Brighton police, for which Mr. C. L. P. Dean, the designer of the present receiver, was responsible.



In a full-sized receiver this would be described as the chassis!



The extreme compactness of the new portable is shown by comparison with the phones.

It is understood that the price is to be £4 4s., and that the makers, The Radio Development Company, of 6, St. Mary's Chambers, 161a, Strand, London, W.C.2, are exhibiting specimens on Stand 23 at Olympia.

A "1935" SHORT-WAVE RECEIVER

MANY broadcast listeners in this country are inclined to dismiss without investigation any suggestion that the short waves can possibly hold any interest for them. Yet there are some hundreds of stations maintaining a regular broadcast service below 100 metres, and of these many provide programmes of a real entertainment value and are quite easily received on a simple type of set.

A receiver designed especially for use on these wavelengths and operated entirely from the A.C. mains will be described shortly in these pages.

Simplicity of construction and operation are the key-notes of this set. While embodying well-tried practice only it nevertheless incorporates a number of novel features, not the least important of which is a system of "band-spread" tuning to give an ease of operation comparable with that obtaining on the normal broadcast wavebands.

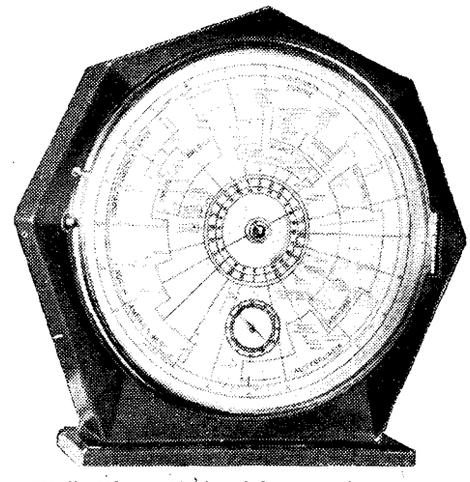
The wave-range covered is approximately 12.5 to 70 metres. An external loud speaker is used.

A brief Specification of this receiver will be included in next week's issue.

WILLIS WORLD CLOCK

The Time Anywhere

ANYONE possessing a moderately sensitive short-wave receiver can to-day listen regularly to broadcast stations many thousands of miles away. But if distance has been conquered there still remains the troublesome question of difference in time obtaining in various parts of the world. Where the programme times of stations are not readily obtainable reduced to Greenwich Mean Time, or to British Summer Time according to the season, difficulty often arises in making the necessary conversion.



Willis World Clock, giving the time in any part of the world at any hour of the day.

In order that the difference in time between any two countries can be found without recourse to calculation, J. H. Willis & Co., Ipswich Road, Norwich, have designed a World Clock.

In place of the customary revolving hands the clock is fitted with a dial which makes one complete revolution every 24 hours. This can be set to show local time, while from the fixed points on the surrounding chart the corresponding time in any part of the world can be read off in a moment. A separate hand and dial give the minutes past the hour.

Summer Time where in operation is shown by additional fixed points appropriately marked on the chart.

The Willis World Clock should prove exceedingly useful in many quarters apart from wireless, for those engaged in overseas business can tell at a glance the best time of day for telephonic or telegraphic contact with any part of the globe.

Yet it is by no means a complicated piece of mechanism, for there is only one revolving dial in addition to the minute hand. It is housed in a plain polished wood case, and the price is £5 17s. 6d.

CATALOGUES RECEIVED

All-Wave International Radio and Television, Ltd., 242, High Street, Bromley, Kent.—The All-Wave Superheterodyne.

Britannia Batteries, Ltd., Redditch.—The Battery Book: an informative catalogue of Pertrix batteries, containing, in addition to a complete list of the various sizes, a number of useful suggestions for battery users.

Leslie Dixon and Co., Electradix House, 218, Upper Thames Street, London, E.C.4.—Illustrated leaflet: Morse Transmitting Keys.

R. A. Rothermel, Ltd., Canterbury Road, High Road, Kilburn, London, N.W.6.—Loud Speakers.

Permeability Tuning

Recent Developments in Iron-core Coils

ONE of the greatest disadvantages of the straight set is the manner in which both the selectivity and sensitivity vary with wavelength. It is shown in this article that this is due largely to the use of variable condensers, and a new system of inductance tuning is described in which tuning is carried out by a movement of the core of a specially designed iron-cored coil. The system is claimed to lead to constant selectivity and amplification and so represents an important development.

TUNING in the past has usually been carried out with the aid of variable condensers, for, in spite of the many drawbacks of this system, it has generally proved to be the most satisfactory. The introduction of powdered-iron cores for high-frequency coils, however, has led to the possibility of tuning through the use of variable inductances—the inductance of a coil being varied by an alteration in the relative positions of coil and core.

Before discussing this new system, which is known as permeability tuning, it is worth considering the characteristics of the usual condenser circuit in some detail in order fully to appreciate the defects which it is desired to overcome. The tuning range normally provided on the medium waveband is about 200-550 metres, a ratio of minimum to maximum wavelength of 1-2.75—so that the capacity ratio of the variable condenser is 1-7.58. The inductance is fixed. Now, in the case of an H.F. intervalve coupling of the tuned-anode or tuned-grid type, and to a lesser degree also in the case of a transformer, the stage gain depends upon the value of the dynamic resistance of the tuned circuit, and the higher this resistance, the higher the amplification. The dynamic resistance is equal to L/CR where L is the coil inductance, C the capacity of the circuit, and R the effective series H.F. resistance. It is immediately obvious that if R is constant at all wavelengths, the dynamic resistance is inversely proportional to capacity, and since the amplification is nearly proportional to the dynamic resistance, the amplification varies in like manner.

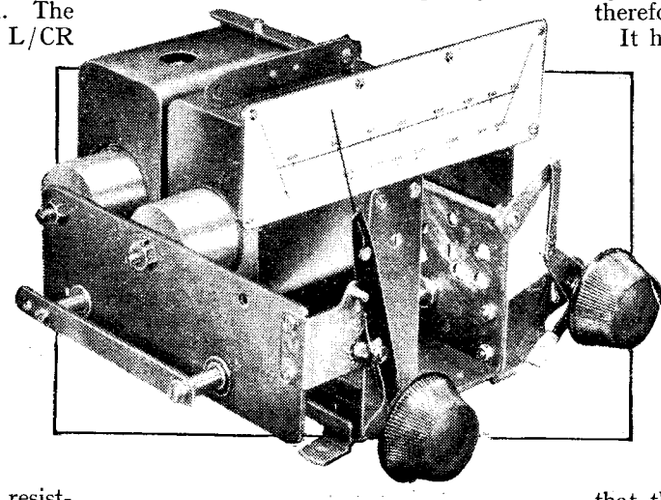
In practice, of course, R is not a constant, and decreases as the wavelength is increased so that the effect of a variation in capacity is offset to some degree. Actually, it is quite possible to design a receiver in which the H.F. resistance varies with wavelength in such a manner that the dynamic resistance remains nearly constant at all wavelengths, and the amplification only varies by a small amount.

This is not the whole story, however, for selectivity is of at least as great importance as amplification, and the requirements are not the same. The selectivity depends on the coil magnification, or $\omega L/R = \sqrt{L/C}/R$ and increases with an increase in this quantity. It can readily be seen that when tuning is carried out by means of a variable condenser, if steps be taken to maintain L/CR at a fixed value in order to obtain constant amplification, the selectivity decreases greatly with a reduction of wavelength.

By careful design $\sqrt{L/C}\,/\,R$ can be kept constant, but then the dynamic resistance, and hence the amplification, falls with increasing wavelength. By no juggling with the circuit values can selectivity and amplification both be maintained constant, and normal design resolves itself into finding the best compromise between conflicting factors.

Inductance Tuning

It should be noted that the above expression for selectivity involves a percentage basis of mistuning, that is, the selectivity is adjudged constant if the attenuation at a frequency 50 kc/s different from resonance at 1,500 kc/s is the same as at a frequency 20 kc/s different from resonance at 600 kc/s. Broadcasting stations, however, are spaced on the basis of a constant frequency difference, so that, strictly speaking, constant selectivity should mean that the attenuation is the same at a fixed number of kilocycles different from resonance, whatever the actual resonance frequency may be. This, of course, greatly increases the difficulties.



A view of the Varley Permeability Tuner in which the sliding cores can be seen on the left.

Now let us consider the case of tuning by means of a variable inductance. The inductance must vary in the ratio of 1-7.58 to cover the medium waveband, and the dynamic resistance is still given by L/CR. It is important to note, however, that it is now the numerator of this expression which increases with wavelength instead of the denominator, so that for constant dynamic resistance R must *increase* instead of decreasing. Actually L/R must be a constant.

Now, for selectivity on a percentage basis $\sqrt{L/C}\,/\,R$ must be constant, and if L/CR is constant, selectivity depends on $\sqrt{L/CR}\,/\,\sqrt{R}$, just as with condenser tuning. In this case, however, R decreases with decreasing wavelength, for this is a necessary attribute for constant dynamic resistance. The selectivity, therefore, *increases* at low wavelengths.

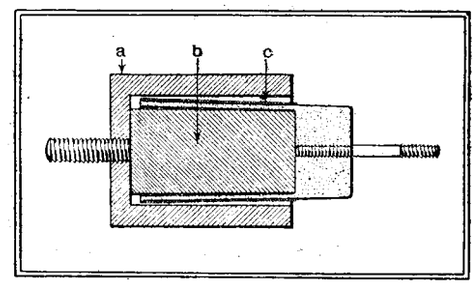


Fig. 1—The construction of one of the tuning units is shown here. The coil, c, is wound on a tapered former fitted over a core, b, which moves with the outer core shell, a, to vary the tuning.

It has been seen, however, that this is advantageous, for constant percentage selectivity is not sufficient when stations are spaced on the basis of constant frequency difference. It can be shown, in fact, that if L/R be maintained constant both the amplification and the selectivity are also constant with wavelength, the latter being reckoned on the ideal basis involving constant frequency differences from resonance.

Variable Inductances

It is clear, therefore, that inductance tuning is ideal provided that the ratio of inductance to H.F. resistance can be maintained constant. Hitherto, the chief representative of variable inductances has been the variometer, but the ratio of inductance to resistance has always varied so greatly that the performance has been at least as bad as that with condenser tuning. The case has been entirely altered, however, by the introduction of the high-permeability powdered-iron cores, and it is readily possible to construct

Permeability Tuning—

a variable inductance by the simple expedient of fitting a movable iron core to a coil.[1] The inductance is at its minimum when the core is completely removed, and at its maximum when it is inserted, and it is not difficult to obtain a sufficient change of inductance to permit tuning over the medium waveband.

The variation of H.F. resistance with inductance depends on many factors, such as the shape of the coil and core, and the precise structure of the core. It has been found possible, however, to devise a construction which permits the ratio of inductance to resistance to remain substantially constant over the tuning range.

A typical construction is shown in Fig. 1, and it will be seen that the coil, *c*, is wound on a tapered former which contains a tapered block of the core material, *b*. This portion of the core is adjustable for the purpose of initially matching the inductance. The second portion of the core consists of a cylinder, *a*, fitting outside the coil, and the coil inductance depends upon the amount by which the two overlap. Tuning, therefore, is carried out by sliding these cores to a greater or lesser degree over the coil.

A Practical Tuner

The basic connections of a typical tuned circuit embodying waveband switching are shown in Fig. 2, and it will be noted that condensers are included to secure the correct waveband coverage. These condensers are necessarily adjustable in order to permit compensation for external variations in stray capacities when the coils are embodied in a receiver. They replace, in fact, the familiar trimmers in a set tuned by variable condensers and are adjusted in the same manner. Various coupling coils are necessary, of course, in order to

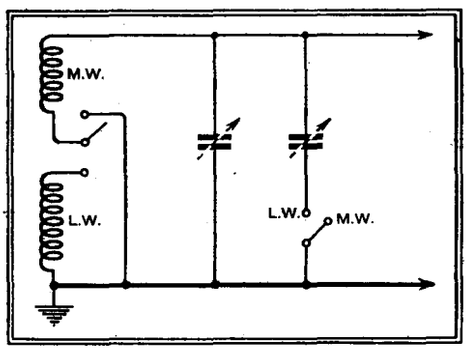
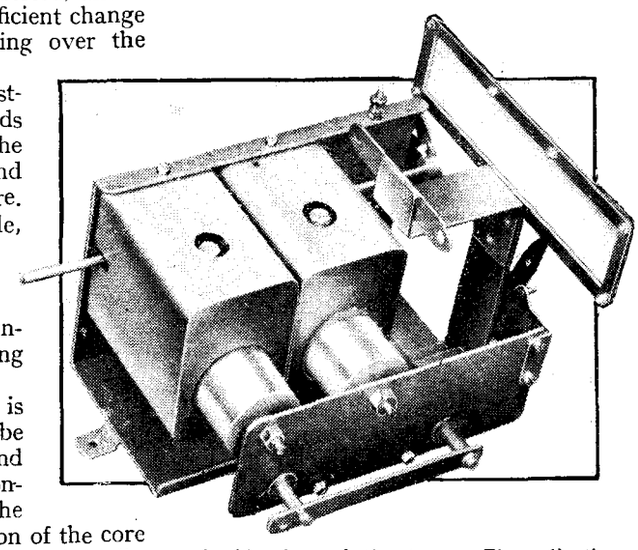


Fig. 2.—Typical connections for a dual-range coil. The condensers are used for trimming and to maintain the correct tuning range.

make use of the inductances, and it is interesting to note that the coupling can be made to vary with the tuning in almost any desired manner merely by suitably positioning the coils and the core.

The coils are being produced in ganged units suitable for the usual types of receiver, and it is claimed that matching can be achieved to an accuracy of 0.25 per cent. The stability of the cores, moreover, is claimed to be of a high order, so that the units remain matched over long periods. A temperature change produces a slight variation, but as all cores are affected equally the effect is negligible in practice. The dynamic resistance obtained varies from 115,000 ohms at 500 kc/s to 88,500 ohms at 1,400 kc/s, and over the same range the selectivity varies by no more than some 30 per cent.



A side view of the tuner. The adjusting screws for the trimming can be seen at the top of the coil screens.

It would thus appear that a considerable step forward has been taken in the design of tuning systems, and one which may give a new lease of life to the straight set. Hitherto the only entirely simple and satisfactory method of obtaining constant sensitivity and selectivity has been with the superheterodyne, and even here the variable selectivity of the signal-frequency circuits has often been a source of trouble. Tuning units of this nature have been designed by W. J. Polydoroff, and are being made in this country by Varley (Oliver Pell Control, Ltd.), who have been responsible for developing the tuner in a form suitable for covering both medium and long wavebands. One model of the Varley Tuner is illustrated in this article.

[1] Ferro-Inductors and Permeability Tuning, by W. J. Polydoroff. Proceedings of the Institute of Radio Engineers, May, 1933.

The Short-Wave World

RECENT remarks about the relative strengths of Zeesen, Radio Coloniale, and Daventry in South Africa have brought forth a letter from a reader in Malta. This gentleman says that precisely the same thing is noticed in that part of the world—i.e., that Daventry is considerably weaker than the French and German stations.

This is hardly surprising, as the Daventry station is considerably farther from Malta than either of the others, and the distance is not great enough for real short-wave reception by reflected ray to enter into the matter at all. Although not concerned with short waves, it is interesting to note this correspondent's statement that the British medium-wave stations are received quite well.

The number of short-wave receivers and components to be seen at Olympia this year, though still not large, is distinctly encouraging. Short waves have long been associated with "home construction" in a more complete sense than most other branches of radio. This has been, in a sense, due to the scarcity of components genuinely made for the exclusive use of the short-wave enthusiast.

As his numbers grow—and they *are* growing—he will be better and better looked after. Let us hope that the 1934 Show will be the first of a long series at which he finds more and more to interest him.

Short-Wave Valves

Short-wave condensers and compact short-wave coil assemblies are the parts that one finds in the greatest variety. Rumour has it that special valves may be following shortly.

With the coming of the autumn and winter season many old short-wave sets that have been discarded throughout the summer in favour of tennis and similar attractions will be brought out once more.

There is no reason whatever why an old set should not render sterling service for yet another season. Its owner must, however, be prepared to face the fact that 1933 selectivity may not prove sufficient for 1935 reception! A really modern short-wave design is shortly to be published in *The Wireless World*. Meanwhile, readers would do well to ponder over the following suggestions:—

First, owing to the rapid increase in the sales of mains-operated (non-radio) apparatus of all kinds, "man-made static" is going to be a real problem.

Secondly, the number of active stations between 12 and 60 metres is increasing at the rate of, roughly, 50 per cent. per annum.

Thirdly, such "perishable" components as valves and batteries should not be expected to go on working for ever without depreciating.

More Selectivity?

The man-made static problem can only be dealt with by careful set-design and the use of a noise-reducing aerial system. These points will be dealt with later. The increase in the number of stations calls for greater selectivity than has hitherto been necessary; fortunately, however, most short-wave sets have always been *more* selective than they need have been.

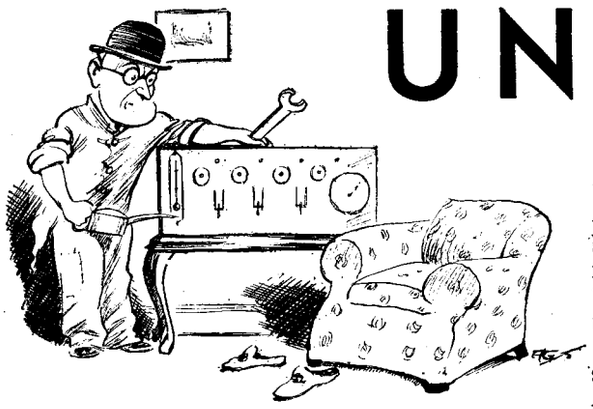
The remedy with regard to valves and batteries is obvious. Remember, also, that headphones (particularly if they are carelessly allowed to carry D.C. in the wrong direction for long periods) merit a little attention occasionally.

The writer has two short-wave receivers at present—a very straightforward battery-operated two-valve affair for amateur C.W. and telephony reception, and a 3-valve all-mains set for short-wave broadcast work. The former has been in use for four years and still seems in many respects to meet 1934 requirements.

MEGACYCLE.

UNBIASED

By FREE GRID



Before starting.

Oiling Up

I SUPPOSE that a great many of you will be contriving to buy, or at least order, new sets at Olympia in spite of the many obstacles such as cabarets and "technical" men. To those who may be successful I wish to give a word of advice before the Easter deliveries of their new purchases begin.

Briefly, my advice is that they should follow my own example and "run in" their new sets with the same care and attention which they would exercise in the case of a new car. By so doing they will find that their receivers will give them much longer service. Even in the case of my present old and well-tried set I never fail to prepare for the evening's entertainment by "oiling up" and generally running over the whole chassis with a spanner with as much anxious care as a racing motorist bestows upon his vehicle before a record-breaking attempt at Daytona beach.

It is insufficiently realised, I think, that with the rapid twirling of the dials ensuing upon the daily attempt to pick the choicest items from each of the various British and foreign programmes, the condenser bearings must become hot unless properly oiled. I have found by bitter experience that inattention to these points results in excessive wear of the bearings with the result that there develops an insidious and progressive loss of efficiency due, of course, to the fact that the bearings of each individual condenser do not wear evenly. The result of this is that deganging sets in and slowly increases day by day. The only remedy, then, of course, is the major engineering feat of taking-down the "engine" and relining the bearings.

Be advised by me, therefore, and avoid all this trouble by "oiling her up" every day before starting the evening's "DX-chasing" and, of course, as I have already intimated, in the case of a new set, the need for care is even greater until such time as she is properly run-in. If manufacturers would only include advice of this kind in their wretched instructional manuals in place of pettifogging warnings against using the condensers as mincing machines and such like things, I feel sure that everyone would be much happier.

"Clyde-built"

I HAVE always been fond of listening to plays broadcast by the B.B.C., but I must confess that I took umbrage at "Clyde-built" which they gave us recently.

Part of the story concerned a ship bound from the Clyde to Australia, which foundered in the neighbourhood of the latter place; the crew, however, were fortunately saved and turned up at Mauritius in their lifeboats after an exhausting two-thousand miles trek across the great wastes of the Indian Ocean.

There was nothing wrong about this part of the story, but the thing that stuck in my gullet was the author's attempt to strike a melodramatic note by making some of the wreckage of the ship drift all the thousands of miles from Australia to Scotland and turn up on the Clyde, whence the ship had commenced its voyage. At least, such was obviously his original intention, but he evidently thought better of it in the end and cut short the voyage of the drifting wreckage by making it turn up on the west coast of Madeira, which, although many thousands of miles from the place of the shipwreck is, at any rate, not so far as the Clyde. I think, however, that he would have done better to have cut the wreckage out altogether, and I blame the B.B.C. for not seeing that he did it.

There is just one other point, and that is that ships which are bound from Capetown to Port Talbot don't usually journey *via* the Indian Ocean and Australia. This latter inaccuracy is perhaps excusable, however, as the author is probably an old salt who still day-dreams of his sailing-ship days when vessels bound for the West Coast of South America often gave up their heart-breaking attempts to get round the Horn and, turning eastwards, almost completely encircled the globe in order to get to their destination. Similar day-dreaming, no doubt, accounted for the addition of the Alice-in-Wonderland sort of touch that on the first night of the broadcast the old Scottish grandfather informed us that his firm had been building boats for eighty years, whereas the following night he stretched it to a hundred years. Still, Scotsmen will be Scotsmen.

Stretched it to 100 years.

'Ware the Ultra Shorts

I SEE that the question of dangers from ultra-short waves is once more agitating certain writers of the popular press. In past years we have all heard of people who have experienced a distinct feeling of warmth emanating from their ultra-short wave transmitters. One gentleman has, however, now gone one better and has burnt himself badly by getting in the way of the beam from his directional ultra-short-wave ether-shaker.

Accidental direction of beam.

I can fully sympathise with the unfortunate experimenter, as a similar thing happened to me some time ago when I was using my transmitter to mend a burst bathroom pipe. Unfortunately, Mrs. Free Grid, who was holding the wretched transmitting gear, happened accidentally to direct its "beam" towards the seat of my trousers as I knelt with my head under the bath, and the results were somewhat painful. In order to warn future experimenters, I may mention that the wavelength I was using was in the neighbourhood of 0.0000001 metre.

Moral Scruples

I FULLY appreciate the kind-heartedness of my correspondents, but I feel that I must point out that the many people who continually send me "dead certs for the 2.30" are wasting their time and efforts as my conscience will not permit me to indulge in gambling.

My remarks are particularly directed to the anonymous gentleman who sends me a daily "best thing." His forecast is usually so remarkably accurate that my rigid moral scruples are a constant worry to me. Is any debased reader willing to "put it on" for me?

Exhibitors at Olympia

List of Stand-holders with Addresses and Stand Numbers, Arranged in Alphabetical Order

Name and Address.	Stand.	
ACE Radio .. .. 2a, West Harbour St., E.1.	19	D 1
Adey Portable Radio .. .. 99, Mortimer St., W.1.	115	A 2
Aerialite, Ltd. .. .. Junction Mills, Whittington St., Ashton-under-Lyne.	253	E 4
Aerodyne Radio, Ltd. .. .. Aerodyne Works, Walthamstow, E.17.	68	C 3
Allwave International Radio & Television, Ltd. .. .. 242, High St., Bromley, Kent.	113	A 2
Amalgamated Press, Ltd. .. .. .. Fleetway House, Farringdon St., E.C.4.	12	D 2
Amplion (1932), Ltd. .. .. 82, Rosoman St., E.C.1.	63	C 5
Anson & Hopwood, Ltd. .. .. .. 41, Cheval Place, S.W.3.	108	A 3
Automatic Coil Winder & Electrical Equip. Co., Ltd. .. .. Winder House, Douglas St., S.W.1.	2	D 5
Automatic Radio Gramophone Co., Ltd. .. Crown Street Hall, Brighton.	110	A 3
B.B.C. .. .. Broadcasting House, W.1.	55	C 1
B.B.C. Publications .. .. Broadcasting House, W.1.	88	B 1
Bakers Selhurst Radio, Ltd. .. .. 75–77, Sussex Rd., Croydon.	242	E 5
Balcombe, Ltd., A. J. .. .. 52–58, Tabernacle St., E.C.2.	32	D 4
Beethoven Radio, Ltd. .. .. .. Beethoven Works, Great College St., N.W.1.	57	C 2
Belling & Lee, Ltd. .. .. Cambridge Arterial Rd., Enfield, Middx.	41	D 1
Benjamin Electric, Ltd. .. .. .. Brantwood Works, Tariff Rd., N.17.	42	C 1
Bernard Jones Publications, Ltd. .. .. 58, Fetter Lane, E.C.4.	10	D 3
Birmingham Sound Reproducers, Ltd. .. Claremont St., Old Hill, Staffs.	235	F 5
Block Batteries, Ltd. .. .. By-Pass Rd., Barking, Essex.	31	D 4
Bridger & Co., Ltd., R. O. .. .. .. No. 4 Factory, Shelford Place, Church St., N. 16.	216	H 3
Britannia Batteries, Ltd. .. .. .. Union St., Redditch, Worcs.	94	A 2
British Blue Spot Co., Ltd. .. .. .. 94–96, Rosoman St., E.C.1.	90	A 1
British G.W.Z. Battery Co., Ltd. .. .. 205–207, Bedford Ave., Trading Estate, Slough, Bucks.	206	H 4
British N.S.F. Co., Ltd. .. .. .. Waddon Factory Estate, Croydon.	49	B 1
British Permel Enamelled Wire, Ltd. .. Charlton, S.E.7.	21	D 2
British Pix Co., Ltd. .. .. 118, Southwark St., S.E.1.	237	F 5
British Radiophone, Ltd. .. .. .. Aldwych House, Aldwych, W.C.2.	97	A 3
British Rola Co., Ltd. .. .. Minerva Rd., Park Royal, N.W.10.	48	B 1
British Wireless for the Blind Fund .. .. 224, Great Portland St., W.1.	50	B 1
"Broadcaster" .. .. 29, Bedford St., Strand, W.C.2.	T27	E 4
Brown Bros., Ltd. .. .. Great Eastern St., E.C.2.	T20	F 1
Brown Radio Co., Wm. F. .. .. .. Ossillo Radio Works, Brierley Hill, Staffs.	229	H 5
Bulgin & Co., Ltd., A. F. .. .. .. Abbey Rd., Barking, Essex.	121	A 2
Burgoyne Wireless (1930), Ltd. .. .. Great West Rd., Brentford, Middx.	102	A 4
Burndept, Ltd. .. .. Light Gun Factory, Erith, Kent.	81	B 4
Burton, C. F. & H. .. .. Progress Works, Bernard St., Walsall.	3	D 5
Bush Radio, Ltd. .. .. Woodger Rd., Shepherd's Bush, W.12.	82	B 4
CADISCH & Sons, R. .. .. 5–6, Red Lion Sq., W.C.1.	T7	H 2
Celestion, Ltd. .. .. London Rd., Kingston-on-Thames.	28	D 3
Central Equipment, Ltd. .. .. .. 188–192, London Rd., Liverpool.	4	D 5
Chloride Electrical Storage Co., Ltd. .. Clifton Junction, Nr. Manchester.	254	E 3
Churchmans, Ltd. .. .. 79, Maidenburgh St., Colchester	T23a	E 3
City Accumulator Co., Ltd. .. .. .. 18–20, Norman's Buildings, Central St., E.C.1.	89	B 1
Clarke & Co. (M/c), Ltd., H. .. .. .. George St., Patricroft, Manchester.	85	B 2
Climax Radio Electric, Ltd. .. .. .. Haverstock Works, Parkhill Rd., N.W.3.	56	C 1
Cole, Ltd., E. K. .. .. Ekco Works, Southend-on-Sea, Essex.	72	B 2
Colvern, Ltd. .. .. Mawneys Rd., Romford, Essex.	38	D 1
Concordia Electric Wire Co., Ltd. .. .. New Sawley, Nr. Nottingham.	238	F 5
Consolidated Radio Co., Ltd. .. .. Warple Way, Acton, W.3.	20	D 1
Cosmocord, Ltd., ... Cambridge Arterial Rd., Enfield, Middlesex	243	E 5
Cossor, Ltd., A. C. .. .. Cossor House, Highbury Grove, N.5.	73	B 3
DALLAS & Sons, Ltd., John E. .. .. 6–10, Betterton St., W.C.2.	T12	H 3
Darwins, Ltd. .. .. Fitzwilliam Works, Sheffield.	40	D 1
De La Rue & Co., Ltd., Thos. .. .. Shern Hall St., Walthamstow, E.17.	5	D 5
Dent, R. H. (Ardente) .. .. .. 309, Oxford St., W.1.	45	B 1
Department of Overseas Trade .. .. 35, Old Queen St., S.W.1.	52	C 1
Dew & Co., Ltd., A. J. .. .. .. 33, Rathbone Place, W.1.	T22	E 2
Dibben, Ltd., Horace .. .. 34, Carlton Crescent, Southampton.	T21	E 1
Diggle & Co., Ltd., Alfred .. .. .. Jane St., Rochdale, Lancs.	13	D 2
Dubilier Condenser Co. (1925), Ltd. .. .. Victoria Rd., North Acton, W.3.	96	A 2
Dulcetto-Polyphon, Ltd. .. .. .. 2–3, Newman St., W.1.	T16	H 1
Dyson & Co. (Works), Ltd., J. .. .. 5, Godwin St., Bradford.	T4	E 2
EARL Manufacturing Co., Ltd. .. .. Avenue Works, Hanover Park, S.E.15.	240	E 5
Eastick & Sons, J. J. .. .. 118, Bunhill Row, E.C.1.	T23	E 2
East London Rubber Co., Ltd. .. .. 29–33, Great Eastern St., E.C.2.	T18	G 1
Econasign Co., Ltd. .. .. 92, Victoria St., S.W.1.	227	H 5
Edge Radio, Ltd. .. .. Raphael St., Bolton.	91	A 1
Edison Swan Electric Co., Ltd. .. .. 155, Charing Cross Rd., W.C.2.	18 58	D 1 C 2
Eldeco Radio, Ltd. .. .. 62, Conduit St., W.1.	93	A 1
Electrico .. .. 97, George St., Croydon.	246	E 4
Electro Dynamic Construction Co., Ltd. .. Devonshire Grove, S.E.15.	117	A 1
Ensign, Ltd. .. .. 88–89, High Holborn, W.C.1.	T5	E 1
Erie Resistor, Ltd. .. .. Waterloo Rd., Cricklewood, N.W.2.	14	D 1
Everett, Edgcumbe & Co., Ltd. .. .. Colindale Works, Hendon, N.W.9.	212	H 3
Ever Ready Co. (Gt. Britain), Ltd. .. .. Hercules Place, Holloway, N.7.	25	D 3
FERRANTI, Ltd. .. .. Hollinwood, Lancashire.	70	C 2
Film Industries, Ltd. .. .. 60, Paddington St., W.1.	207	H 4
Flinders (Wholesale), Ltd. .. .. .. East Stockwell St., Colchester.	T10	H 3
Fuller Accumulator Co. (1926), Ltd. .. Woodland Works, Chadwell Heath, Essex.	124	A 3
GARRARD Engineering & Mfg. Co., Ltd. .. Newcastle St., Swindon, Wilts.	54	C 1
General Electric Co., Ltd. .. .. .. Magnet House, Kingsway, W.C.2	34 66 225	D 3 C 4 H 4
Gilbert & Co., Ltd., C. .. .. 73, Arundel St., Sheffield.	T9	H 2
Goodman, J. .. .. 28–30, Drysdale St., N.1.	217	H 3
Goodmans (Clerkenwell), Ltd. .. .. Broadyard Works, Turnmill St., E.C.1.	125	A 3
Graham Farish, Ltd. .. .. 153, Masons Hill, Bromley, Kent.	59	C 3
Gramophone Co., Ltd. (H.M.V.) .. .. 98–108, Clerkenwell Rd., E.C.1.	33 61	D 4 C 4
Grosvenor Electric Batteries, Ltd. .. .. 2–3, White St., E.C.2.	104	A 4
HACKER & Sons, H. .. .. Perfecta Works, Ray Lea Rd., Maidenhead.	116	A 1
Halcyon Radio, Ltd. .. .. 83a, Valetta Rd., Acton, W.3.	36	D 2
Harmer & Simmons, Ltd. .. .. .. 223, Hoe St., Walthamstow, E.17.	209	H 4
Hartley Turner Radio, Ltd. .. .. .. Thornbury Rd., Isleworth, Middx.	119	A 1
Haynes Radio .. .. 57, Hatton Garden, E.C.1.	9	D 3
Heayberd & Co., F. C. .. .. 10, Finsbury St., E.C.2.	24	D 2
Hellesens, Ltd. .. .. Morden Rd., S. Wimbledon, S.W.19.	78	B 5
Hendersons Wholesale Electrical & Radio, Ltd. .. .. Electric House, Queen's Rd., Brighton.	T2	E 2
Henley's Telegraph Works Co., Ltd., W. T. Holborn Viaduct, E.C.1.	109	A 3
High Vacuum Valve Co., Ltd. .. .. 113, Farringdon Rd., E.C.1	27	D 3
Hillman Brothers .. .. 123–125, Albion St., Leeds.	T3	E 2
Hobday Bros., Ltd. .. .. 21–27, Great Eastern St., E.C.2.	T17	G 1
ILIFFE & Sons Ltd. .. .. Dorset House, Stamford St., S.E.1.	6	D 4
Itonia, Ltd. .. .. 58, City Rd., E.C.1.	T6	H 1
JACKSON Bros. (London), Ltd. .. .. 72, St. Thomas' St., S.E.1.	114	A 2
Johnson Talking Machine Co., Ltd. .. .. 96, Clerkenwell Rd., E.C.1.	T13	H 2
KINGSWAY Radio, Ltd. .. .. .. 3–9, Dane St., W.C.1.	44	C 1
Kolster-Brandes, Ltd. .. .. Cray Works, Sidcup, Kent.	84	B 3
L.E.S. Distributors, Ltd. .. .. .. 15–16, Alfred Place, W.C.1.	T25	E 3
Lampex Radio and Electric Co. .. .. Phantom House, Brewery Rd., N.7.	22	D 2
Lectro Linx, Ltd. .. .. 79a, Rochester Row, S.W.1.	218	H 3
Lissen, Ltd. .. .. Warple Rd., Isleworth, Middx.	83	B 3
London & Provincial Factors, Ltd. .. .. 146, Theobald's Rd., W.C.1.	T26	E 3
Lugton & Co., Ltd. .. .. 203, Old St., E.C.1.	T1	E 3
M. & B. Radio .. .. Turney Rd., Dulwich, S.E.21.	210	H 4
McMichael Radio, Ltd. .. .. .. Wexham Rd., Slough, Bucks.	60	C 3
Mains Power Radio, Ltd. .. .. .. Broadway Works, Eastern Rd., Romford, Essex.	230	H 5
Manufacturers Accessories Co. (1928), Ltd. .. 85, Great Eastern St., E.C.2.	T24	E 3
Marconiphone Co., Ltd. .. .. .. 210–212 Tottenham Court Rd., W.1.	76	B 4

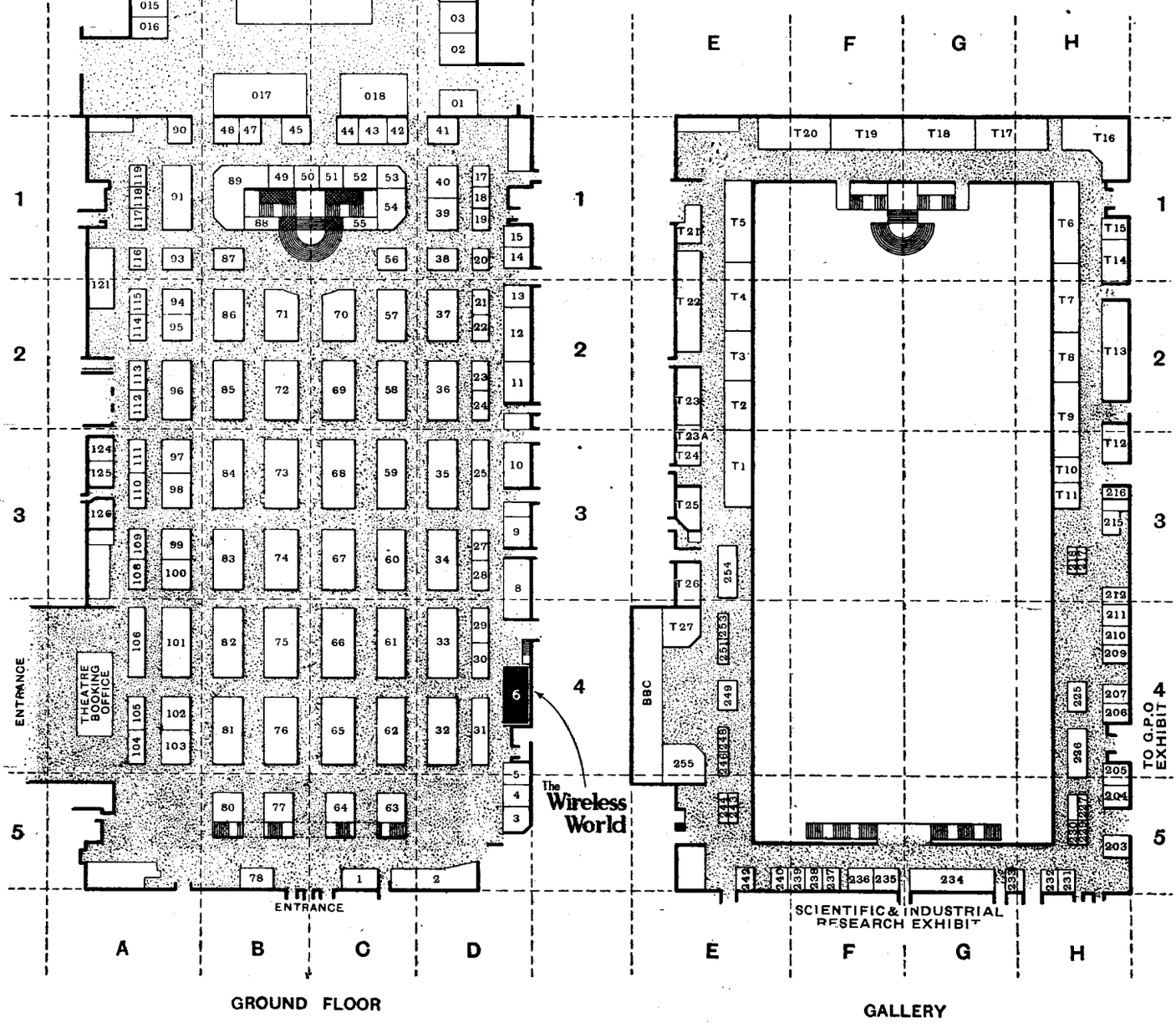
GUIDE TO THE STANDS

The reference letter and figure in black type shown against each stand number is for use in conjunction with the squared plan on the opposite page

The Wireless World STAND FINDER

GUIDE TO ALL EXHIBITORS AT OLYMPIA

Any Stand in the Exhibition can instantly be located by using this squared plan in conjunction with the references shown in black type in the accompanying list of exhibitors



A selection of Constructional Receivers recently described in the pages of this journal will be on view at "The Wireless World" Stand (No. 6).

Exhibitors at Olympia—

Name and Address.	Stand.	
Milnes Radio Co., Ltd. .. .. .. Victoria Works, Bingley, Yorks.	249	E 4
Mullard Wireless Service Co., Ltd. .. .. Mullard House, Charing Cross Rd., W.C.2.	65	C 4
Multitone Electric, Ltd. .. .. .. 95, White Lion St., N.1.	51	C 1
NATIONAL Radio Service Co. .. .. 15–16, Alfred Place, W.C.1.	215	H 3
New London Electron Works, Ltd. .. .. East Ham, E.6.	39	D 1
Newnes, Ltd., George .. .. 8–11, Southampton St., W.C.2.	8	D 3
Novo Radio-Electric, Ltd. .. .. .. 34, Lovaine Place, Newcastle-on-Tyne.	17	D 1
Nuvolion Electrics, Ltd. .. .. .. Meredith Works, Park Cres., Clapham Park Rd., S.W.4.	236	F 5
ORMOND Engineering Co., Ltd. .. .. Ormond House, Rosebery Ave., E.C.1.	100	A 3
Orr Radio, Ltd. .. .. 79a, Parkhurst Rd., N.7.	64	C 5
Ossicaide, Ltd. .. .. 447, Oxford St., W.1.	211	H 4
PARTRIDGE, Wilson & Co., Ltd. .. .. Davenset Works, Evington Valley Rd., Leicester.	29	D 4
Peto & Radford .. .. 50, Grosvenor Gardens, S.W.1.	226	H 4
Philips Lamps, Ltd. .. .. 145, Charing Cross Rd., W.C.2.	62	C 4
Plew Television, Ltd. .. .. Waddon, Croydon.	11	D 2
Portadyne Radio .. .. Gorst Rd., N. Acton, N.W.10.	71	B 2
Powertone Products .. .. 102, Cromer St., W.C.1.	15	D 1
Provincial Incandescent Fittings Co., Ltd. .. Pifco House, High St., Manchester.	111	A 3
Pye Radio, Ltd. .. .. Africa House, Kingsway, W.C.2.	69	C 2
RADIO Development Co. .. .. .. 6, St. Mary's Chambers, 161a, Strand, W.C.2.	23	D 2
Radio Gramophone Development Co., Ltd.. 18–20, Frederick St., Birmingham.	74	B 3
Radio Instruments, Ltd. .. .. .. Purley Way, Croydon.	80	B 5
Radio Society of Gt. Britain .. .. .. 53, Victoria St., S.W.1.	204	H 5
Regentone, Ltd. .. .. Worton Rd., Isleworth, Middx.	99	A 3
Reproducers & Amplifiers, Ltd. .. .. Frederick St., Wolverhampton.	53	C 1
Rist (1927), Ltd., A. .. .. Freemantle Rd., Lowestoft.	233	G 5
SELECTA Gramophones, Ltd. .. .. 81, Southwark St., S.E.1.	T11	H 3
Siemens Electric Lamps & Supplies, Ltd. .. 38–39, Upper Thames St., E.C.4.	77	B 5
Sinclair Speakers, Ltd. .. .. .. 13, Vale Royal, York Rd., N.7.	232	H 5
Smith & Sons (Motor Accessories), Ltd., S.. Cricklewood Works, N.W.2.	47	B 1
Sonochorde Reproducers, Ltd. .. .. 1, Willesden Lane, N.W.6.	43	C 1
Sound Sales, Ltd. .. .. Tremlett Grove Works, Junction Rd., N.19.	203	H 5
Stratton & Co., Ltd. .. .. Eddystone Works, Bromsgrove St., Birmingham.	30	D 4
Sunbeam Electric, Ltd. .. .. .. Park Royal Rd., N. Acton, N.W.10.	35	D 3
Sun Electrical Co., Ltd. .. .. .. 118–120, Charing Cross Rd., W.C.2.	T19	F 1
Swift Levick & Sons, Ltd. .. .. .. Clarence Steel Works, Sheffield.	118	A 1
TANNOY Products .. .. Canterbury Grove, S.E.27.	95	A 2
Telegraph Condenser Co., Ltd. .. .. Wales Farm Rd., N. Acton, W.3.	37	D 2
Telegraph Construction & Maintenance Co., Ltd. .. .. Telcon Works, East Greenwich, S.E.10.	112	A 2
Telephone Mfg. Co., Ltd. .. .. .. Hollingsworth Works, Martell Rd., S.E.21.	105	A 4
Telsen Electric Co., Ltd. .. .. .. Aston, Birmingham.	75 101	B 4 A 4
The 362 Radio Valve Co., Ltd. .. .. Stoneham Rd., E.5.	244	E 5
Thompson, Diamond & Butcher .. .. 34, Farringdon Rd., E.C.1.	T8	H 2
ULTRA Electric, Ltd. .. .. Erskine Rd., N.W.3.	67	C 3
VANDERVELL, Ltd., C. A. .. .. .. Well St., Birmingham.	234	G 5
Varley (Oliver Pell Control, Ltd.) .. .. Bloomfield Rd., S.E.18.	103	A 4
Vee Cee Dry Cell Co. (1927), Ltd. .. .. Northwold Rd., N.16.	126	A 3
Vidor, Ltd. .. .. West St., Erith, Kent	106	A 4
Voigt Patents, Ltd. .. .. The Courts, Silverdale, S.E.26.	255	E 4
WESTINGHOUSE Brake & Saxby Signal Co., Ltd. .. .. 82, York Rd., King's Cross, N.1.	86	B 2
Weston Electrical Instrument Co., Ltd. .. Kingston By-Pass, Surbiton.	239	F 5
Wharfedale Wireless Works .. .. .. 62, Leeds Rd., Bradford.	205	H 4
Whiteley Electrical Radio Co., Ltd. .. .. Victoria St., Mansfield, Notts.	98	A 3
Wingrove & Rogers, Ltd. .. .. .. 188–189, Strand, W.C.2.	87	B 1
"Wireless & Gramophone Trader" .. .. Dorset House, Stamford St., S.E.1.	T14	H 1
Wireless League .. .. 12, Grosvenor Crescent, S.W.1.	248 & 251	E 4
Wireless Retailers' Association .. .. 316, First Avenue House, High Holborn, W.C.2.	231	H 5
"Wireless World" .. .. Dorset House, Stamford St., S.E.1.	6	D 4
Wolsey (Radio & Allied Trades), Wholesale, Ltd. .. .. 54, Lamb's Conduit St., W.C.1.	T15	H 1
World Radio Research League .. .. Broadcasting House, W.1.	88	B 1
Wright & Weaire, Ltd. .. .. .. 749, High Rd., Tottenham, N.17.	1	C 5

ON THE SPOT

Visits to Foreign Broadcast Stations

XIX Hamburg (Germany) 904 k/cs 331·9 metres 100 kW

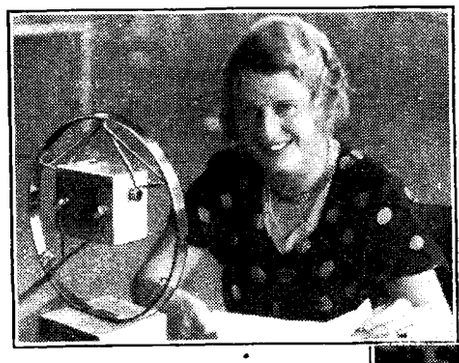
AS a startling revelation of what can be done by an inspired architect it would be difficult to find anything to rival Hamburg's Broadcasting House. What, from the exterior, appears to be an ultra-modern building, is, in fact, an old house with a new wing. Inside, the architectural achievements are even more praiseworthy, for the main studio can be varied in size by moving the ceiling or the walls or the floor to suit any desired acoustic requirements.

The new 100-kilowatt transmitter with its anti-fading aerial may be clearly seen from the Hamburg-Berlin railway line, the best view being obtained just after Bergedorf, a few minutes before reaching Hamburg.

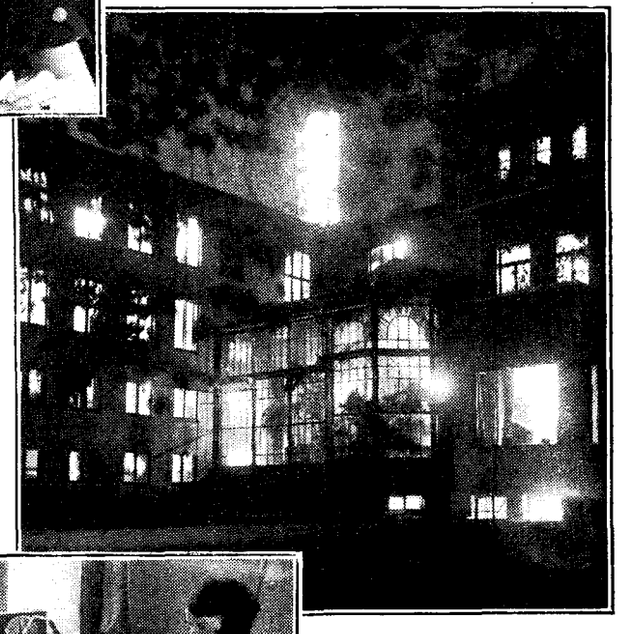
Hamburg is one of the few German stations at which announcers are specially selected for different types of programmes. Dr. Pauli, director of the station, considers that this is essential in order that the announcements may be worthy of the style of programme. Thus, all musical items are announced by a fully fledged orchestral conductor.

Hamburg feeds a number of relay stations, including Hanover, Bremen, Flensburg, Magdeburg, and Stettin, which all operate on a single wavelength, but have their distinctive interval calls. This last feature is important, for when a programme is being relayed from one of these provincial centres its place of origin can be immediately identified by the listener who is familiar with the individual calls.

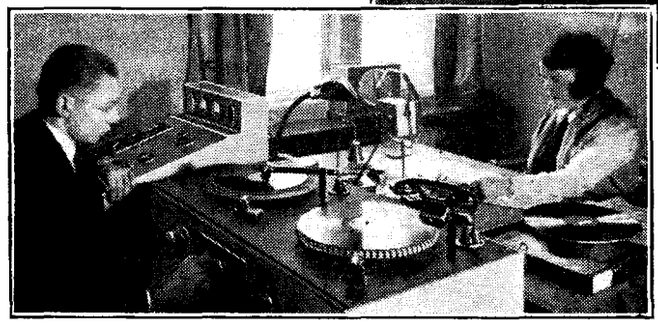
WANDERING WAVE.



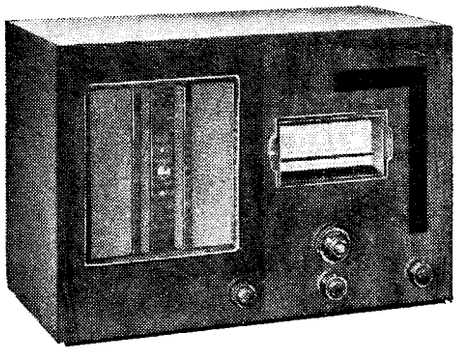
Fraulein Trude Meinz, one of Hamburg's two lady announcers.



The famous conservatory attached to the Hamburg broadcasting headquarters is frequently used for dramatic programmes. The illuminated "No rag" tower can be seen in the background.



This photograph was taken during an actual gramophone broadcast from Hamburg.



Cossor Battery Receiver

MODEL 350

***FEATURES. Type.**—Table-model battery receiver with moving-iron loud speaker. **Circuit.**—Var.-mu H.F. amplifier — leaky grid detector — triode output valve. **Controls.**—(1) Tuning. (2) Volume. (3) Reaction. (4) Wave-range and on-off switch. **Price** (exclusive of batteries) £5 12s.·6d. **Makers.**—A. C. Cossor, Ltd., Highbury Grove, London, N.5.*

High-efficiency Iron-cored Tuning Coils

THERE is now quite a wide range of choice in simple battery receivers costing about £5, but the low price of the Cossor Model 350 does not necessarily place it in this category, since the price does not include batteries. Full value is, however, afforded by the inclusion of a high-frequency stage (most receivers at this price are of the det.-L.F. variety) and iron-cored, low-loss tuning coils. On the other hand, the output valve is a single triode, and the loud speaker is of the moving-iron type, but the same circuit is available with a moving-coil loud speaker and a pentode output valve at a slightly higher cost.

There is, however, nothing in the design and finish of the cabinet to suggest the low cost of the receiver. The overall dimensions are 20in. × 13½in. × 10in., and the H.T. and grid-bias batteries are housed on a shelf above the chassis, while the L.T. battery is mounted behind the loud speaker.

There are four controls—the main tuning control, volume control, reaction and combined wave-range, and on-off switch. The tuning scale is of the horizontal type, and is calibrated approximately in wavelengths. The settings of the principal European stations are given in a table above the tuning indicator. The scale is etched on translucent material, but a pilot lamp is not fitted. The appearance of the set as a whole is considerably enhanced by the escutcheon plate, which is dull black inside the recessed window and bright chromium on the face.

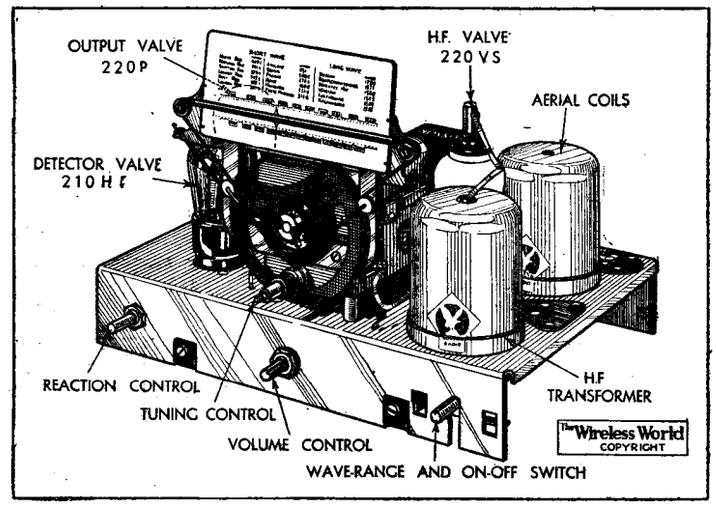
By careful manipulation of the volume and reaction controls the selectivity may be varied to comply with local conditions. Normally, approximately four channels are lost on either side of the local transmitters in Central London, but, by reducing volume and increasing reaction, this figure can be considerably improved. On long waves an ample margin of separation is provided between Daventry and Radio Paris.

With reaction at minimum, the performance clearly indicates the efficiency of the iron-cored tuning coils, and even when receiving distant Continental stations there is generally an ample reserve of reaction in hand.

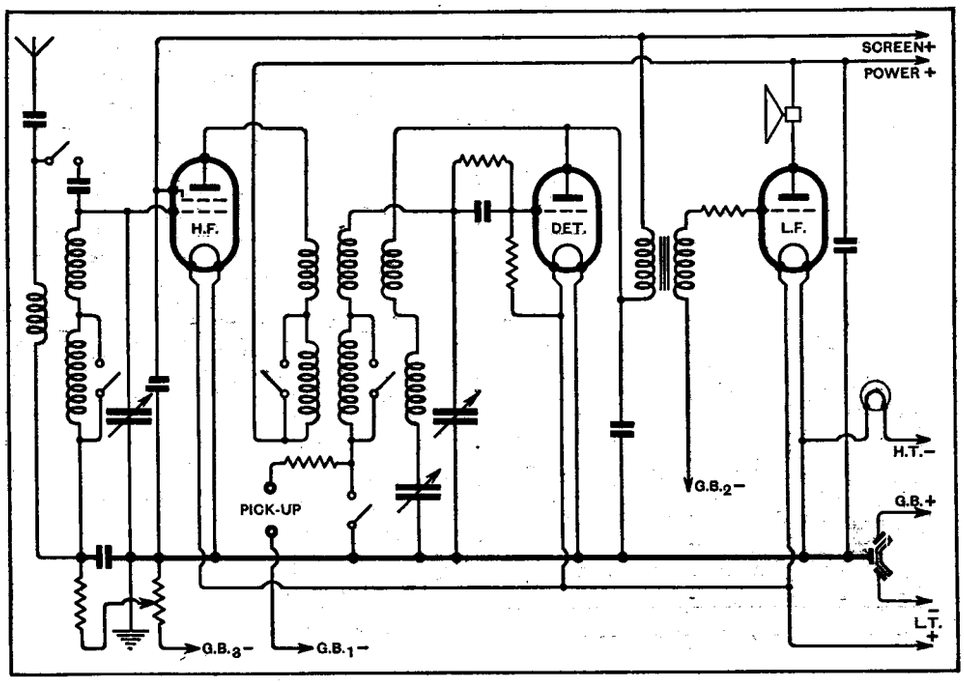
A single tuned circuit precedes the H.F. stage, and the aerial coupling is magnetic on medium waves and a combination of magnetic and capacitative coupling on long waves. The H.F. valve is of the variable-mu type, and the volume is controlled in this stage by varying the grid bias. A high-resistance potentiometer connected across the separate grid-bias battery is employed for this purpose, and contacts are incorporated in the on-off switch to disconnect the resistance when the set is not in use. Transformer coupling is employed between the H.F. and detector stages, the detector being a leaky grid triode. A gramophone pick-up is connected in the low potential return lead of the H.F. transformer secondary, and by an ingenious arrangement of grid leaks a potentiometer circuit is established which biases the detector valve by the correct amount when the pick-up is in use. The detector is transformer-coupled to the triode output valve, and the loud speaker is connected directly in the anode circuit. Sockets are provided for the addition of an external loud speaker in parallel with the internal unit.

Although the bass reproduction does not come up to the standard to which we have become accustomed as the result of the widespread use of moving-coil units, the reproduction in other respects is entirely satisfactory, and there can be no doubt that the higher efficiency of the moving-iron unit contributes its share to the overall sensitivity of the three-valve circuit and the ease with which foreign transmissions are received.

A milliammeter connected in the negative H.T. lead showed the total consumption of the set at maximum volume to be 10 mA. The current taken is dependent on the setting of the volume control and in the minimum position is only 6.5 mA. The H.T. circuit is protected by a lamp-type fuse.



General view of the chassis. The tuning coils are of the iron-cored type.



Simplified circuit diagram. Volume is controlled in the H.F. stage by a high-resistance potentiometer connected across the G.B. battery.

Letters to the Editor:—

The Question of Quality

Single-Span : Transients : No Name

The Editor does not hold himself responsible for the opinions of his correspondents

The Question of Quality

YOUR recent articles and correspondence regarding quality have interested me a great deal. I agree that the maximum of quality should be the ideal at the transmitter, regardless of the possible limitations of even the majority of receivers.

I think enough has already been said on the matter so far as it relates to broadcasting. I would, however, like to raise a question upon which the foregoing has some bearing, and which I consider is of great importance. I refer to the appallingly low standard of quality with which both the commercial and fighting services seem to be content.

I have had much time on my hands recently owing to ill health and have spent a considerable portion of it at the receiver. Perhaps it will be as well if I mention, in passing, that both my broadcast and short-wave receivers are capable of giving excellent quality reproduction.

Let us travel down the scale of wavelength, beginning with the Commercial Airways on 900 metres. Why do the air services tolerate the horrible bubbly carrier waves and mushy over-modulated speech which characterises practically all aircraft? Surely crystal control is now sufficiently reliable to warrant its use in aircraft transmitters. Croydon Aerodrome, by the way, I exempt. The speech quality is excellent and consistent, but what of Heston?

Now, what about those truly fearful noises which may be heard on the 170-metre band, emanating from trawlers, lightships, etc. I have heard signals which I thought to be spark, only to find they were trawler "telephony." Assuming their gear to be sound, which, personally, I do not think it is, could it not be pointed out to the individuals who operate these transmitters that the best quality is not obtained by shrieking at the top of one's voice into a solid-back microphone?

Now to the Air Force. From the general operating point of view they are quite outside the pale. Apart from their poor morse operators, their C.W. signals chirp like dicky birds and their telephony is even worse than their civil confrères.

Surely when a telephony operator is reduced to the A for apple, G for George, H for Harry level, just because his gear is junk, it is time something was done. This applies equally to the lightships as well. Recently I heard a lightship take just over three-quarters of an hour to pass a very important message a distance of some twenty miles. The fuming master thereof was finally reduced to spelling out each word in the time-honoured Ack, Beer, Charlie style, changing over after each word before going on to the next!

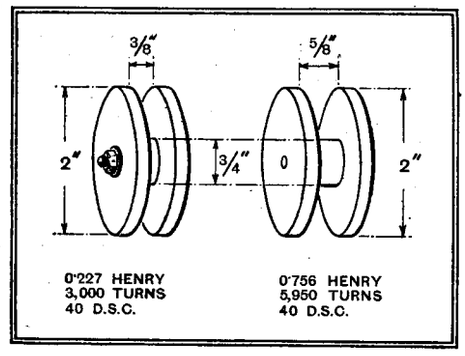
The natural tendency for the non-technical operator, confronted with one of these transmitters, is to shout, and that, of course, makes matters ten times worse.

In short, with the one shining exception of the Post Office, whose transmissions and operators are of the highest order, it would appear that our public services are muddling along with any old junk gear, and this I submit is not in the public interest.

Any amateur station perpetrating such noises would earn the name of "Mud" from his fellows, and in all probability the wrath of the authorities as well. I say nothing of foreign amateurs, but I will assert without fear of contradiction that the British amateur can hold his own against all comers for high-quality signals and good operating. I suggest that it is time that other users of the ether should be able to say the same.

ARTHUR O. MILNE, G2MI.
Laskfield, Kent.

HIGH-PASS FILTER COILS.



Readers wishing to construct the high-pass filter incorporated in "My Home Set—1" described in the June 29th issue will find all the essential data for winding the chokes in the above diagram.

Single-Span

I EXPECT that by the time this letter reaches you many sets employing single-span tuning, as described by Mr. Cocking in *The Wireless World*, will be in use. I hope, however, that it will not be too late for me to extend to your paper congratulations from New Zealand for this notable advance.

The description of this set was of particular interest to me, since two and a half years ago I developed a set in which the intermediate frequency was higher than the signal frequency, and in which there were no circuits tuned to the signal frequency.

It may be of interest to your readers to know that I employed this principle of a high intermediate frequency when engaged in developing a receiver for ultra-short waves of 120 cms. wavelength. I wished to test whether the particular method of detection which I was employing functioned without distortion. A modified form of Barkhausen-Kurz oscillator was used at a frequency of 252.1 mc/s, and this was made to beat with the signals from the local broadcasting station on a frequency of 0.65 mc/s. The intermediate frequency in this case was thus 252.75 mc/s, and so could be received and detected on the ultra-short wave receiver. This afforded a simple and convenient method of testing the action of the receiver by using the audio modulation of the broadcasting station.

A. W. PYBUS, M.Sc.
Dunedin, New Zealand.

Correspondence, which should be as brief as possible, should be addressed to the Editor, "The Wireless World," Dorset House, Stamford Street, S.E.1, and must be accompanied by the writer's name and address.

Transients

THE contention put forward by Sgt. Farrell (whose letter appeared in the issue of July 20th) that a single cycle of a sound of purely sinusoidal form would be heard as a click is only true under certain conditions, and the same limitation will apply to his statement that either of the wave forms illustrated in my previous letter (June 1st issue) will sound like a hum. While such will admittedly be the case at a wavelength corresponding to, say, 1,000 cycles/sec., it will certainly not be so if the wavelength is increased considerably. For instance, at five cycles/sec. the rectangular form would be heard as a rattle, while the triangular or sinusoidal forms would be completely inaudible, although if the amplitude were sufficiently large they could produce actual physical discomfort. Thus the question of phase shift does undoubtedly assume great importance at low frequencies, whatever may be the case at higher ones.

Another point of significance is that the wave forms of the sound of the human voice are so distinctive that they can be drawn on a film to produce an artificial voice. It is surely inconceivable that this would be the case if phase relationship were of no importance, even although the sound may remain recognisable after phase shift has taken place. Admittedly this argument cannot be regarded as logical proof, but it should not be dismissed merely because it does not fit in with a certain theory.

Another point which appears to me to be important is that there is no scientific basis for the assumption that the ear appraises any sound by analysing it into its sine wave harmonics and assessing the amplitude of each without taking account of phase. The only excuses for this idea are the convenience of the sine form for mathematical treatment and the fact that the diaphragm of the ear, like everything else, will prefer to move according to a sine law for very small oscillations. Neither of these is a logical reason, and, what is more, at larger amplitudes the ear diaphragm, again like

everything else, will prefer to depart from the sine law. Anyone who doubts this should try a long, loud spell of tuning note, which is almost a pure sine wave.

My conclusions are therefore:—

(*a*) In general phase relationships of harmonics are important although the audible effect of any change will vary with the character of the sound and may in certain special cases become unappreciable. It is a fact, however, that most sounds are produced with a definite and unvarying wave form peculiar to each source.

(*b*) For percussive sounds the wave form is of paramount importance, and must be maintained to a high degree of accuracy if the reproduction is to be recognised as a good copy of the original.

Barrow-in-Furness. F. J. A. POUND.

No Name

WE were interested in the leader published in your issue of *The Wireless World*, dated July 13th, and particularly in the letter published in the issue of July 27th from Mr. Frank Murphy, of Murphy Radio, Ltd.

Although we express for what it is worth our private opinion that every bona-fide manufacturer of radio instruments should append a name to the product as placed on the market, we hardly feel competent to enter into any discussion with Mr. Murphy, or, indeed, with any other radio firm having a full and complete knowledge of that industry; but when Mr. Murphy expresses his personal resentment at his drawing-room being turned into an advertisement hoarding by the name of a piano, we think we should register a mild protest.

Although not actually makers of pianos, we are engaged in the production of a closely allied instrument—the organ.

We think perhaps that Mr. Murphy may not be aware that certain privileges exist to the creators of musical instruments, and of pictures, and probably of other things, where the result or effect created is due, not so much to mechanical or theoretical skill as to the personal artistic abilities of individuals.

In other words, the painter of a picture, or the maker of a piano or an organ, is permitted by the purchaser to place a signature or a name-plate on the front of the article sold, and in the case of really artistic, first-class creations, that signature or name-plate is regarded as a seal of excellence or hall-mark of quality.

A purchaser of pianos and organs expects to see that name-plate, and we can even cite one case in our own actual experience where, after a name-plate had been inadvertently omitted, the purchaser at once requested us to rectify the omission.

Another very important detail which may not have occurred to Mr. Murphy is that the presence of a name stamps the article with a certain market value, and in the case of really high-class musical instruments the depreciation in value may be enormous if that plate is removed.

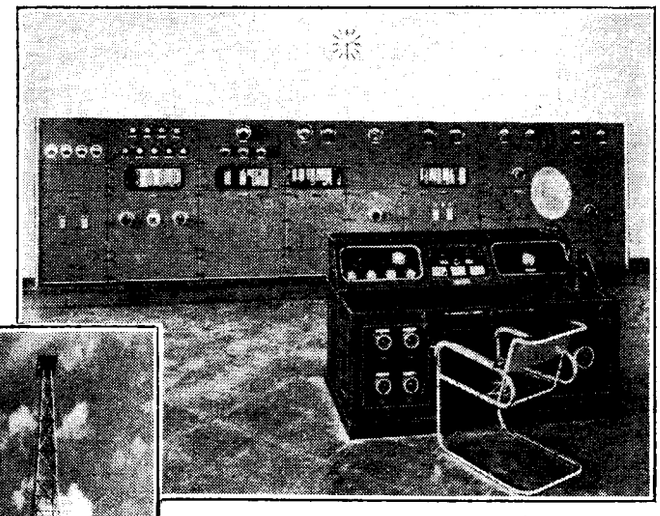
Regarded in this light, we sincerely hope that Mr. Murphy will not consider the word Steinway, or whatever it may be, on his piano as an advertisement hoarding, even though he may still hold that the name of the maker on the front of an electric fire is out of place.

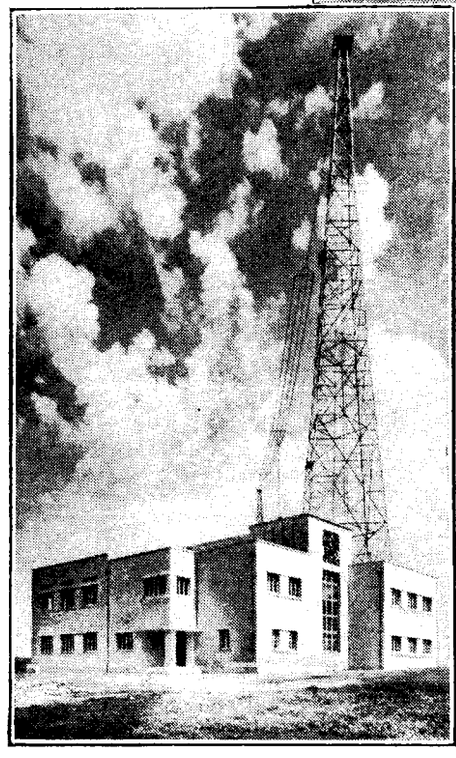
For HELE AND CO., LTD.,
J. KENNETH HELE, Managing Director.
Plymouth.

DISTANT RECEPTION NOTES

THE small Portuguese station at Parede has recently closed down. It was run by the Portuguese Radio Club, but, owing to insufficient financial support, it was found impossible to carry it on. To British listeners its disappearance is not entirely a loss, for since it shared a wavelength with the 60-kilowatt Königsberg it was very seldom received. It did, however, interfere seriously at times with the big German station. Königsberg is now perfectly clear, and good reception is nearly always obtainable.

The new Droitwich station has been testing for some little time now after the general close-down at midnight, and I dare say that many readers have picked up its transmissions. It is considerably farther away from me than 5XX, but it comes in with magnificent volume, and the quality is an immense improvement on that of the old station.





PORTUGAL'S FIRST NATIONAL BROADCASTING STATION. Two photos taken recently at the new Lisbon transmitter, which was constructed by Standard Telephones & Cables Ltd. Working on a wavelength of 476.9 metres and a power output of 20 kW. the station is ideally situated on a hill-top, and excellent reports have been received from all parts of Europe.

The old 5XX has now been in operation for just nine years, and that is a long time for a broadcasting station. It was looked upon as a marvel in its day, and the fact that it could be heard all over the country turned it into a National transmitter some time before such things as Regional and National stations were thought of.

It was announced on good authority some months ago that the Eiffel Tower was due to abandon the long waves and to start transmitting within the limits of the medium waveband. No such thing has happened, for the Eiffel Tower is still going strong on 1,395 metres, and good reception is obtainable, particularly in daylight hours. Actually, there is only one kilocycle between this station and Motala, but during the daytime one notices no interference with the Eiffel Tower's programmes.

Better Reception Conditions

Conditions for long-distance reception have taken a very marked turn for the better since my last notes appeared. Atmospherics, it is true, are a nuisance at times, and on evenings when this is the case the wise listener confines himself either to his local station or to the more strongly received Continentals. When atmospheric interference is absent the number of foreign stations receivable is very much greater than it was only a week or two ago. Further, there is a marked improvement in their signal strength.

Of the long-wave stations the best are Huizen, Radio-Paris, Zeesen, Warsaw, the Eiffel Tower, Luxembourg, and Kalundborg. Oslo, for some reason or other, is quite poor at the moment.

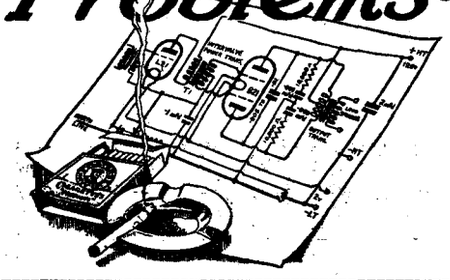
One of the surest signs that long-distance conditions are improving is the return to strength of the stations at the top of the medium waveband. With the exception of Florence, which varies greatly from night to night, the group of stations with wavelengths between 483.9 and 549.5 metres is now providing really good reception. This group includes Budapest, Beromünster, Athlone, Stuttgart, Vienna, and Brussels No. 1.

A little lower down there is another solid block of well-received stations, comprising Prague, Lyons PTT, Cologne, Söttens, Paris PTT, Stockholm, Rome, Munich, and Leipzig.

The elusive Katowice has begun to appear again, though I cannot yet record good reception from Brno. In the lower part of the medium waveband stations that are now quite reliable are Milan, Berlin, Hamburg, Brussels No. 2, Poste Parisien, Hilversum, Bordeaux, Frankfurt, and Bari. Breslau, Trieste, and Nürnberg show good strength, but are prone to heterodyne interference.

D. EXER.

Readers' Problems



THESE columns are reserved for the publication of matter of general interest arising out of problems submitted by our readers. Readers requiring an individual reply to their technical questions by post are referred to "The Wireless World" Information Bureau, of which brief particulars, with the fee charged, are to be found at the foot of this page

Oscillator-less Superhet

WE are asked to say whether it is indicative of a defect that one or two stations can be well received when the oscillator valve of a superheterodyne is withdrawn from its socket. The set in question employs a separate oscillator.

It is quite possible that signal impulses with a frequency difference between them corresponding to the frequency of the I.F. amplifier can reach the grid of the first detector, and in these circumstances audible signals will be obtained. No definite defect is indicated, but the preselector system of the set would not appear to be of a very ambitious design, or, alternatively, it may be out of alignment.

The Pick-up as a Modulator

IN a recent paragraph in the "Hints and Tips" section the possibilities of using a pick-up as a modulator of an oscillating valve were discussed; by using this arrangement, all the valves in the receiver are operative when gramophone records are being reproduced. In certain specialised receivers this is a definite advantage.

One or two readers who have put this scheme into practice have apparently encountered minor difficulties, and in particular complain of distorted reproduction.

Probably the most serious risk in using the scheme in question is that of overmodulation, which is bound to produce distortion; the oscillator valve should be supplied with an adequate H.T. voltage, and as a rule it is as well to provide means for limiting the voltage applied from the pick-up to the grid of the oscillator valve. This may be done in the manner shown in Fig. 1, where a potentiometer (of the value recommended for the pick-up in use) is connected in the normal manner. It should be noted that the connection of this potentiometer may sometimes stop self-oscillation, especially if it be mounted close to the oscillator valve with short leads; to prevent this a condenser C of about 0.0001 mfd. should be interposed in the grid circuit.

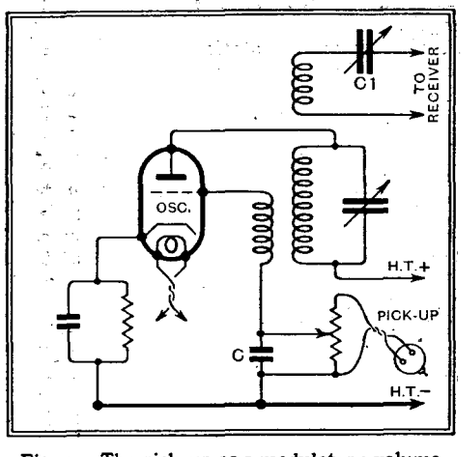


Fig. 1.—The pick-up as a modulator: volume controls for both the pick-up and the modulated output are included.

It is also possible that the output of the oscillator may be sufficiently great to overload the early valves of the receiver, and it is for this reason that thorough screening of the oscillator unit was recommended. It is also important that the regulating condenser (C1 in Fig. 1), whereby the amount of energy applied to the receiver is adjusted, should have a really low minimum capacity.

A Second L.T. Battery

A QUERIST who is engaged in devising a battery-fed version of the resistance-coupled Push-Pull Amplifier described in *The Wireless World* of May 11th, is in difficulties with regard to the connections of the phase-reversing feeder valve which is used when the amplifier is employed for gramophone reproduction. His difficulty is associated with the fact that the cathode of this valve must be isolated from the cathodes of the remaining valves.

It would appear that the best way out of the difficulty is to employ an independent L.T. battery for heating the filament of the feeder valve; this is quite a practical scheme, as the smallest size of mass-type accumulator will be quite suitable for supplying a single filament.

Beware the H.F. Stopper

IN a number of receivers the application of H.F. voltages to the L.F. amplifier is prevented, or at least restricted, by the interposition of a "stopping" resistance in the grid circuit of the valve immediately succeeding the detector; sometimes this resistance has a very high value.

It should be remembered that the presence of a resistance of a quarter of a megohm or so in series with the output from a pick-up and the grid of the valve to which it is connected cannot be tolerated, and we feel sure that this accounts for the poor quality and weak reproduction of which a correspondent complains. He has apparently connected his pick-up in the wrong manner; it should be joined to the "grid" side of the stopping resistance.

Selectivity—Real and Apparent

THE apparent lack of selectivity on the long waveband which is common to all receivers is responsible for a number of letters to the Information Department.

On the medium band a typical set covers a frequency range of roughly 1,000 kilocycles, or about 110 station channels. With an ordinary tuning dial engraved with a 0-100 division scale this means that the adjacent channels should be spaced by slightly under one division.

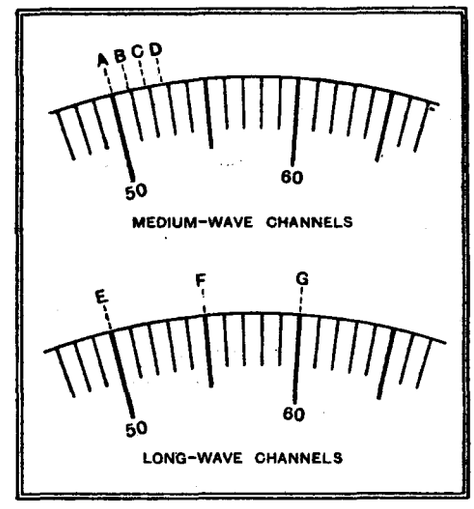


Fig. 2.—Tuning on the medium and long waveband compared.

The frequency coverage of the average receiver on the long waveband (1,000 to 2,000 metres) is only 150 kilocycles, and in spite of the fact that the channels on this band are rather more tightly packed, there is only room for some twenty stations. This means that adjacent stations will be spaced by about five divisions on the same scale.

The tuning of a typical receiver on both bands is shown in Fig. 2. It should be pointed out that for the sake of simplicity we have assumed straight-line-frequency tuning; this is not true in practice, but the illustrations given are sufficiently near the mark to show that the apparently broad tuning on the long waveband is quite normal. But true selectivity will almost certainly be actually higher.

Loss of Signal Strength

WHEN installing a shielded aerial it must not be forgotten that the length of wire which is screened is totally ineffective as a collector of signal energy. This is a matter of some importance, as sometimes it is found necessary to shield a part of the horizontal length of the aerial as well as the down-lead.

A correspondent has found that in these circumstances a very considerable loss of signal strength has resulted. This is not surprising; all that we can suggest is that he should endeavour to increase the height, and possibly the length as well, of the unshielded portion of the aerial.

The Wireless World INFORMATION BUREAU

THE service is intended primarily for readers meeting with difficulties in connection with receivers described in *The Wireless World*, or those of commercial design which from time to time are reviewed in the pages of *The Wireless World*. Every endeavour will be made to deal with queries on all wireless matters, provided that they are of such a nature that they can be dealt with satisfactorily in a letter.

Communications should be by letter to *The Wireless World* Information Bureau, Dorset House, Stamford Street, London, S.E.1, and must be accompanied by a remittance of 5s. to cover the cost of the service.

Personal interviews are not given by the technical staff, nor can technical enquiries be dealt with by telephone.

MISCELLANEOUS ADVERTISEMENTS

NOTICES.

THE CHARGE FOR ADVERTISEMENTS in these columns is

12 words or less 3/- and 3d. for every additional word.

Each paragraph is charged separately and name and address must be counted.

SERIES DISCOUNTS are allowed to Trade Advertisers as follows on orders for consecutive insertions, provided a contract is placed in advance, and in the absence of fresh instructions the entire "copy" is repeated from the previous issue: 13 consecutive insertions 5%; 26 consecutive, 10%; 52 consecutive, 15%.

ADVERTISEMENTS for these columns are accepted up to FIRST POST on MONDAY MORNING (previous to date of issue) at the Head Offices of "The Wireless World," Dorset House, Stamford Street, London, S.E.1, or on SATURDAY MORNING at the Branch Offices, 19, Hertford Street, Coventry; Guildhall Buildings, Navigation Street, Birmingham, 2; 260, Deansgate, Manchester, 3; 26B, Renfield Street, Glasgow, C.2.

Advertisements that arrive too late for a particular issue will automatically be inserted in the following issue unless accompanied by instructions to the contrary. All advertisements in this section must be strictly prepaid.

The proprietors retain the right to refuse or withdraw advertisements at their discretion.

Postal Orders and Cheques sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co. Notes being untraceable if lost in transit should not be sent as remittances.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of private advertisers, letters may be addressed to numbers at "The Wireless World" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge, which must include the words Box 000, c/o "The Wireless World." All replies should be addressed to the Box number shown in the advertisement, c/o "The Wireless World," Dorset House, Stamford Street, London, S.E.1. *Readers who reply to Box No. advertisements are warned against sending remittance through the post except in registered envelopes; in all such cases the use of the Deposit System is recommended, and the envelope should be clearly marked "Deposit Department."*

DEPOSIT SYSTEM.

Readers who hesitate to send money to advertisers in these columns may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Wireless World," both parties are advised of its receipt.

The time allowed for decision is three days, counting from receipt of goods, after which period, if buyer decides not to retain goods, they must be returned to sender. If a sale is effected, buyer instructs us to remit amount to seller, but if not, seller instructs us to return amount to depositor. Carriage is paid by the buyer, but in the event of no sale, and subject to there being no different arrangement between buyer and seller, each pays carriage one way. The seller takes the risk of loss or damage in transit, for which we take no responsibility. For all transactions up to £10, a deposit fee of 1/- is charged; on transactions over £10 and under £50, the fee is 2/6; over £50, 5/-. All deposit matters are dealt with at Dorset House, Stamford Street, London, S.E.1, and cheques and money orders should be made payable to Iliffe & Sons Limited.

SPECIAL NOTE.—Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post. When sending remittances direct to an advertiser, stamp for return should also be included for use in the event of the application proving unsuccessful.

Set Manufacturers' Surplus, Clearance and Bankrupt Stocks offered in any of these columns may not be Manufacturers' current lines. Radio components advertised at below the list price do not carry any manufacturer's guarantee.

RECEIVERS AND AMPLIFIERS, ETC.

ARMSTRONG 1935 Chassis Programme.

ARMSTRONG 5-valve 6-stage Superheterodyne Chassis, Pentagrid frequency changer, bandpass filter, screened pentode intermediate, high-slope pentode output, full A.V.C., Cossor valves, royalties, etc.; £6/10.

ARMSTRONG 5-valve 7-stage Superheterodyne Chassis, Heptode frequency changer, bandpass filter, screened pentode intermediate, double diode triode, fully delayed A.V.C., illuminated full vision scale, adjustable noise suppressor combined radio-gramophone volume control, Marconi valves, etc.; £6/18/6.

ARMSTRONG 6-valve Superheterodyne Chassis, Octode frequency changer, bandpass filter, screened pentode intermediate, fully delayed A.V.C., adjustable noise suppressor, horizontal drive, combined radio-gramophone volume control, Mullard valves, royalties, etc.; £8/18/6.

ARMSTRONG Universal 8-stage Superheterodyne, full A.V.C., ready shortly.

ARMSTRONG 4v. 3-pentode Bandpass A.C. Chassis, retained for 1935, greatly improved; £5/18/6, with valves.

ARMSTRONG Latest 4v. Battery Chassis, 2 screened high-frequency stages, pentode output, 3 tuned circuits, calibrated wavelengths, good selectivity with exceptional pull; £4/10, with valves.

ALL Armstrong Chassis are Constructed of Highest Grade Components Throughout, carry 12 months' service free guarantee, and are sent 7 days' approval, carriage paid.

ARMSTRONG MANUFACTURING Co., 100, King's Rd., N.W.1. [6267

MURPHY Latest Table Model; 8 guineas.—Box 1223, c/o *The Wireless World*. [6252

CROSLLEY Midgets and Car Radio.—Send for wholesale catalogue to importers.—Royal, 5, Buckingham Rd., London, E.18. [6270

EDDYSTONE 4-valve Short-wave Receiver, 1933, complete with coils; accept 65/-.—Brooks, 137, Russell Rd., Moseley, Birmingham. [6268

NEW British Radiophone Battery Superhet Seven Chassis complete with valves, beautifully constructed; a real bargain, £6/10.—Williams, 1, East Av., E.17. [6274

OUR Kit of Parts for "Wireless World" Quality Amplifier, complete in every detail, including valves; amplifier only, £8/10; feeder unit, 36/-; send for detailed list of components.

WE Can Supply Kits for Any "Wireless World" receiver or amplifier; carriage paid, cash with order or c.o.d.

WARD, 45, Farringdon St., London, E.C.4. 'Phone: Holborn 9703. [6164

1935 Models.—4-valve superhet, A.C. or D.C., M.C. speaker, £3/19/6; 5-valve, £5/5; 6-valve, £6/10; car radio, £10/10, including valves; appro., "Wireless World" deposit; bargains.—30, Warren St., London, W.1. [6269

Receivers and Amplifiers, Etc.—Contd.

SPECIAL Clearance.—New 1933-34 models Ultra Tiger 4v. Superhets, list 14 guineas, £8/15; also Alba, Ekco, Cromwell and G.E.C. sets; list on application.—R. B., 34, Ardern Terrace, Leicester. [6170

55/-.—Class "B" 3-valve band pass, in superb horizontal 2-colour walnut cabinet, Radiophone 2-gang in metres, Kola P.M. (without valves, batteries), listed £9/9; c.o.d., carriage forward.—Kay, 167, City Rd., London, E.C.1. [6197

LOTUS A.C., S.G., Det. Pentode, M.C. Bandpass, £6; Philips 11½-gn. A.C., £6; Amplion A.C.4, £7; Blue Spot Pedestal, Class B, 4v. valves, batteries, £6/10; Burgoyne Class B, 3v., valves, batteries, M.C., £4; all new 1934 sets complete.—Butlin, 143b, Preston Rd., Brighton. [6246

RADIO Recordion 60-watt 230v. A.C. Amplifier, complete with turntable, pick-up, etc. radio incorporated, housed in oak cabinet, 2 D.O.25s in output stage, 3 B.T.H. Senior P.M. speakers on ornamental baffles, in splendid condition throughout, ready to plug in, ideal outfit for cafe or dance hall; price £22/10.

MARCONI 30-watt A.C. Amplifier, 200-230v., automatic record changer, in teak cabinet, microphone stage incorporated, complete with valves; £15.

G.E.C. 60-watt Converter Driven, in teak cabinet, covered in back and front, as new; price, less valves, last few, £2/10.

MARCONI 60-watt A.C. Amplifier, type P.13, 110-250v., suitable for mic., radio, or gram., in polished oak cabinets, complete with valves; £12/10 each.

SPEAKERS, microphones, meters and all other gear appertaining to P.A. work at bargain prices; callers are invited; stamp for lists.—H. Franks, 23, Percy St., Tottenham Court Rd., W.1. Museum 8585. [6285

PUBLIC Address Amplifiers.—A.C. mains, three stage, 21 watts, undistorted A.C. output, complete with valves, £15; universal A.C./D.C. three stage, 7 watts output, complete, £13; guaranteed 12 months; trade supplied; deferred terms.—D. E. Clarkson, B.Sc. (Eng.), 45, Manor Rd., Wallington, Surrey. 'Phone: Wallington 3953. [6280

MIDGET Receivers, every one brand new, working off A.C. and D.C. mains, 100-130 or 200-240 volts, by universal adaptor included, all incorporate M.C. speaker, provision for gramophone pick-up, L. and M. waves, complete with valves, etc., Emerson 5-valve chassis (as above), sealed cartons, £3/15; above chassis incorporated in handsome figured cabinet (10×7½×5½), list 10 guineas, at £4/6/3; carriage paid, cash with order; or c.o.d.—Degalliers, 4, Coryton House, 21, Upper Marylebone St., London, W.1. Museum 7795. [6275

MAINS EQUIPMENT.

VORTEXION.—See display advt. on page 45.

VORTEXION Leads Again.

VORTEXION Specified Single Span Model, 350-100 m.a., 4v. 5a. C.T., 4v. 2.5a. C.T., 4v. 1a. C.T.; 25/-, less terminals, 23/-, less 5-year guarantee 2½/-; power chassis, complete, £3/10; steel chassis only, 7/6; also normal model, shrouded, at 16/-, special shrouded choke 12/6.

VORTEXION.—Quality amplifier or super monodial, 425-0-425, 120 m.a., 4v. 6-8a. C.T., 4v. 3a. C.T., 4v. 1a., 4v. 1a., super shrouded, core size 2¼in.× 1½in., 2½% regulation primary engraved insulated terminals, weight 14lb., 26/- carriage 2/-; normal shrouded, 22/-; open type, 20/-, post 1/3; speaker field replacement choke, 16/-; special output transformer, to "W. W." spec., 12/6.

(This advertisement continued on next page.)

Mains Equipment.—Contd.

(This advertisement continued from previous page.)

VORTEXION 7.30h. 120 m.a. Choke, 215 ohms, in die cast shrouding to match; 12/6.

IMITATED, but unequalled. Good enough for a "Wireless World" specification is good enough for you.

VORTEXION Cost Little More than the Cheapest, but unequalled by the dearest.

VORTEXION Standards Despatched by Return.

VORTEXION A.C./34, used by author in construction of A.V.C. Three, as illustrated; 18/-.

GUARANTEED 12 Months, and within 5% normal and 2½% super models, neat shrouding, with detachable feet, as used by Government Departments, etc., etc., any model guaranteed 5 years at extra cost of 2/-.

ALL Secondaries Centre Tapped.

VORTEXION.—250-0-250 60 m.a. 4v. 1 to 2a., 4v. 2 to 4a., open type, 10/-; shouded, 12/6; post 9d.

VORTEXION.—Ferrocart III, 350-0-350, 60 m.a., 4v. 2.5 C.T. 4v. 3.5 C.T.; open type 13/6, shrouded 16/-; post 9d.

VORTEXION.—Super model for H.T.8 or 9 or 10, 4v. 1 to 2, 4v. 2 to 4; open type 14/6; shrouded 16/6; post 1/-.

VORTEXION.—350-0-350, 120 m.a., 4v. 2 to 5a, 4v. 2 to 4a., 4v. 2.5a.; open type, 14/6; shrouded, 16/6; super shrouded model, weight 11lb., 4 filaments to specification, 21/-; post 1/3.

VORTEXION.—400 or 450 or 500v. 120 m.a., 4v. 2 to 5, 4v. 2 to 5. 4v. 2. 5a.; open type. 19/-; shrouded, 23/-.

VORTEXION.—400 or 450 or 500, 150 m.a., 4v. 4a., 4v. 2.5, 4v. 2, 4v. 2, 4v. 2, core size 2¼×1¼in., a super job, 2% regulation, 35/-; shrouded, with terminals; less terminals, 30/-; open type, 26/-; post 1/3

VORTEXION Auto Transformers to B.E.S.A. Specification, 100, 110, or 120v. to 200, 220, or 240 volts, 60 watts, 9/-; post 9d.; 120 watts, shrouded 12/6, open type 10/6, post 1/-; 200 watts, shrouded 16/6, post 1/-; 2,000 watts, £4/10.

VORTEXION 1,000-watt Transformers; £4/10, carriage free.

VORTEXION 30h. at 60 m.a. Chokes, 5/6; 40h. at 60 m.a., 8/6; 30h. at 150 m.a., 200 ohms, 10/6 open type, 12/6 shrouded.

VORTEXION Transformers Made to Your Specification; price according to wattage, 6v. filaments same price unless wattage grossly exceeded; special quotations by return.

VORTEXION (S. A. BROWN), 182, The Broadway, Wimbledon S.W.19. Tel.: Liberty 2814. [5901

BATTERY Charging Plants.—The N.P. is renowned for service; low price; quality and efficiency.

BATTERY Charging Plants.—A.C. mains, from 52/- to £20; complete, ready for use.—The N.P.

BATTERY Charging Plants.—New trade lists of N.P. (late Nash Products).—N.P. Electrical Co., 514, Alum Rock Rd., Birmingham, 8. [6284

TANTALUM for A.C. Chargers H.T. and L.T.—Blackwell's Metallurgical Works, Ltd., Garston, Liverpool. [5039

PARAMOUNT Mains Transformers, equal to any, and better than most; try them once and you will always use them!

PARAMOUNT, single-span model, 350-0-350v. 100 m.a. 4v. 5a., 4v. 1a., 4v. 2.5a., shrouded, screened primary 2½% regulation; 20/-.

PARAMOUNT.—350-0-350v. 120 m.a., 4v. 5a., 4v. 4a., 4v. 2.5a., shrouded, screened primary, suitable for single span; 16/-, post 1/-.

PARAMOUNT Mains Transformers are Guaranteed for 12 months and made from the very best British materials.

PARAMOUNT.—250-0-250v. 60 m.a., 4v. 1-2a., 4v. 2-4a., 10/-, post 9d.

PARAMOUNT.—Chokes, 30h. 60 m.a., 5/6, post 9d.; 20h. 120 m.a, shrouded, 11/-; open, 8/6, post 9d.

PARAMOUNT Products are Fitted with Neat Aluminium frames or shrouds, all filaments are centre tapped, insulating paper between each layer; every component must pass a stiff test before it leaves our works.

PARAMOUNT.—500-0-500v., or 450v., or 400v., 120 m.a., 4v. 5a., 4v. 4a., 4v. 2.5 amps., shrouded, screened primary, 21/-; open 18/-; post 1/3.

PARAMOUNT Transformers for Westinghouse H.T.8, 9, or 10, with 4v 2a., 4v. 4a., shrouded, 16/-, post 1/-; for H.T.11, 45/-, post 1/6.

PARAMOUNT.—Guaranteed electrolytic condensers, 4+4 mfd., 500v. peak, 3/6, post 3d.; let us quote you for any component you may need.

PARAMOUNT.—Auto-transformers, 100-120v. up to 200-250 volts, or vice versa, 60-watt, 8/6; 120-watt, 10/-; shrouded, 12/-; post 9d.

PARAMOUNT.—Any transformer made to your own specification; price according to wattage; quotations by return

PARAMOUNT Mains Transformers, manufactured by Brock and Salter, 66, Hartfield Rd., Wimbledon, S.W.19. (one minute from Wimbledon Station). Tel.: Liberty 3226. [6216

OUR New Lists Now Ready; constructors of transformers, chokes and coils should apply immediately.—Lumen Electric Co., 9, Scarisbrick Av., Litherland, Liverpool, 21. [6248

LESDIX Chargers, all steel, A.C. and D.C. mains, 2 to 200 cells at low prices; state requirements; dynamos and rotaries in stock, all sizes; battery superseders for 2-volt input, 80-volt output, 37/6; fractional H.P. and sewing machine motors, 25/-.—Below.

LESDIX Measuring Instruments, 2¾in. bakelite case, flush panel, any reading, A.C. or D.C.; from 6/- each; ask for full range instrument list.—Below.

LESDIX Microphones.—We are makers of 25 types for all uses; Home Radio mikes, solid bakelite body, 5/6; G.P.O. microphones, on stand, with mouthpiece, 7/6; P.A. mikes, 50/-; list free.—Electradix Radios, 218, Upper Thames St., London, E.C.4. [0398

Components, Etc., for Sale.—Contd.

PREMIER.

PREMIER SUPPLY STORES Offer the Following Set Manufacturers' Surplus New Goods at a Fraction of the Original Cost; all goods guaranteed perfect, carriage paid over 5/-, under 5/-, 6d. extra; I.F.S. and abroad, carriage extra.

SPECIAL Offer of P.M. and Energised M.C. Speakers, from well-known gramophone manufacturer.

TYPE 10971C, 9in. diameter, 2,000 ohm. field, 40-70 m.a., Pentode transformer, handles 4 watts; 17/6.

TYPE 10955F, 9in. diameter, 11,650 ohm field, 20-30 m.a., auditorium type power transformer, handles 10 watts; 30/-.

TYPE 10955H, 9in. diameter, 115 ohm field, 350-400 m.a., auditorium type Pentode transformer, handles 10 watts, 30/-; A.C. conversion kit, 20/-.

TYPE 4480B, 9in. diameter, permanent magnet, handles 4 watts, 7 ohms speech coil, 13/6; Multi ratio transformer; 4/6 extra.

ELIMINATOR Kits, including transformer, choke, Westinghouse metal rectifier, T.C.C. condensers, resistances and diagram, 120v., 20 m.a., 20/-; trickle charger 8/- extra; 150v. 30 milliamps, with 4v. 2-4 amps C.T. L.T., 25/-; trickle charger 6/6 extra: 250v. 60 milliamps with 4v., 3-5 amps C.T. L.T., 30/-; 300v. 60 m.a. with 4v., 3-5 amps, 37/6; 200v. 100 m.a., 39/6.

PREMIER Chokes, 40 milliamps, 25 hys., 4/-; 65 milliamps, 30 hys., 5/6; 150 milliamps, 30 hys., 10/6; 60 milliamps, 80 hys., 2,500 ohms, 5/6; 25 milliamps, 20 hys., 2/9.

ALL Premier Guaranteed Mains Transformers have Engraved Terminal Strips, with terminal connections, input 200-250v., 40-100 cycles, all windings paper interleaved.

PREMIER H.T.7 Transformer, output 135v. 80 m.a. for voltage doubling, 8/6; 4v. 3-4a., C.T. L.T., 2/- extra; with Westinghouse rectifier giving 200v. 30 m.a., 17/6.

PREMIER H.T.8 and 9 Transformers, 250v., 60 m.a., and 300v. 60 m.a. rectified, with 4v. 3-5a. and 4v. 1-2a. C.T. L.T. and screened primary, 10/-; with Westinghouse rectifier, 18/6.

PREMIER H.T.10 Transformer, 200v. 100 m.a., rectified, with 4v. 3-5a., and 4v. 1-2a. C.T. L.T. and screened primary, 10/-; with Westinghouse rectifier, 19/6.

PREMIER Mains Transformers, output 250-0-250v. 60 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. (all C.T.), with screened primary; 10/-.

PREMIER Mains Transformers, output 350-0-350v. 90 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. (all C.T.), with screened primary; 10/-.

PREMIER Auto Transformers, 100-110/200-250v. or vice versa, 100-watt; 10/-.

SPECIAL Offer of Mains Transformers, manufactured by Phillips, input 100-120v. or 200-250v., output 180-0-180 volts 40 m.a., 4v. 1 amp., 4v. 3 amps, 4/6; 200-0-200v., 4v. 1a., 4v. 3a., 4/6.

WESTERN ELECTRIC Mains Transformers, 300-0-300v. 65 m.a., 4v. 1-2a., 4v. 2-3a., 6/6; 500-0-500v. 150 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 2-3a., 4v. 1a., C.T., 4v. 1a. C.T., 19/6; 1,000-0-1,000v. 250 m.a., 4v. 3a. C.T., 4v. 3a. C.T., 49/6; 2,000-0-2,000, 150 milliamps, 49/6.

PREMIER L.T. Charger Kits, consisting of Premier transformer and Westinghouse rectifier, input 200-250v. A.C., output 8v. ½ amp., 14/6; 8v. 1 amp., 17/6; 15v. 1 amp., 19/-; 6v. 2 amp., 27/6; 30v. 1 amp., 37/6; 2v. ½ amp., 11/-.

COLLARO Gramo. Unit, consisting of A.C. motor, 200-250v. high quality pick-up and volume control, 49/-; without volume control, 46/-.

B.T.H. Truspeed Induction Type (A.C. only) Electric Gramophone Motors, 100-250v.; 30/- complete.

B.T.H. Gramophone Motors, 100-250 volts A.C. or D.C., specially recommended for D.C., complete; 30/-.

EDISON Bell Double Spring Gramophone Motors, complete with turn-table and all fittings, a really sound job; 15/-.

SPECIAL Offer of Wire Wound Resistances, 4 watts, any value up to 50,000 ohms, 1/-; 8 watts, any value up to 15,000 ohms, 1/6; 15 watts, any value up to 50,000 ohms, 2/-; 25 watts, any value up to 50,000 ohms 2/6.

WIRE Wound Potentiometers, 15,000 ohms, 1/6; 50,000 ohms, 2/-; 500,000 ohms, 3/-; 1,000 ohm wire wound semi variable resistances, carry 150 m.a., 2/-.

CENTRALAB Potentiometers, 50,000, 250,000, ½-meg. any value, 2/-; 200 ohms, wire wound, 1/-.

POLAR Star, manufacturers' model, 3-gang condensers, fully screened, 7/6; with trimmers.

AMERICAN Triple Gang 0.0005 Condensers, with trimmers, 4/11; Utility Bakelite 2-gang 0.0005 screened with uniknob trimmer, 3/6; Polar Bakelite condensers, complete with knob, 0.00015, 0.00035, 0.0003, 0.0005, 1/-.

ORMOND Condensers, 0.0005 2-gang semi-shielded, 2/6; brass vanes, with trimmers, 3/6.

MAGNAVOX D.C.152, 2,500 ohms, 17/6; D.C.154, 2,500 ohms, 12/6; D.C.152 Magna, 2,500 ohms, 37/6, all complete with humbucking coils; please state whether power or pentode required; A.C. conversion kit for above types, 10/-; Magnavox P.M. 7in. cone, 18/6.

RELIABLE Canned Coils with Circuit, accurately matched, dual-range, 3/- per coil; ditto, iron cored, 3/6.

RELIABLE Intervalve Transformers, 2/-; multi ratio output transformers, 4/6.

T.C.C. Electrolytic Condensers, 550v. working, 650v. peak, 8 mf., 4/-; 4 mf. or 8 mf., 440v. working, 3/-; 15 mf., 50v. working, 1/-; 25v. working, 25 mf., 1/3; 6 mf., 50v. working, and 2 mf., 100v. working, 6d.

T.C.C. Condensers, 250v. working, 2 mf., 1/9; 2 mf. 1,500v. working, 6/-; 4 mf., 1,500v. working, 10/-.

H.M.V. Condensers, 400v. working, 4×4×1×1×1×1×0.1×0.1×0.1×0.1, 4/9; 4×2×1×1×1×0.5, 3/9.

VARLEY Constant Square Peak Coils, band pass type BP.7, brand new in maker's carton with instructions and diagram, 2/6.

VARLEY H.F. Intervalve Coils BP.8. band pass, complete with instructions in original cartons; 2/6.

SCREENED H.F. Chokes by One of the Largest Manufacturers in the Country; 1/6.

PREMIER British-made Meters, moving iron, flush mounting, accurate, 0-10, 0-15, 0-100, 0-250 m.a., 0-1, 0-5 amps; all at 6/-.

(This advertisement continued in third column.)

Components, Etc., for Sale.—Contd.

(This advertisement continued from first column.)

A LARGE Selection of Pedestal Table and Radiogram, cabinets, by best manufacturers, at a fraction of original cost, for callers.

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PLEASE Send for Fully Illustrated Catalogue.

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SOUTHERN RADIO'S Bargains.—Set manufacturers' guaranteed surplus.

VARIABLE Condensers.—Lotus 3-gang 0.0005, 12/6; Lotus 2-gang, 0.0005, 8/6; Lotus Dyblock single, 0.0005, 4/9 (list 9/6): all these condensers are complete with dials, escutcheons, knobs, fully screened with trimmers, and boxed; Hydra block condensers, 16 mfd. (2+2+3+2+1+1), 1,000v. D.C., 7/- each; Dubilier 4 mfd. (2+1+1), 1,000v. D.C., 2/9; 4.5 mfd. (2.25+2.25), 1,000v., for mains noise suppression, 3/-; fixed 4 mfd., 2/3; 2 mfd., 1/6; 1 mfd., 1/-; Utility Midget 2-gang variable condensers, 0.0005, with concentric trimmers, 3/5; T.C.C. 0.1+0.1, 1/3 each.

SPEAKERS.—Blue Spot permanent magnet, with universal transformer for power, super power, pentode and Class B; 23/- (list 39/6).

G.E.C. Stork Speaker in Cabinet; 19/6 (list £3/15).

BLUE Spot Genuine 100U Inductor Speaker on Chassis; 13/6 (list 39/6).

S.T.400 Kits, all specified proprietary components; £2/19/6 (list £4/17/6).

EKCO A.C. Eliminators, each new and boxed, in original sealed cartons, type K25, with trickle charger, 25 milliamps., 39/6 (list £5/7/6); type A.C. 25, 33/6 (list £3/17/6); type K.12, with trickle charger, 37/- (list £3/17/6); Ekco trickle chargers, type T.C.1, for 2-, 4- and 6-volt accumulators, 20/- (list 42/-).

IGRANIC Superhet Coils, set of 4 (1 Osc., 2 I.F., with pig tails, 1 L.F. plain); 12/6 (list 50/-).

LISSEN Superhet 3 Coils Kit, screened, ganged on base with wave change and filament switches; type L.N.5181, for battery or mains; 12/6 (list 30/-).

VARLEY Constant Square Peak Coils, complete with all accessories, new, boxed, B.P.5; 2/4.

VARLEY H.F. Inter-valve Coils B.P.6; 2/3.

FRAME Aerials.—Lewcos dual wave superhet, 9/- each (list 27/6).

PICK-UPS.—Marconi No. 19 (1934), 22/6 each (list 32/6); Celestion latest improved type W8 (1934), 16/9 (list 35/-); all new and boxed.

READY Radio Instamat Transformers, for matching any valve to speaker; Junior model, ratios 1:2, 1:1, 1½:1, 2:1, 3:1, 7/6 (list 27/6); Senior model, ratios 10:1, 12½:1, 14:1, 16:1, 20:1, 25:1, 12/6 (list 37/6).

RECEIVERS.—3-valve screen-grid Elector Super, complete with valves, Exide batteries and accumulator, Celestion moving coil speaker, contained in magnificent walnut cabinet; £3/10 (list £10).

OSRAM Thirty-Three Music Magnet, complete with G.E.C. speaker, 2 Osram screen-grid and Osram power valves in moulded bakelite walnut cabinet; £3/12/6 (list £9/9); in original sealed cases.

BOTOLPH Lightweight Portable Receivers, complete with 5 Mullard valves, Exide batteries and accumulator, overall size 13in.×11in.×8in., £2/19/6 (list £8/8); a real suitcase portable.

READY Radio Meteor Screen-grid 3-valve Kits, all specified components new, in sealed cartons; 25/-, less valves; with 3 Mullard valves, 42/6 (list £5/7/6).

"A" Kit, as above, complete with magnificent walnut cabinet and Celestion perm. mag. speaker; less valves, £3/5; with 3 Mullard valves, £4/2/6 (list £8/17/6.

MULLARD Radio for the Million, "Station Master Three" battery kits, complete with cabinet and 3 Mullard valves (screen grid, H.L., power), brand new in original sealed cartons; £2/19/6 complete.

MISCELLANEOUS. — Westinghouse metal rectifiers, H.T. 6, 7, 8, 9/3 each; Ferranti chokes, 20 henry 60 m.a., 6/9 each; Lewcos superhet, 8-way bases, complete with valve holders, grid leak, fixed condenser type "48," 2/- each; Lissen base turntables, 1/6 (list 5/-); Lewcos coils, B.P.F./R., 4/-; T.B.F./C., 3/3; O.S.C./126 (Extensor), 3/3; T.O.S./R., 3/3; Morse tapping keys, with buzzer and flashlight signal, complete with battery and bulb, 2/- each; "Modula" remote set volume controls, 1/6 each.

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SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren St. Tube). 'Phone: Museum 6324. [6279

1/6—Cadmium plated chassis. 4-valve. pressed steel, 14×9; post 6d.

2/9—Brew A.V.C. units for battery receivers, prevents fading, list 10/-, brand new.—Kay, 167, City Rd., London, E.C.1. [6159

H. A. WIRELESS for 1935; components, receivers, eliminators, kits, etc.

EKCO and Regentone D.C. Eliminators, 15-25 milliamps, 200-240v.; 21/-; cash with order or c.o.d.

EXHIBITION Models of Sets now in stock; free demonstration in your own home (London and suburbs only).

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PEARL and PEARL Bargain List A Free.—190, Bishopsgate, London, E.C.2. [0421

Components, Etc., for Sale.—Contd.

Components, Etc., for Sale.—Contd.

FERRANTI A.F.5, 13/-; O.P.M.6, 10/-; "Pentamu" output transformer, 3/6; Heayberd heater transformer, 4/6.—9, Alders, London, N.21. [6263

UNIVERSAL Avometer, 20 range, with Avodapter, in perfect order, £8; H.M.V. automatic record changer and motor, 230v. A.C., perfect, £6.

A.F.5C 16/-, O.P.3C 8/-, B.2 10/-, B.7 8/-; Varley Q.P.P., D.P.36 and D.P.37-39 transformers, 15/- pair; J.B. 3-gang, with dials and covers, new, 9/-; J.B. 2-gang ditto, 7/-; carriage extra.—Cosmic Radio Service, 23, Water St., Liverpool. [6271

WEST END RADIO STORES Great Summer Sale.—New Sonochorde 2,500 ohm energised M.C. speakers, pentode model, 8-inch cone; 7/11, postage 1/-.

WESTINGHOUSE 6v. 1 amp. Rectifiers, 5/-; 6v. ½ amp., 4/6; Philips 20h. 180 m.a. chokes, 650 ohms, 4/6; 20h. 60 m.a., 2/6.

DUBILIER 8 mfd. Dry Electrolytic Condensers, 450v. peak, 2/6; 4 mfd., 2/3; 1,000v. test, 6.55 tapped banks, 1/6.

B.T.H. A.C./D.C. Gramo. Motor, 100/250v., new, 35/-; Collaro A.C. motors, new, 31/6, automatic stop.

WEARITE Mains Transformers, 350-0-350, 70 m.a., 4v. 3a., 4v. 2.5a., 7/6; Standard cables, 300-0-350v. 60 m.a., 4v. 4a., 4v. 2a., 4/11.

VISITRON Photo-electric Cells, 10/6, guaranteed; Celestion pick-ups, new, 14/6; H.M.V. 3-gang 0.0005 condensers, with drum drive, 7/6

HALSON 4-valve A.C./D.C. Midget Superhets, 100/250v., new, £3/19/6; Crossley 4v. ditto, £5; Crossley 5-valve, £6/10.

HUNDREDS of Other Bargains for Callers; postage extra on all orders.—West End Radio Stores, 14, Lisle St., Leicester Sq., W.C.2; also at 382, Coldharbour Lane, Brixton, S.W. [6258

NEWPORT SURPLUS STORES Offers Exceptional Bargains in all Components; Ferranti meters and transformers always in stock.—Note address: 24a, Newport Court, Charing Cross Rd., W.C.2. [6265

VAUXHALL.—Radiophone, Radiopaks, complete with volume control and Lucerne station named scale and escutcheon, state type, 32/6; intermediate transformers for above, with terminals, 6/-; coils, set of 3 on base with switch and terminal, 16/6; 3-gang condensers, superhet., 14/6; ordinary type, 12/6; disc drives, complete, 4/9.

VAUXHALL.—Pick-ups from 8/- to £2; state make for quotation; volume control, all values, with switch and knob, 3/6; gramophone switches, 3/6.

VAUXHALL.—Benjamin, Class B, transformers, 1-1½ to 1, 6/6; Radiophone, Class B, 10/-; L.F. transformers, 7/-.

VAUXHALL.—Westinghouse rectifiers: H.T.8 9/6, H.T.9 10/-; Westectors, W.4, W.X.6, 5/9; Clix valve holders, 7-pin, 7d.; W.B., 4-5-pin, 4½d.; send postcard for lists; post paid 2/6 or over or c.o.d.

VAUXHALL UTILITIES, 163a, Strand, W.C.2 (facing Bush House, S.E. Wing). Temple Bar 9338. [6278

PIONEER RADIO MANUFACTURING Co., Ltd., offers: Ericsson 3-1 L.F. transformers, list price 17/6; new and guaranteed, our price 2/3, post free U.K.; Varley constant square peak band-pass coils, type B.P.5, complete with switch, brand new, in maker's original carton, with full instructions and diagrams, list price 15/-, our price 2/4, post free U.K.; Polar 3-gang Star Minor condenser, with trimmer, brand new, list price 18/9, our price 7/- each, post free U.K.; Collaro electric gramo. motor, A.C., 200-250, with pick-up and volume control, auto start and stop, brand new, listed at £4, our price 47/6, carriage paid; Celestion energised M.C. speaker, 2,500 ohms, model D.C. 2054, with universal transformer, list price £2/5, our price 12/6; bankrupt set manufacturers' stock.

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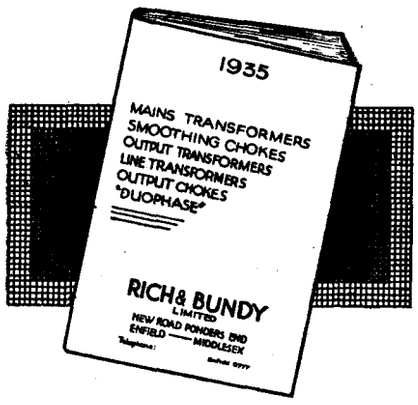

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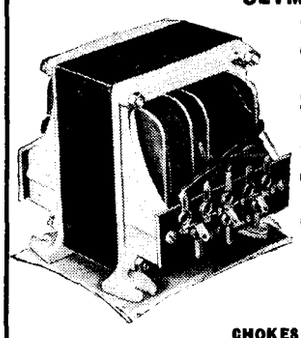

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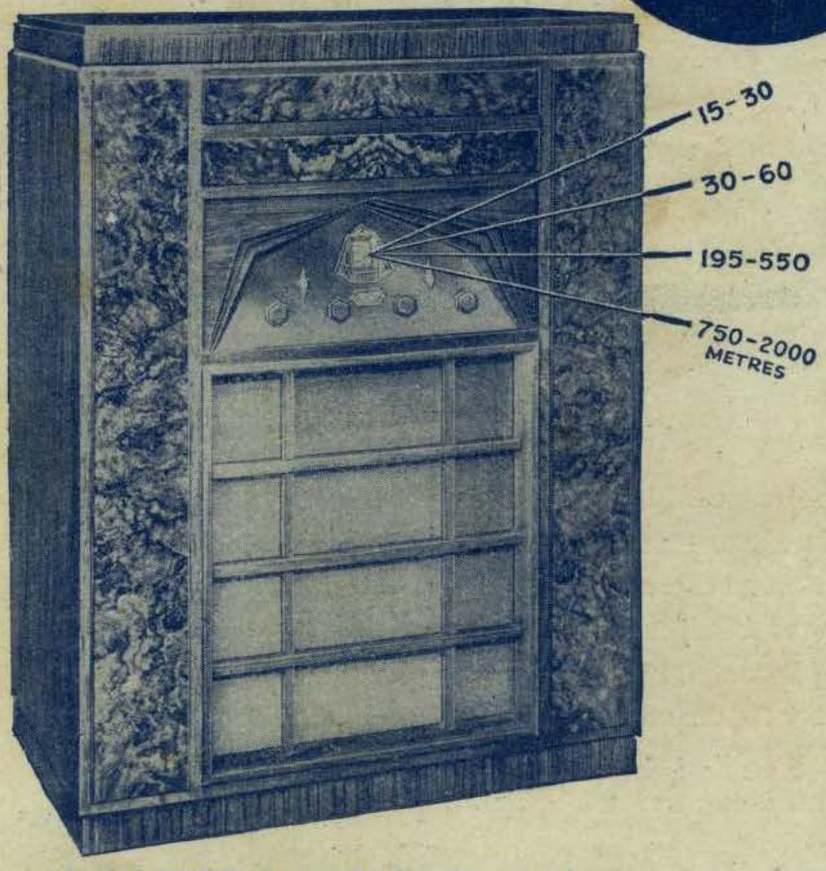
MODEL 1203 Auto ALL-WAVE RADIO GRAMOPHONE



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It is available in Cabinet as illustrated, or in teak for tropical use.

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Incorporates delayed amplified A.V.C., and Noise suppressor.

The resistance coupled L.F. and tone corrector stage is followed by a 2-stage resistance coupled push-pull L.F. amplifier with an undistorted output of 6 watts.

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Complete specification is given in Catalogue, post free on request.

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The Wireless World

4D

THE PRACTICAL RADIO JOURNAL

with

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Friday, August 24th, 1934.

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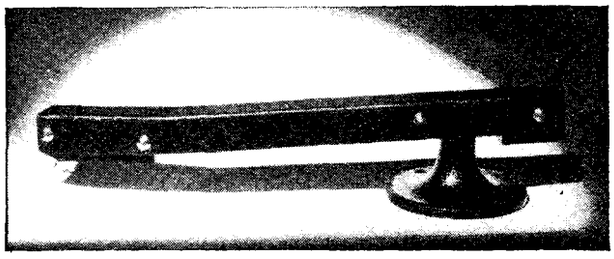
as the Greatest Advance in High Fidelity Reproduction Ever Attained



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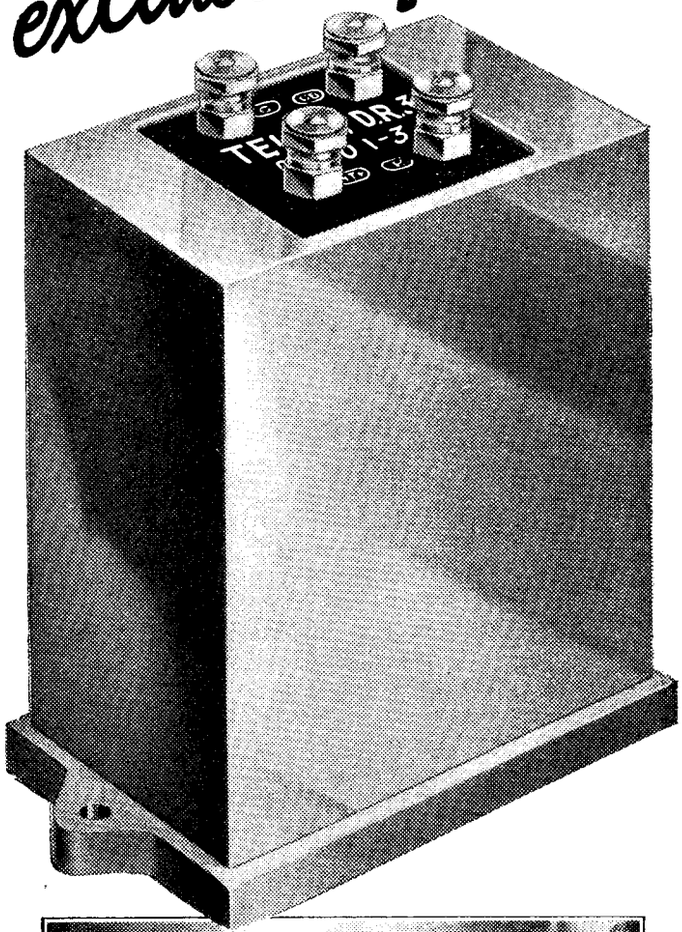
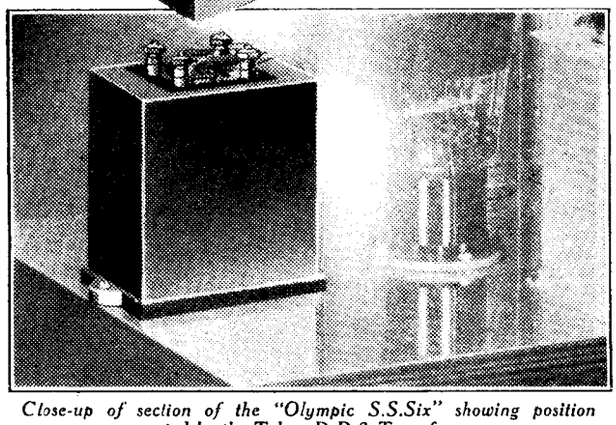
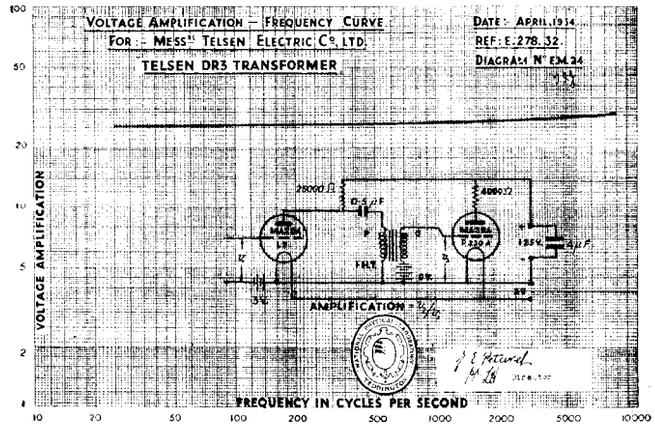
exclusively specified FOR THE 'WIRELESS WORLD'

Olympic S.S.Six





Close-up of section of the "Olympic S.S.Six" showing position occupied by the Telsen D.R.3 Transformer.



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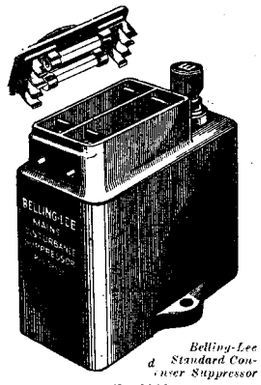

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Type 1711... **8/6**

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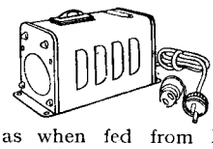

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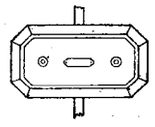

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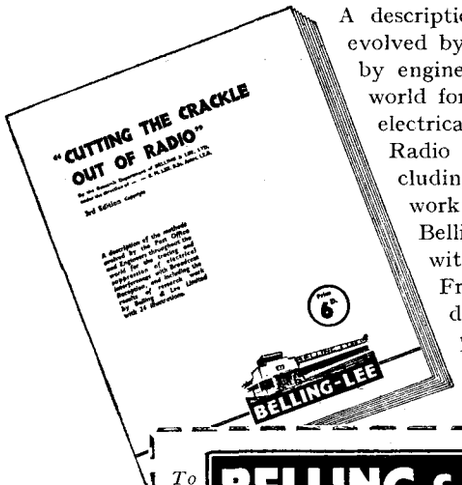

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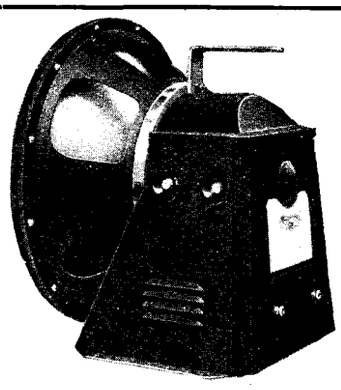

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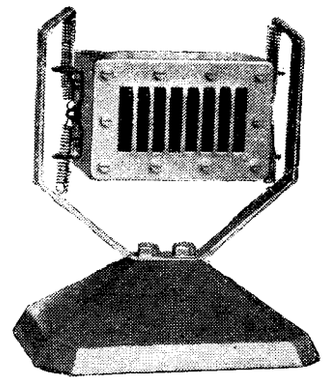

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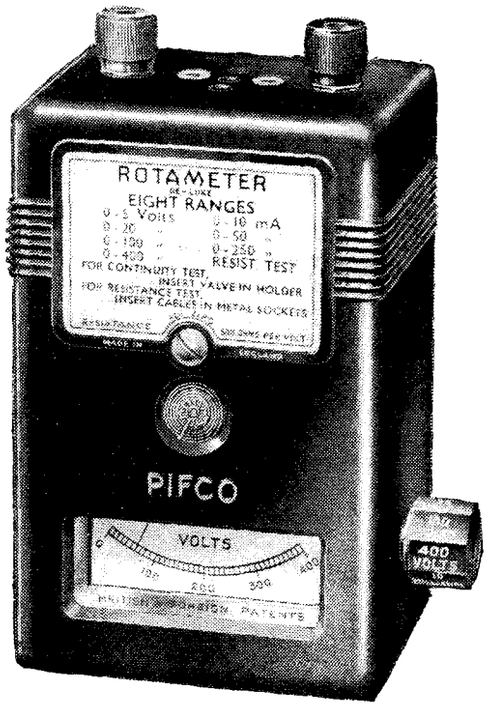

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8—Resist/valve test.
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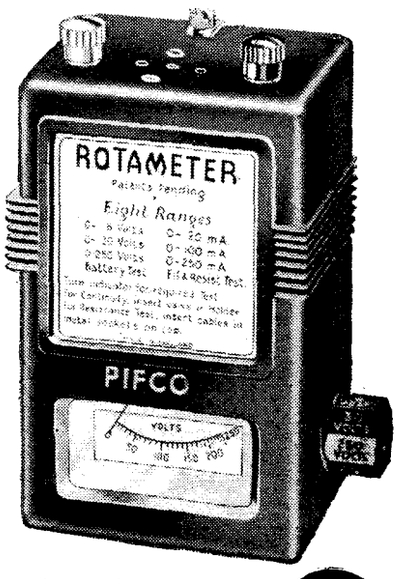
Adapter sockets for use in testing 7- and 9-pin valves are now available .. .. *Price* **3/-**



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The Wireless World

THE PRACTICAL RADIO JOURNAL

24th Year of Publication

No. 782. FRIDAY, AUGUST 24TH, 1934. VOL. XXXV. No. 8.

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EDITORIAL COMMENT

The Show

Some General Observations

LAST year, in discussing tendencies at the Radio Exhibition of 1933, we rather deplored the attempt of nearly all manufacturers to bring down their prices to what we regarded as a dangerous figure, for although from the public's point of view we were entirely in favour of wireless sets being obtainable as cheaply as possible, we feared that this cheapening would result in lowering the standard of quality of reception.

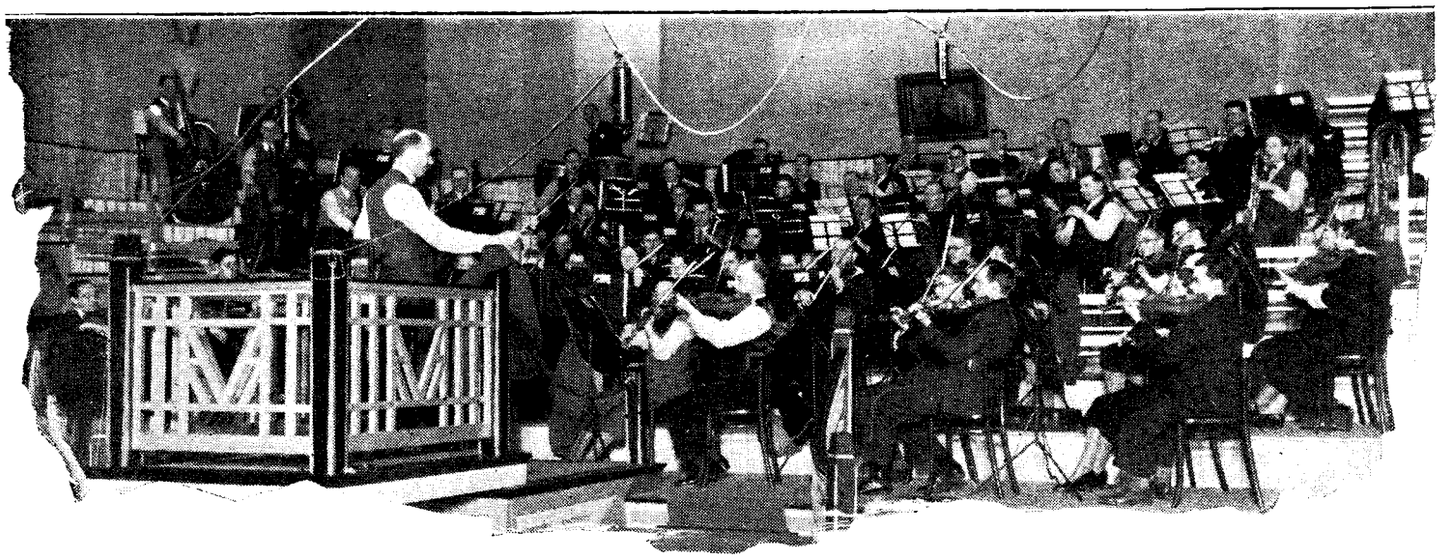
There is no doubt that during the past year the public has been left to discover, to their regret, that many manufacturers had forsaken quality for price considerations. This year there are very welcome signs that price is no longer to be permitted to take control, and although there still are plenty of examples of cheap sets for those who are not particular as to quality, there is in addition a fine range of apparatus where quality of reproduction has been aimed at rather than price reduction, so that the public now has a wide choice.

Naturally, the high-quality receivers are not cheap. For some years R.G.D. receivers have set a very high standard for quality, and one or two other firms, too, have found it worth while to limit their production and only manufacture receivers of high quality. But it is gratifying this year to find that manufacturers who hitherto have produced sets in very large quantities at low prices have turned their attention to high-grade models in addition. Notably amongst these new receivers we would mention the new high-fidelity set produced by H.M.V. Here we have a big concern with a reputation in the field of musical reproduction, to whom we might expect to look for a standard of the best that a wireless receiver could do, and although the production of this set has been delayed until now, it is no less welcome on that account. We would like it to be possible for every listener to have the opportunity of hearing receivers of high standard, in order to realise how much more is now available to them through broadcasting.

We regard this year's Show as definitely encouraging because on so many stands there is evidence that the headlong rush of the last year or two towards cheap sets, with an almost wanton disregard for quality, has received a definite check.

The Rival Show

Turning to another aspect of the Show, we feel that once again this year we must express regret that the B.B.C. theatre and variety performance should have been linked with the wireless exhibition. Last year this was an innovation and it was undoubtedly an interesting experiment, but now that it has been repeated this year with even greater credit to the B.B.C. for the excellent way in which it has been carried out, our complaint is, still, that the Show is quite definitely a rival to the Radio Show. Visitors attending Olympia flocked first of all to the B.B.C. theatre and, afterwards found little time left to see the Exhibition itself. We should not forget that the Exhibition is, after all, primarily organised for the opportunity which it gives to the stand-holders to show their products to the public. We incline also to the view that a theatre performance is not calculated to advertise the attractions of broadcast listening, but rather to stress the limitations where the appeal is to the ear alone and not to the eye.



Expanding the Music

De-controlling at the Receiver

LACK of contrast may be regarded as one of the most serious limitations of broadcasting. At the transmitter the control engineer has to tone down loud sounds and accentuate very weak ones. At the receiving end it is now possible to reinstate some of the contrast which the control engineer has removed. This article explains the process. It is interesting to note that a special H.M.V. 15-valve set, shown at Olympia, incorporates this idea

By A. L. M. SOWERBY, M.Sc.

MUSIC-LOVERS have long been accustomed to grumble at the B.B.C. for the lack of light and shade in the music they transmit. Every listener must have noticed that the louder passages are a little subdued, and never quite rise to the full volume that one expects. During a soft passage, on the other hand, the volume-control at the transmitter is very obviously turned up, so preventing the music from being lost against the inevitable background of hiss. The rise and fall of this background, some of which must be derived from the microphone and its associated amplifier, gives the alert listener a very clear indication indeed of the artificial changes in level superimposed upon the original performance of the music.

It is widely thought that the B.B.C. control is unnecessarily drastic, and that bigger changes in volume, rising even as far as the wider limits of the gramophone record, might be permitted with advantage. Another criticism, which is perhaps a more subtle one, is made by those who point out that the reduction of range is not proportional. By this it is meant that the same level of loudness in the transmission is made to do duty, even during one item, for several very different levels of loudness in the original playing, the level of reproduction being chosen with a view to maintaining, as far as possible, the impressiveness of a sudden *crescendo* or *diminuendo*, in spite of the reduction in overall scale.

That this limitation of range between loudest and softest passages is necessary is not disputed. The variations in loudness of the received music are made at the transmitting station by changes in the depth of modulation of the carrier wave. Modulation consists in causing the amplitude of the high-frequency carrier wave to rise above and fall below its normal steady level, this rise and fall taking place at the frequency of the musical note being transmitted (Fig. 1). Since, for undistorted modulation, the rise must be equal to the fall, there is a natural upper limit to the load of musical sound that a carrier wave can be called upon to convey. This limit is reached when the carrier just, and only just, falls away to zero amplitude at the exact moment of maximum fall (Fig. 2). The modulation-depth at this limit is 100 per cent.

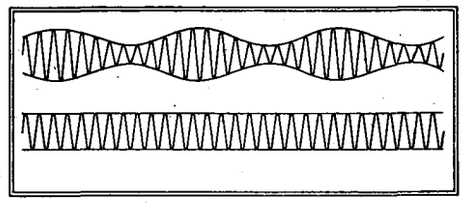


Fig. 1.—(*below*) Unmodulated carrier wave and (*above*) carrier wave 50% modulated. The wave does not cease, even instantaneously.

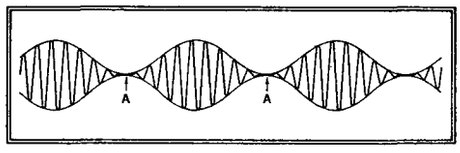


Fig. 2.—Carrier wave 100% modulated. Note that further modulation would introduce gaps round the points A, where already the amplitude just falls to zero.

In practice it is not always easy to achieve this limit of loudness, for it is difficult to make the musical signals take such complete control of the carrier as this without introducing some distortion. An upper limit of 80 per cent. modulation is often regarded as the highest which it is safe to allow the transmitter to attain, even momentarily. A further advantage of this limitation of modulation-depth is found at the receiving end, for the detector valve, which is charged with the duty of separating the modulation from the carrier, is much more liable to introduce distortion if the modulation-depth of the received carrier is high.

It is less easy to define the lowest limit to which the modulation-depth may be reduced without spoiling the programme as received. Theoretically, there is no lower limit, and it should be possible to reduce the loudness of the received music to any desired extent. It should therefore be possible to obtain as wide a range as could possibly be desired between loudest and softest.

As every listener will appreciate, with wireless music there is always a certain background of hiss and assorted small noises, originating, in part at least, from the transmitter. If the modulation depth is dropped too far, the softest passages of

Expanding the Music—

music will tend to be lost against this background. It is necessary, therefore, to maintain a sufficiently high level of sound to ensure that the accompanying background shall at all times be unnoticeable in comparison.

Between these two limits, of distortion

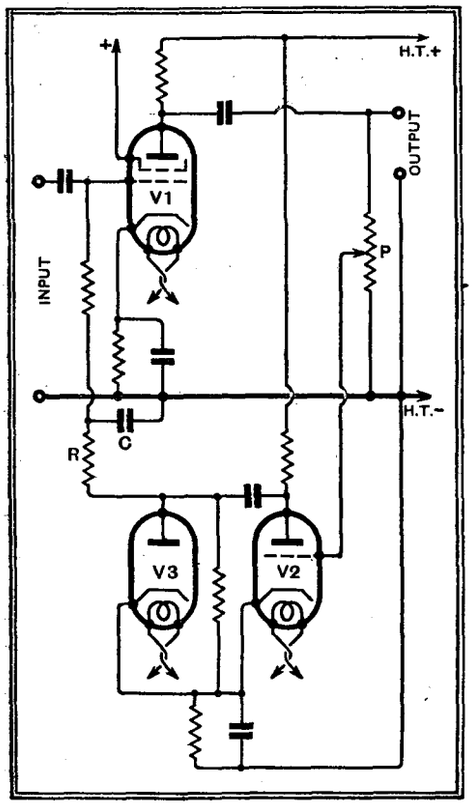


Fig. 3.—Amplifier which amplifies strong signals less than weak ones, hence a *contractor* of the volume range. The degree of contraction can be controlled by adjustment of P.

on the one hand and background noise on the other, the musical programme has somehow or another to be sandwiched in, retaining as much as possible of the original spirit of the music as the process permits. How this should be done—by a strictly automatic reduction of scale or by an unsystematic manual method aiming at the better retention of musical effect—is, as matters stand to-day, largely a matter of opinion. But it is to this need for reduction in scale that we must attribute the unnatural effect conveyed by some wireless music, where, as someone has happily phrased it, we are allowed to sit in the stalls so long as the orchestra plays softly, but are whisked suddenly to the back of the gallery when a *forte* passage comes along.

It is generally accepted that the maximum ratio between the loudest signal that a transmitter can send out without distortion, and the quietest that is not too nearly lost against the background is about 30 to 40 db. That is, the loudest signal is somewhere between one thousand and ten thousand times as powerful as the quietest. Compared with real music, as heard in a concert hall, this range is very small; the loudest passages of the orchestra can rise to ten million times the power of the softest—a range of 70 db. This enormous range cannot even be approached by broadcast transmission as we know it to-day, but until the range of loud speaker music can make a closer approach to that of real music, much of the pleasure that should be derived from listening must continue to be missed.

From what has been said it will be perceived that the limitation of range is not due to the loud speaker, the set, or the transmitter, but to the channel of communication used. At first sight it would seem that, since the carrier-wave from aerial to aerial must continue to be employed, there can be no hope that the full range of real music can ever be attained by the loud speaker. So far as the present systems of transmission are concerned this is true, but means are known[1] whereby the full scale of loudness may be compressed, in a strictly proportional automatic manner, before transmission, and then, after transmission in this compressed state, the scale may be opened again at the receiver to re-create the volume-range of the original music. In this way the modulation necessary at the transmitter can be kept within the permissible limits, and can yet be made to give rise to a full range of volume-levels at the loud speaker.

The problem of the compression of the volume range at the transmitter can be solved by introducing into the path of the signals, at any convenient point after the microphone and before the process of modulation, an amplifier, the gain of which is controlled by the amplitude or loudness of the signals. If weak signals are amplified very much more than strong ones, the necessary condition of compressing the range is fulfilled. The degree of compression, evidently, will depend on the ratio between the two values of gain given by the amplifier for weak and strong signals respectively.

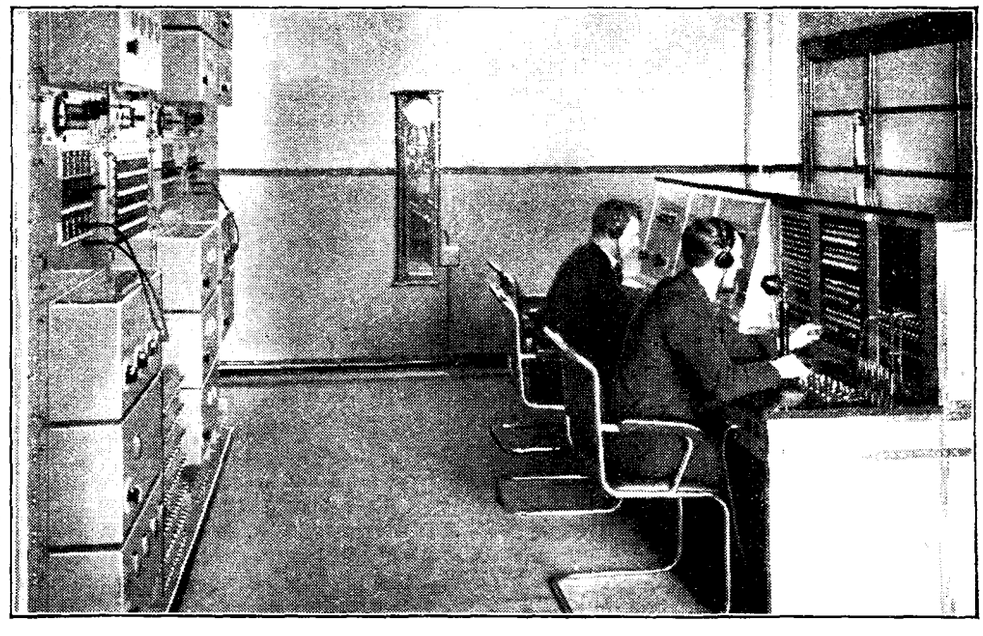
The design of an amplifier of this type is really nothing more than the application to a special purpose of the principle of automatic volume control, which is successful precisely because strong signals are less amplified than weak ones. In the ordinary receiver using A.V.C. the gain is controlled by rectifying the carrier-wave and feeding back the steady voltage derived from its rectification to control the grid bias of variable-mu amplifiers, a filter to remove both high-frequency and low-frequency voltages being interposed in the feed-back line.

Details of the System.

For the range-contracting amplifier the same principle is pressed into use, the main difference being that in the absence of a carrier wave it becomes necessary to rectify the audio-frequency signals themselves. A schematic diagram of an amplifier fulfilling this purpose is shown in Fig. 3. The valve V1 is connected in the amplifying chain that follows the microphone, all signals having to pass through it before being used to modulate the carrier. To its output side is connected a further amplifier V2, the sole purpose of which is to increase the signal voltages until they are great enough to operate satisfactorily the diode rectifier V3. The voltage developed by their rectification is proportional to their mean amplitude, and this voltage is fed back, by way of the filter RC, to the grid of V1, thus reducing the amplification that it affords.

The contraction of range will be proportional if the valve V1 is so constructed that the gain is inversely proportional to its grid bias; this means, of course, that a specially designed valve is necessary for strict proportionality. The degree by

[1] See "High Quality Radio Broadcasting," Proc. I.R.E., May, 1934, page 612.



In the control room of a B.B.C. station. The task of the control engineer is to see that no sound is sufficiently powerful to produce overmodulation, and to bring up the strength of very weak passages.

Expanding the Music—

which the range is reduced can be controlled by fixing the range of grid bias values fed back to V1; if a change from faintest to loudest signal only alters bias by one volt the resulting change in gain will be small, while if a loud signal biases V1 back by 20 volts the change in gain will be large. The bias variations produced by the signal depend simply upon the general level of signal voltages rectified by V3; adjustment of the potentiometer P, therefore, provides a simple means of controlling the degree of contraction of the volume range.

If a great reduction were needed, it might be necessary to replace V1 by two or more valves in cascade; if the ratio of maximum to minimum gain in a single stage is 10, it will be, for the same grid-bias change, 100 or 1,000 in a two-stage or three-stage amplifier.

By making use of an amplifier of this kind, it becomes possible to contract the volume-range of the original music to some 35 db., a range which can just be transmitted over the average broadcast or wire link without running into serious background noise at the lower levels. It remains to be seen how this range can be expanded again to the full 70 db. of real music at the receiving end.

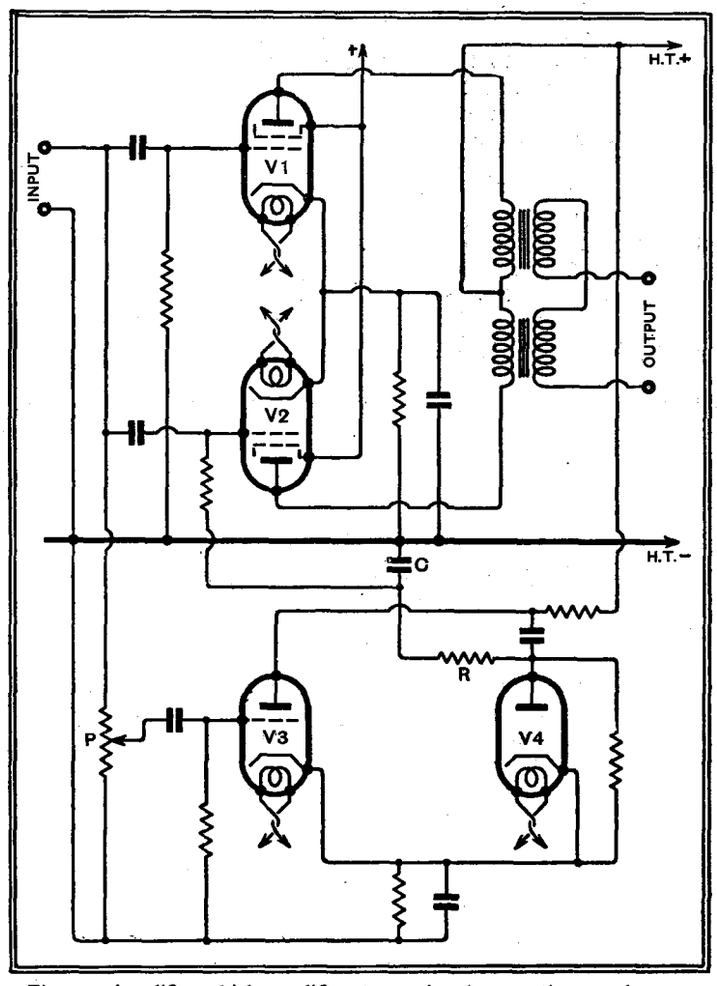


Fig. 4.—Amplifier which amplifies strong signals more than weak ones; hence an *expander* of the volume range. The degree of expansion can be controlled by adjustment of P.

Expanding at the Receiver

Again, we can make use of the principle of automatic volume control, this time using an arrangement in which gain increases in proportion to increasing signal. Since an increase in bias cannot be made to increase the gain given by a valve, it becomes necessary to "wangle" the circuit. There are several conceivable ways of doing this, but one of the simplest is to feed the same signal to two valves so arranged that the amplification given by one is very nearly cancelled out by the second. If increasing bias is now supplied to the second valve it will amplify less, and so have less output with which to cancel the output of the first uncontrolled valve. A greater proportion of this valve's amplification will thus remain uncancelled, and the overall gain of the system will rise.

Such an arrangement is shown in Fig. 4, in which V1 and V2 have separate output transformers, the secondaries of which are connected in opposition. Exact balance, it should be noticed, is not attempted. Let us assume that at normal bias the gain of V1 is fifty times, and that of V2 forty-nine times; then the amplification of a faint signal will be equal to the difference between the gains of the two valves, which means that the resultant output voltage will be equal to the input voltage. The amplifier will thus pass on the signal exactly as received, without either increasing or diminishing it. Now, suppose that a loud passage of music comes along; by way of the auxiliary amplifier V3 this will reach the rectifier V4, so generating a negative bias that is fed back to V2 but not to V1. The gain of V2 will consequently drop, while that of V1 is maintained unchanged. The final output will therefore rise, since V2 now cancels out a smaller fraction of the gain of V1; if the gain of V2 drops to ten times the overall gain will now be forty. In this way a strong signal may be made to control the extra amplification that it needs for the re-expansion of the volume-range to that of the original music.

Just as in the case of the range-contractor, the degree of control can be adjusted by adjusting the maximum bias that a full-strength signal can call forth; this is done by adjusting the potentiometer P, and so determining the maximum signal-voltage applied to the diode rectifier V4. If a single stage of expansion does not provide a sufficient extension of the volume-range the output of the stage shown may be passed on to a second pair of opposed valves, the bias generated by V4 being used to control one of these as well as V2. In this way any desired expansion of the range can be achieved.

Types of Valves

Some stress has been laid on the need, both in contractor and expander, for a valve which gives an amplification inversely proportional to its grid-bias. With suitable adjustments this is not strictly necessary, provided that the controlled valves in both expander and contractor have the same characteristics, and provided also that they are working under identical operating conditions. As it is in the essence of the scheme that the contractor should be attached to the transmitter and the expander to the receiver, this identity of adjustment is hardly likely to be attainable in practice. Perfect results, therefore, could only be had with special valves strictly fulfilling the condition mentioned. But there can be no doubt that, even if the subsequent expansion of the volume-range did not compensate with strict accuracy for the compression at the transmitter, the resulting music would at least be very much nearer to the original as played in the studio than can ever be possible under the conditions at present existing, where no attempt at all is made to obtain the full range.

Interdependence of Transmitter and Receiver

For the sake of those who would like to experiment with an expander, it should be pointed out that its performance must be disappointing unless there is, at the transmitting end, some definite law relating the loudness of the original music as played to the level of volume transmitted. Under the present conditions of control by the B.B.C., it is quite evident that no such strict relationship exists. They use manual control, directed towards keeping the spirit of the music played while keeping the volume-range within possible limits. In the absence of an expander at the receiving end, this is probably the most satisfactory method, but it does definitely mean that their programmes are not suitable material upon which to base experiments in the expansion of the range of volume-levels. It would, indeed, not be surprising to find that a set equipped with an expander was definitely worse than an ordinary set.

Any advance towards the perfect recreation in the home of the volume-range existing in the studio must therefore be initiated by the B.B.C. themselves, and the private experimenter and listener must wait upon their pleasure for the realisation of anything beyond a compromise in this further step towards perfection in reception.

QUALITY AND INTERFERENCE

By W. T. COCKING

THE relationship between quality and interference is not always fully realised, for although it is often believed that quality and selectivity are incompatible, misapprehension exists as to the possibilities in this direction. It is shown in this article that it is not difficult to avoid intelligible interference while maintaining quality, but heterodyne interference cannot be so removed.

Difficulties of High-Quality Reproduction.

FOR the full enjoyment of broadcasting there is no doubt that a high standard of quality of reproduction is necessary. Neither the beauty of a composer's masterpiece nor the perfection of an artiste's rendering can receive the attention they merit if our loud speakers reproduce but a part of their efforts. This is self-evident, but few realise how readily the ear is deceived into believing that very inferior reproduction is a close approach to perfection.

The range of frequencies which can be detected by the average ear extends from about 16 cycles to 20,000 cycles, but notes at the extremes of the scale occur so seldom in broadcast programmes that it is possible to restrict this range considerably without the ear being any the wiser.

Frequency Response

Numerous experiments have been carried out with a view to determining the effect upon quality of a restriction of the reproduced band of frequencies, and it is fairly well established that if all frequencies in the band of 30-10,000 cycles are reproduced properly, the quality can be considered very nearly perfect. The extension of the response to include lower frequencies has a negligible effect, and the same may be said of an extension to frequencies above 15,000 cycles. The difference between an upper limit of 10,000 cycles and one of 15,000 cycles, however, is very small. We may say, therefore, that practical perfection is obtained with a response of 30-10,000 cycles.

Many modern transmitters are capable of dealing faithfully with this range, but this can be said of very few receivers. The majority of present-day sets give little output at frequencies over 5,000 cycles and so cannot be said to give even an approach to perfect reproduction. There are signs, however, that their defects are being realised, and that improvements in quality are being made. That it is not difficult to obtain high-quality reproduction is well brought out by the response curve of the Olympic S-S Six[1] which is shown by curve A of Fig. 1. Over the full frequency range, the deviations from linearity are within ±3 db. Curve B of the same illustration shows the response obtained with a receiver manufactured by a well-known firm and typical of present-day practice. The set is provided with a tone control, and when taking the curve this was set to maximum brilliancy. In view of the poor high-frequency response, the provision of a tone control to remove still more of the upper register seems redundant, and the quality when it is employed (curve C) is naturally appalling.

[1] *The Wireless World*, August 10th and 17th, 1934.

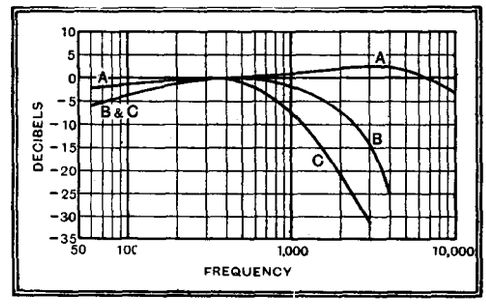


Fig. 1.—The response curves of modern receivers indicate the quality obtainable. Curve A is for the Olympic S-S Six at minimum selectivity, B is for a typical commercial superheterodyne, and C shows the results from the same receiver with the tone control set at "deep."

Now it should not be concluded that reproduction of this degree is evidence of poor design. On the contrary, it probably represents the best compromise between conflicting factors that can be obtained with simple and inexpensive apparatus. It is important, therefore, to examine the question in some detail, for it is by no means difficult to design a receiver capable of reproducing up to 10,000 cycles.

Interference

So far as the low-frequency circuits are concerned, no restriction of response need be considered, for if we can build apparatus of the necessary quality, there is nothing to stop us from using it. This cannot be said of the H.F. circuits, however, for although there is nothing to prevent us from building apparatus perfect from the quality viewpoint, considerations of interference may prevent us from using it. The questions of quality of reproduction and freedom from interference are very closely interrelated and the one may greatly limit the other.

We are, of course, considering only interference between transmitters adjacent in wavelength, for man-made static and similar effects need not concern us at the moment. There are three different types of interference which may occur between two adjacent stations. Assuming the receiver to be tuned to one station, the programme of its neighbour may also be

Quality and Interference—

audible, and this is known as intelligible modulation interference. In addition, there may be a steady high-pitched whistle, the frequency of which is equal to the difference between the carrier frequencies of the stations, usually 9,000 cycles; this is called steady heterodyne interference. The third type of interference is popularly called sideband splash or monkey-chatter, and it consists of a series of high-pitched twitterings. It is due to the sidebands of one station heterodyning with the carrier and sidebands of the other. The effect, however, is chiefly due to the sidebands of the unwanted station beating with the carrier of the wanted station, and, in theory, the programme of the former should be heard inverted in frequency. It is, however, rarely bad enough for this.

Now, whether or not interference is audible depends upon the relative strengths of the two carriers at the detector. If the carrier of the wanted station is sufficiently stronger than that of the other, the interference, although still there, will be below audibility, and so need not concern us. The extent to which the interference must be weaker than the wanted programme for it to be inaudible obviously depends upon the volume level and may be some 40 db. to 60 db.

Avoiding Interference

For the avoidance of intelligible modulation interference, the difference between the carriers at the detector can be much smaller than this, for the demodulation of a weak signal by a stronger in a linear detector helps us greatly. Unfortunately, such a detector confers no benefit as regards the other two types of interference, so that there must still be 40 db. or more difference between the carriers at the detector.

Now if the wanted station is local, giving a field strength of, perhaps, 1 v/metre, and the adjacent transmitter is distant with a field strength of 1 mv/metre, the wanted carrier is 1,000 times (60 db.) as strong as the unwanted without any selectivity in the receiver. We shall thus obtain perfect quality and complete freedom from interference.

Suppose, however, that both stations give the same field strength at the receiver. In order to obtain a detector input 60 db. greater from one station than from the other, the tuning system must respond 1,000 times as much to its resonance frequency as it does to a frequency only 9,000 cycles different. If it does this, the interference will be inaudible, but so also will be the high frequencies present in the programme of the wanted transmission. They are not completely lost, however, for they can be restored completely by the proper application of tone-correction in the low-frequency circuits.

If we do this we shall find that intelligible modulation interference has completely disappeared, but that both steady heterodyne interference and sideband splash reappear in their original intensity. Unless they happen initially to be too weak to be audible, these forms of interference cannot be eliminated without restricting the high-note response of the receiver and so adversely affecting the quality of reproduction. If we intend to receive only stations which are spaced by 9,000 cycles, and they are the only ones worth while from a quality viewpoint, we can eliminate the steady heterodyne interference by restricting the frequency-response of the receiver to about 8,000 cycles. Although we have made some sacrifice of quality, it is only small, and we have obtained freedom from one form of interference.

We are now left only with sideband splash. Theoretically, its elimination demands the suppression of all frequencies higher than some 3,500 cycles, but experience shows that this is necessary only when the field strength of the wanted station is considerably less than that of its neighbour. This is undoubtedly due to the discontinuous nature of the interference, but in spite of this it is found that in general distant reception the frequency-response cannot be maintained above some 4,000-5,000 cycles if reasonable freedom from sideband splash is to be obtained.

It will thus be apparent that the quality of reproduction which it is possible to obtain with freedom from heterodyne interference and sideband splash depends not upon the selectivity of the receiver but only upon the relative strengths of the wanted transmitter and its neighbours. The only improvement which seems possible is to be obtained by adopting a wider separation of broadcasting stations, and, with the present number of transmitters, this is impossible unless the broadcasting band be greatly extended.

The reason for the poor standard of reproduction shown by the commercial receiver mentioned earlier will now be apparent. The set is intended for use in all parts of the country, and wherever he is situated the purchaser expects interference-free reception of a large number of stations. The selectivity and frequency-response, therefore, are adjusted to give the best possible compromise between the conflicting requirements of freedom from interference and quality of reproduction obtainable at the price for which the receiver is sold.

The result is, of course, that in local reception the quality is far below the possible standard, and when receiving a very weak transmission the interference is greater than it need be. The frequency response, in fact, suits only the conditions obtaining when receiving a Continental station of moderate strength.

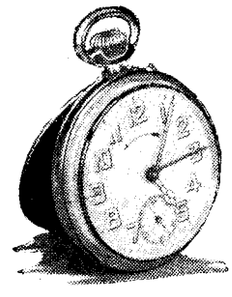
Variable Selectivity Essential

In view of these facts it will be clear that no receiver with fixed characteristics will give the best results on any station. The selectivity, and hence the frequency-response, should be variable so that the optimum compromise between quality and freedom from interference can be obtained on every station. For local reception the selectivity should be low and practically perfect quality obtained. For distant reception the selectivity should be increased so that the quality can be as high as possible consistent with the degree of interference prevailing at the moment.

Efforts to obtain variable selectivity are being made, and it represents a very important development. One form of it is embodied in the Olympic S-S Six, and it is entirely due to this that it has been possible to arrange for such a satisfactory frequency-response for local reception. Although the response is as shown by curve A (Fig. 1) with the low selectivity setting of the control, it tends to the form of curves B and C when the selectivity is adjusted towards its maximum, and a curtailment of the upper register is a necessity for interference-free reception.

ARNOLD PROGRAMME WATCH

As a reminder of the starting time of programmes to which it is specially desired to listen, the Arnold Programme Watch proves to be distinctly useful. Although this alarm watch is not appreciably larger than an ordinary modern watch, it gives a sufficiently loud and clear call, and the alarm is easily set by rotating the bezel.



The programme "call-boy."

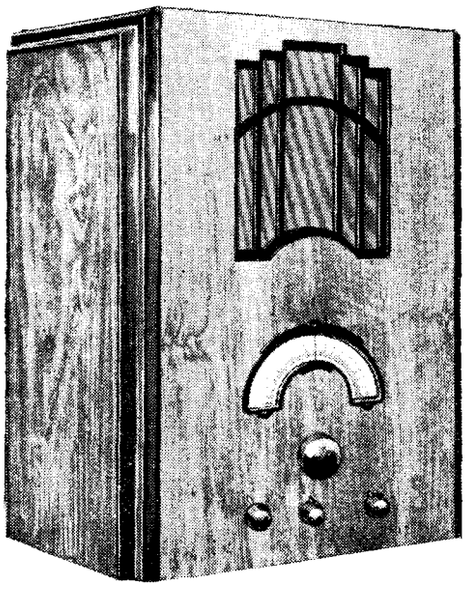
Power for the time-keeping mechanism and for the alarm bell is supplied by the same spring, and so the operation of winding is carried out by a single stem winder, which is a convenience. The watch is sold by A. Arnold and Co., 122, St. John Street, Clerkenwell Road, London, E.C.1, and costs 25s.

Modern Acoustics. By A. H. Davis, D.Sc. Pp. 345+xi. (Bell and Sons, Ltd., York House, Portugal Street, London, W.C.2). Price 26s. net.

Six years ago the only comprehensive text-books on sound were the standard treatises of Rayleigh and Lamb. Since that time half a dozen books dealing with various aspects of modern acoustics have appeared, and Dr. Davis's volume is a welcome addition to their number. The author is in charge of the Acoustics Department of the National Physical Laboratory, and his long experience in acoustical measurements confers a special quality on the book. After establishing the theoretical basis of vibrations, the author applies the results to sources of sound, and makes free use of the concept of acoustic impedance. Audio-frequency oscillators and amplifiers are dealt with in detail, and much of the book is devoted to measurement of sound intensity, frequency, impedance, transmission of materials, and reverberation times. A chapter is given to hearing, and another to the measurement and suppression of noise.

Attention is given to gramophone recording and reproduction, including optical methods: telephone transmitters and receivers, deaf aids, and gramophone pick-ups are also dealt with. Altogether, a capable presentation of modern acoustics.

J. H.



Notes on the Olympic S-S Six

Hints on Operating the New Single-Span Receiver

THE construction, adjustment and performance of the Olympic S-S Six have been thoroughly dealt with in the last two issues, and but little remains to be said about this latest addition to the range of single-span receivers. The question of the use of alternative components in the construction, however, is one which often arises and which deserves some consideration. In the case of fixed condensers and resistances, of course, all good makes have similar electrical characteristics, so that they may be interchanged without any ill-toward effect upon the performance. The same applies, but rather less exactly, to the mains transformer and smoothing choke.

The coils, of course, are of special type, but in the case of their trimming condensers there is no objection to the use of a different type of air-dielectric trimmer provided that it be of good quality. It should be remembered, however, that the trimmer settings given in an earlier article apply only to the specified condensers.

Surprising as it may seem, greater latitude is permissible in the choice of valves than in the matter of many components. In the frequency-changer, for instance, the Marconi or Osram MX40 may be replaced by the Ferranti VHT4, the Cossor 41MPG, the Micromesh 15D1, or the Mullard FC4. For the two I.F. stages it is possible to use the Marconi or Osram VMP4, the Mazda AC/VP1, the Micromesh 9A1, or the Mullard VP4A in place of the Cossor MVS/Pen. For the combined buffer and I.F. valve, however, the only alternative to the Mazda AC/TP is the Mullard TP4. There are many alternatives in the case of the duo-diode-triode, however, and the Cossor DDT, the Ferranti H4D, the Marconi and Osram MHD4, the Mazda AC/HL/DD, the Micromesh 11A2, and the Mullard TDD4 are all equally suitable.

Even in the case of the output pentode some choice is permissible, although a change in the load impedance may prove necessary. The Cossor 42M-Pen and the Ferranti PT4D may each be substituted for the Mazda AC/2/Pen without any change in resistance values. Any make of indirectly heated rectifier valve which is rated for 350 volts input may be used.

From the point of view of quality of reproduction, the matching of the loud speaker and output valve is of great importance. The AC/2/Pen requires a load impedance of some 6,500 ohms, and this is obtained with the specified speaker by using the 45-1 ratio on the output transformer. Since the impedance of a loud speaker is not constant, but varies greatly with frequency, the matching can only be completely accurate at a few frequencies. With a triode output valve this is not very important, for the matching is never very critical. With a pentode, however, it greatly affects the quality of reproduction, for quite a small change of load has an audible effect. In order to prevent the upper frequencies from being reproduced at excessive strength and to keep harmonic distortion at a low figure, therefore, it is important to maintain the load on the valve as constant as possible.

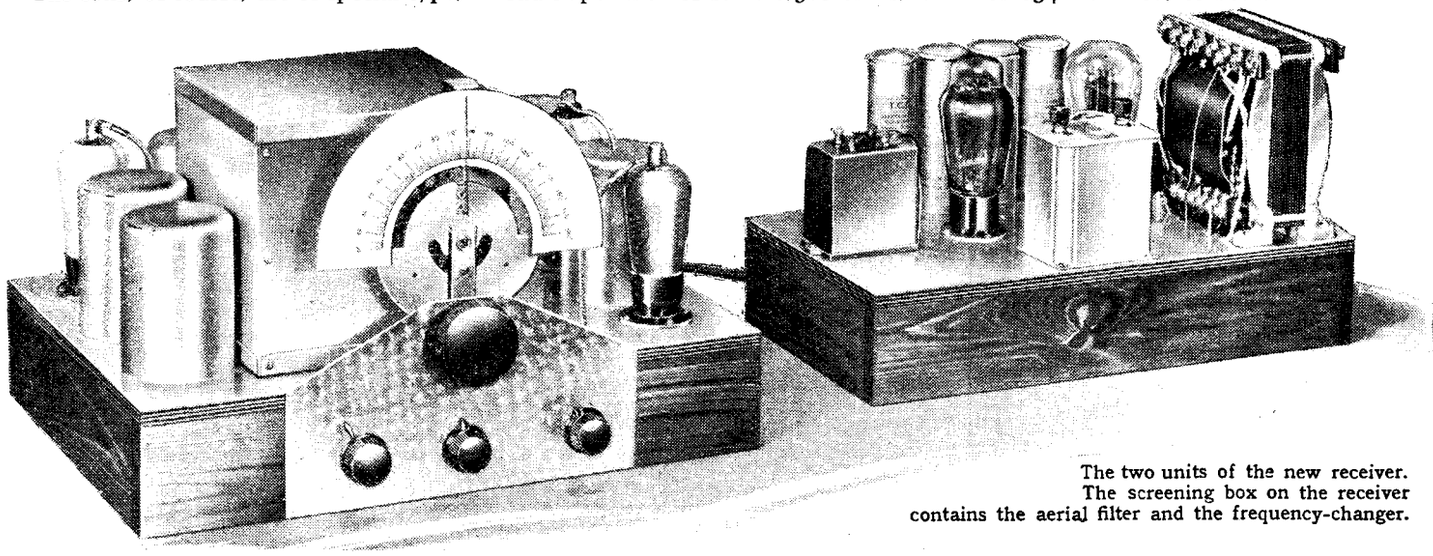
Since the speaker impedance increases with frequency, this can be done by shunting the primary of the output transformer by the series combination of a resistance and a condenser. These components are shown as R27 and C34 on the circuit diagram, and values of 5,000 ohms and 0.005 mfd. best suit the characteristics of the specified loud speaker. It should be remembered, however, that a different speaker may call for different values for these components if the best performance is to be secured.

The Loud Speaker

The transformer ratio required should be calculated in the usual way by dividing 6,500 by the speech coil impedance and taking the square root of the result. The values of R27 and C34 are most readily settled after a listening test. If the reproduction is too shrill R27 should be reduced or C34 increased, or both.

Provision is made for energising the field winding of a loud speaker, and the field is actually used to provide smoothing. If a separately energised, or a permanent-magnet, speaker be employed therefore, it is necessary to use a speaker field replacement type choke of 2,500 ohms resistance. The two terminals of such a choke should be connected to the two points on the power unit to which the field is normally joined.

It may be remarked that the tone cor-



The two units of the new receiver. The screening box on the receiver contains the aerial filter and the frequency-changer.

Notes on the Olympic S-S Six—

rector, which is included to compensate for sideband cutting, is not in circuit when the apparatus is employed for reproducing gramophone records, so that unwanted accentuation of the upper register is avoided. The amplification available on gramophone is of a high order, and it is permissible to use an insensitive type of pick-up.

In order to avoid mains hum and the possibility of L.F. howling, it is recommended that the pick-up leads be suitably screened.

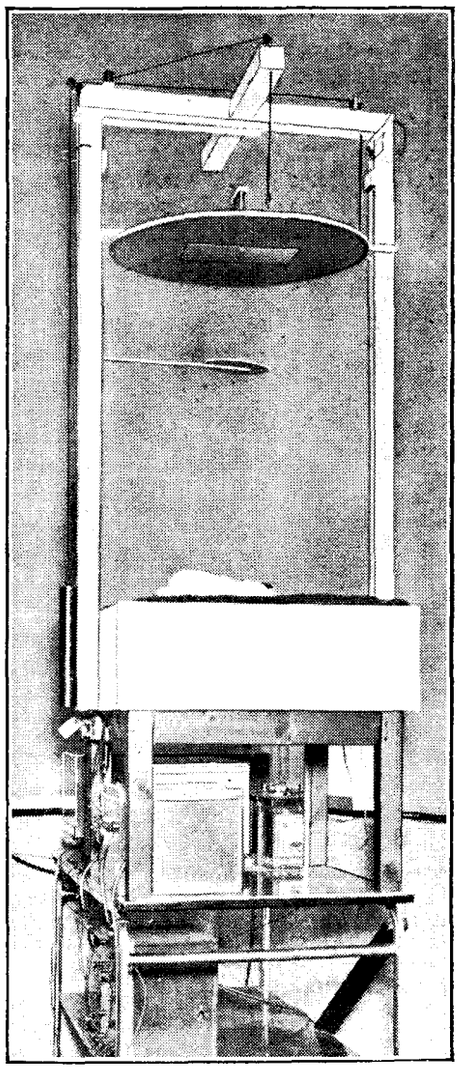
Scientific Radio at Olympia

The Cathode Ray Tube in Operation

THE possibilities of high-definition television (120 or 180 lines) using the cathode-ray tube as its reproducing agency are, at present, prominently in the technical public mind. Considerable interest therefore attaches to an exhibit in which the cathode-ray tube effectively makes its first bow to the great British public, and introduces itself in words, pictures and demonstrations.

This occurs in The Radio Weather House, the exhibit of the Radio Research Board in the East Gallery of the Grand Hall, where there are hourly "performances" throughout the day, each show lasting just over half an hour. The first half of each show is devoted to a two-reel talking film, on 16 mm. portable projectors. This is followed by a series of working demonstrations, with *vivâ voce* explanation and commentary by a demonstrator. The whole exhibit is illustrative of the cathode-ray oscillograph, and the uses to which it has been put in the work of the Radio Board, whose staff is already well known for its prominence in the technique of cathode-ray working.

The talking film has been made by the Gaumont British Instructional Co., in co-operation with the Radio Department N.P.L., which carries out the work of the Radio Research Board.



A model giving an acoustic analogy of the return of wireless signals from the ionosphere.

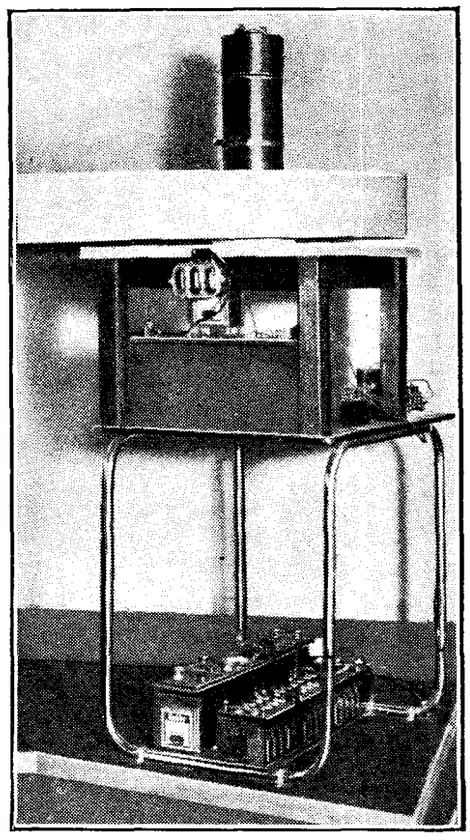
What the Films Teach Us

The two reels are a veritable triumph of co-ordination between well-designed experiment and skilful photography, and both parties are to be congratulated on a production which does so much to simplify and explain an instrument that is likely to be of such considerable public use. First, it deals with the speed at which radio phenomena occur, and emphasises the need for a very speedy indicator. The respective responses of (a) a needle-type of instrument, (b) a mirror-type of instrument, and (c) a cathode-ray tube are excellently illustrated, after which the story goes on to the use of the electron beam as a working indicator. The principles of the tube are very clearly illustrated and described, and the methods of utilising the beam and its fluorescent indication are then developed. The essential practices of two-dimensional deflection are dealt with in a manner that should prove very helpful to beginners, and to the public generally, in following these principles as applied to television scanning. Some of the practical applications to which the oscillograph has been put by the Radio Board are also illustrated, but this section is rather brief, and it is understood that it is likely to be further illustrated by future instructional films.

The remaining half of each show is given over, as already stated, to working demonstrations with *vivâ voce* commentary. The first demonstration is one illustrative of the method of echo-sounding used to explore the height of the ionosphere. This uses air waves instead of radio waves, and gives a scale reduction of about one in a million, but provides the audience with a clear impression of how wireless signals are reflected, and how they are varied by the conditions of the Heaviside layer.

A second demonstration is of the special cathode-ray direction-finder for collision prevention, which was described in our issue of August 3rd. This is shown in operation in conjunction with an animated diagram of moving ships illustrating the conditions in which collision would be probable or improbable respectively.

The last working model is another direction finder arranged for indication of course deviation on shipboard. The oscillograph for this purpose has special "collector" electrodes inserted in its bulb, which are used to operate relays and light indicating lamps, according to the course already set on a known radio transmitter—a beacon, for example. A middle amber light is shown so long as the course is held, but flashes to red or green when the course deviates to port or starboard respectively.



A three-colour signal device, actuated by cathode rays, which gives warning when a ship deviates from its course.

The title of The Radio Weather House is an expansion of the "Weather House" broadcast talks given earlier in this year by Mr. Watson Watt, Superintendent of the radio department. These talks treated our atmosphere (as a whole) as The Weather House of the Earth, and brought its upper floors into the picture as the region governing radio weather.

NEW A.C.-D.C. MAINS SETS

UNIVERSAL HIGH VOLTAGE RADIO, Ltd., of 28-29, Southampton Street, Strand, London, W.C.2, have now announced their new season's models. All of them are superheterodynes, employing Ostar-Ganz indirectly-heated high-voltage valves, and are suitable for operation on A.C. or D.C. mains of from 100 to 250 volts. Sets are available as compact table radio-gramophones, or as ordinary table receivers.

The "Hyvoltstar" miniature set embodies an interesting four-stage circuit using only two valves, plus a Westector for rectification. Automatic volume control is provided, as in the more ambitious five- and seven-valve receivers. Both the latter cover short wavebands (13 to 80 metres) in addition to the normal medium and long wavebands.

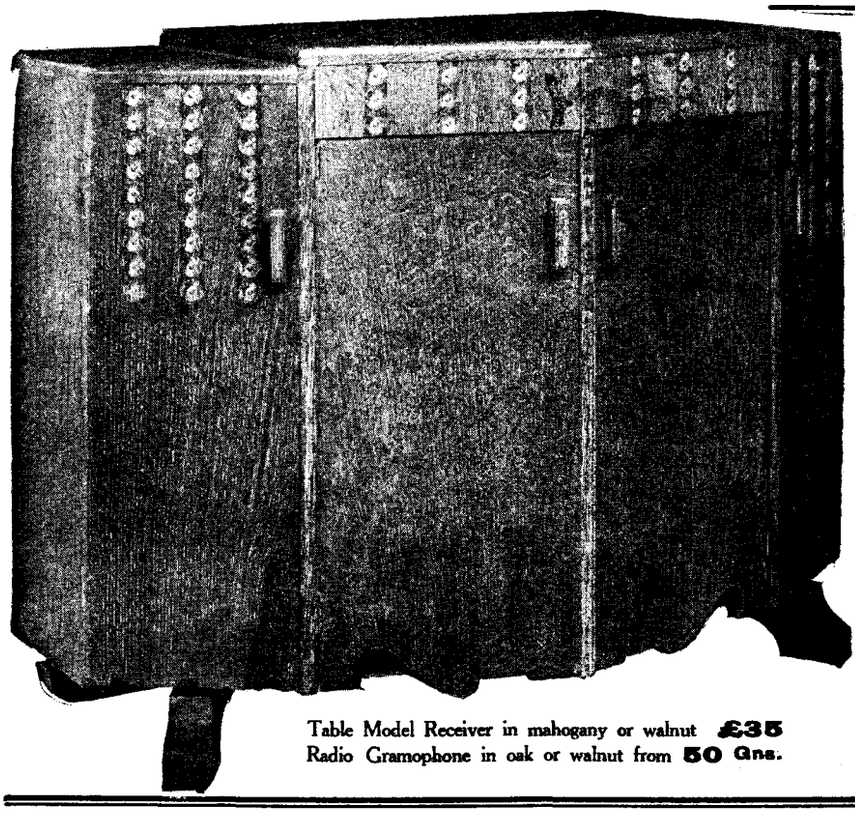


Table Model Receiver in mahogany or walnut **£35**
Radio Gramophone in oak or walnut from **50 Gns.**

RADIO RESEARCH
PRODUCES
RADIO REFINEMENTS

The ALLWAVE RADIO GRAMOPHONE does everything that a good radio gramophone should do and, in addition, receives Short Wave Stations operating between 14—58 metres, the receiver portion being identical to that used in our table model receiver with a wave length range tuning from 14 to 2,000 metres.

An additional feature of this instrument is the Automatic Record Player, which eliminates the bother of lifting the lid to change records.

The dial scale automatically shows the wave length in use, and calibration is accurate and reliable on all wave ranges.

7 watt output stage. 8 valves. 12" dynamic speaker.

Write for full technical description.

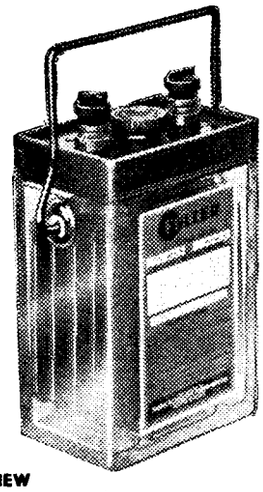
ALLWAVE

ALLWAVE INTERNATIONAL RADIO & TELEVISION LIMITED, 242, HIGH STREET, BROMLEY, KENT.
'Phone: Ravensbourne 4046.

3 NEW THINGS DISPLAYED AT RADIOLYMPIA
STAND No. 124

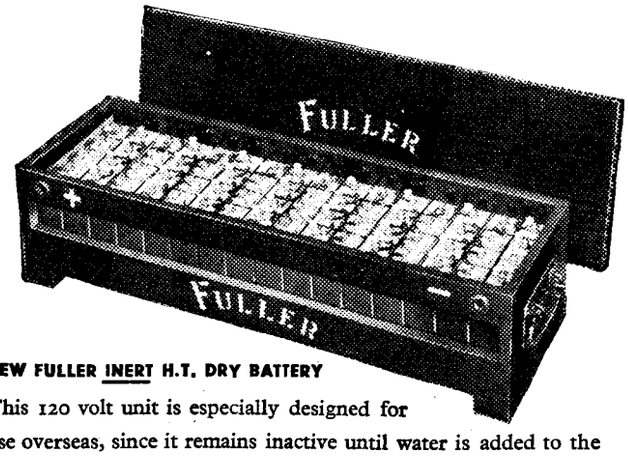
NEW FULLER HEAVY DUTY DRY BATTERIES

High capacity 45 volt units with 2 - 3 times the life of the ordinary H.T. Battery. For the largest multi-valve sets.



NEW FULLER HIGH CAPACITY 2 VOLT CELLS

Multiple thick plate type especially suitable for Multi-valve Radios and largest Radio - gramophones.



NEW FULLER INERT H.T. DRY BATTERY

This 120 volt unit is especially designed for use overseas, since it remains inactive until water is added to the cells. *No deterioration* in course of transit. Very high capacity.

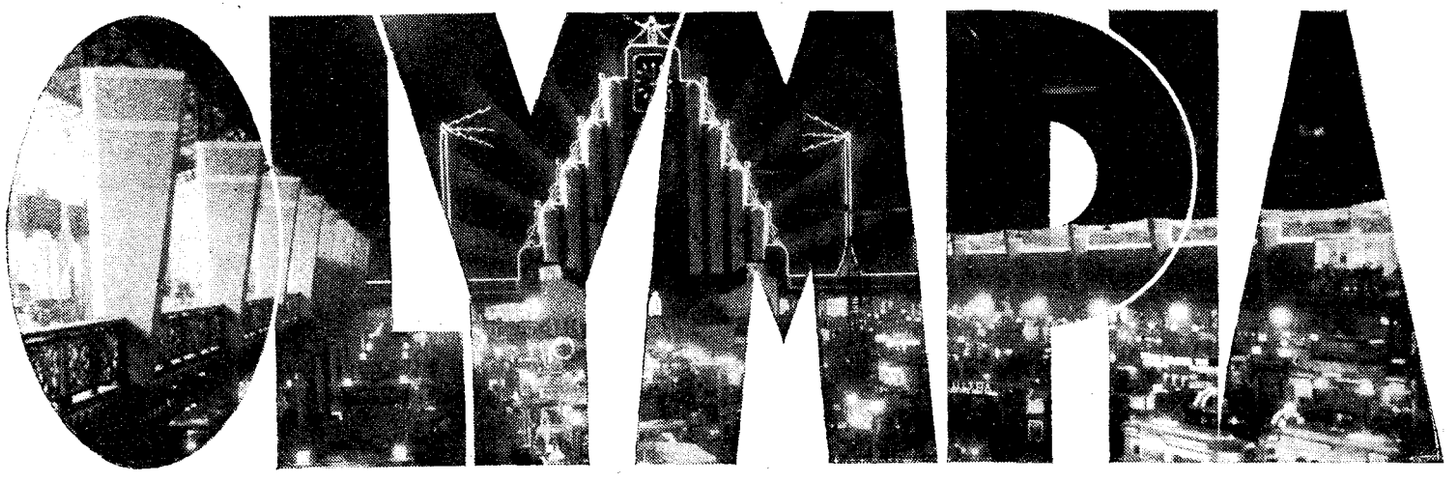
Fuller Accumulator Co. (1926) Ltd., Chadwell Heath, Essex. Phone: Seven Kings 1200. Telegrams: "Fuller, Chadwell Heath."

SERVICE AGENTS THROUGHOUT THE COUNTRY

FULLER BATTERIES

H.T. AND L.T. DRY CELLS AND ACCUMULATORS

Mention of "The Wireless World," when writing to advertisers, will ensure prompt attention.



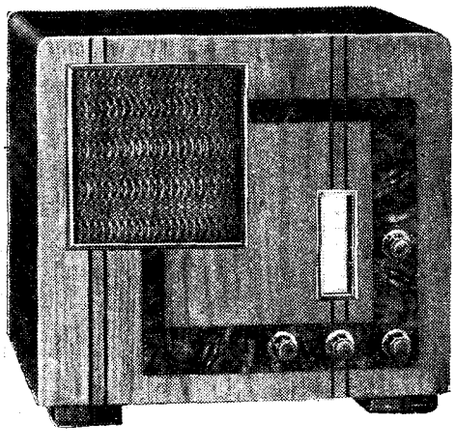
IN the following pages we present our readers with a full report on the Show compiled by the technical staff of "The Wireless World" after personal visits to every stand. The illustrations, too, have been prepared from photographs taken by our staff photographers at Olympia. We believe that this report will prove a valuable guide to the new season's receivers and components

A Stand-to-Stand Review of the Show Compiled at Olympia by the Technical Staff of "The Wireless World"

ACE RADIO (19)

Prominently displayed on this stand is a universal superheterodyne with a heptode frequency-changer at the price of £10 19s. 6d. A similar receiver for A.C. only is listed at 10 guineas and contains four valves apart from the rectifier. Three-valve straight sets for A.C. and universal operation are also shown, and a three-valve battery set is on view at the price of £5 19s. 6d.

Ace Radio, 2a, West Harbour Street, E.1.



Aerodyne Curlew four-valve receiver for universal mains.

ADEY (115)

A series of portable sets, which are almost certainly the smallest available for loud-speaker reproduction, are shown on this stand. Two stages of aperiodic H.F. amplification are provided by Adey "self-coupling" valves, and this year's models are fitted with pentode output valves.

Adey Portable Radio, 99, Mortimer Street, W.1.

AERIALITE (253)

Material used in the erection of aerials comprises the exhibit of this firm. Special aerial wires, sold under the trade names of Aerialite, Levenstrand, and Coilite, are already well known; there is also an "invisible" aerial kit, the Percolite chemical earth tube, and ready-made motor car aerials.

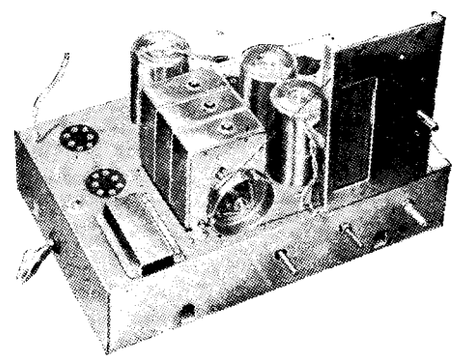
Aerialite, Ltd., Junction Mills, Whittington Street, Ashton-under-Lyne.

AERODYNE (68)

This firm is showing a series of inexpensive receivers for mains and battery operation ranging in price from 5 to 20 guineas. The Cardinal Superhet Radiogram is the most expensive model, and embodies a five-valve (including rectifier) chassis. It has a heptode frequency changer preceded by a bandpass input circuit and followed by an I.F. stage fitted with an H.F. pentode. A double-diode-triode serves for A.V.C. second detector and L.F. amplifier, and finally there is a power pentode giving three watts output. The volume control is combined with the mains switch, and, in addition, a noise suppressor is included to provide a silent background while tuning.

Moving-coil speaker, electric gramophone motor, and pick-up complete the equipment, and the whole is housed in an attractive walnut veneered cabinet. It is for A.C. mains operation.

At the other end of the range is the Raven three-valve det.-L.F. battery set at 5 guineas. Ultra modern in appearance it includes a 12in. cone balanced-armature speaker and. a 30-hour spring clock. Cabinets finished in different styles are available. There is a four-valve straight



Chassis of Aerodyne Swallow A.C. superheterodyne.

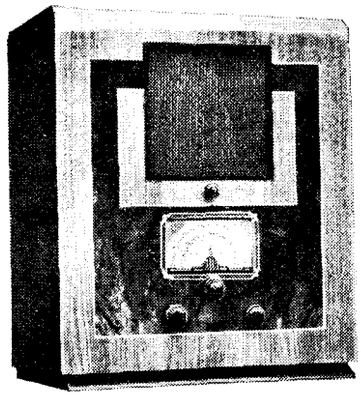
A.C. set at 10 guineas, a five-valve cabinet version of the Superhet Radiogram at 12 guineas, and a four-valve universal mains set, the Curlew, in which all the receiving valves are pentodes, at £10 19s. 6d.

Aerodyne Radio, Ltd., Aerodyne Works, Walthamstow, E.17.

Stand-to-Stand Report—

ALBA (32)

A wide range of receivers is shown on this stand, and the model 57 is of particular interest in view of its price of 12 guineas. It is an A.C. set with A.V.C. and a 3.5 watts output stage; tone control is included, and the sensitivity is below 10 μV. The set is also available for universal



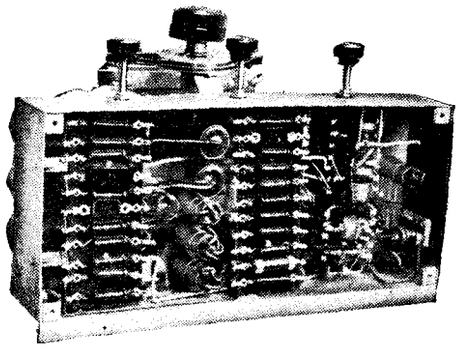
The Alba Superhet Six.

operation at 13 guineas. The model 72 radiogramophone has a single H.F. stage with a screen-grid detector and a pentode output valve; it is priced at 16 guineas. In addition to a number of smaller sets, a pick-up and playing-desk are also shown.

A. J. Balcombe, Ltd., 52-58, Tabernacle Street, E.C.2.

ALLWAVE (113)

To the technically minded visitor, and also to the overseas listener who wants programmes and does not mind how he gets them, there are few receivers more interesting than the highly specialised Allwave Superheterodyne shown on this stand. Briefly, this is a universal A.C.-D.C. mains



Underside of the Allwave universal chassis.

set, covering wavelengths between 14 and 2,000 metres in four ranges. There are a total of seven valves (including rectifier), and among the many interesting features may be mentioned litz-wound coils, two I.F. stages, and tone control.

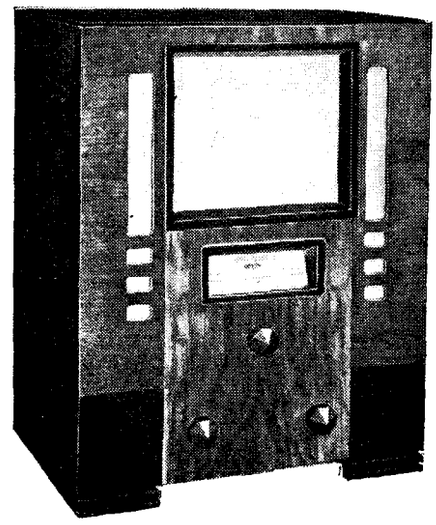
Both the I.F. stages and the frequency changer have automatic gain control, while the manual volume control operates in the L.F. circuit (actually by variation of grid bias of the intermediate L.F. valve, which is a pentode).

As the receiver is intended for overseas as well as for home use, it is designed to stand up to abnormal conditions of heat and humidity. Operation should be easy, as there is a smoothly working two-speed condenser drive and wavelength calibration. The same chassis is available as a radiogramophone.

Allwave International Radio and Television, Ltd., 242, High Street, Bromley, Kent.

AMPLION (63)

One of the chief exhibits on this stand is the Radiolux Auto-Gram at 50 guineas. This apparatus includes an automatic record changer which will play both sides of a mixture of 10in. and 12in. records. The receiver is a superheterodyne with both signal and intermediate frequency amplification, and a pentode output stage. Smaller receivers



The Amplion model 63 receiver.

are also shown, as well as a range of loud speakers of the permanent magnet moving-coil type at prices ranging from 32s. 6d. to 55s. All speakers are sold complete with a multi-ratio transformer giving correct matching to impedances of 1-20 ohms and 2,000-40,000 ohms.

Amplion (1932), Ltd., 82, Rosoman Street, E.C.1.

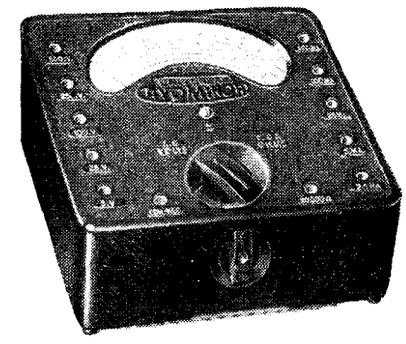
ARDENTE (45)

This stand is devoted to a display of amplifiers for public address work. The model T.A.205 is A.C. operated with an out-

Ardente TA205 public address amplifier.

put of 5 watts and is priced at £24. A larger model with an output of 10 watts is available at £30, while at the price of £35 equipment with an output of 18 watts, suitable for feeding six loud speakers, can be obtained. In addition to amplifiers, microphones are prominently displayed.

R. H. Dent (Ardente), 309, Oxford Street, W.1.



The new Universal AvoMinor.

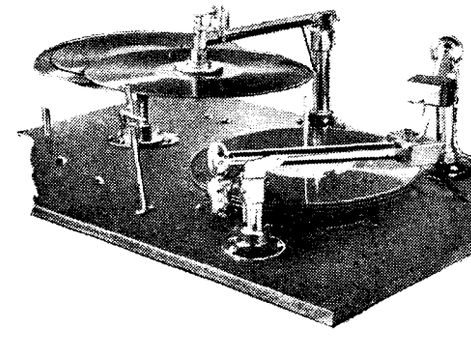
AUTOMATIC COIL WINDER (2)

Several notable additions have been made to the Avo series of test apparatus and there are now five different instruments and an improved AvoDaptor. The new Universal AvoMinor allows for A.C. and D.C. measurements, it being in effect a miniature version of the larger Universal Avometer, though its scope is not so wide. It costs £5 complete with all accessories.

Some modifications have been made to the Universal Avometer, and it now provides 36 different ranges, the lowest current scale being 0-6 mA.

The D.C. version of this instrument is retained, as also is the first model AvoMinor. The other new item is a modulated oscillator for set testing costing £5 10s. It has a variable output and the price includes valve and all batteries.

Automatic Coil Winder and Electrical Equipment Co., Ltd., Winder House, Douglas Street, S.W.1.



Automatic Radio Gramophone record changer.

AUTOMATIC RADIO GRAMOPHONE CO. (110)

The record changer produced by this company will play both sides of a series of records up to twenty-five in number. The records may be of 10in. or 12in. diameter, mixed indiscriminately, and the total playing time available may be as much as four hours.

The instrument is notable for the simplicity of the method adopted for playing the reverse side of the record. Separate pick-

Stand-to-Stand Report—

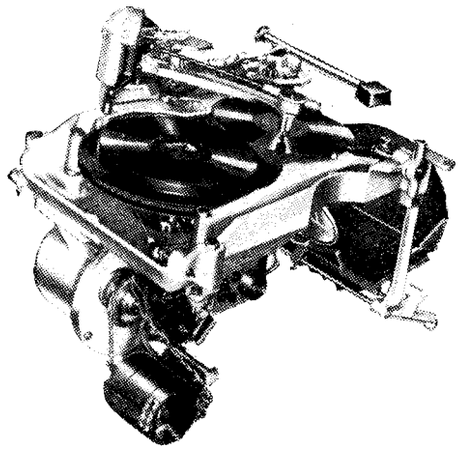
ups are mounted above and below the disc, which is rotated in mid-air by a special two-claw chuck gripping the centre hole. When playing the underside the motor is, of course, reversed.

A complete superheterodyne radiogramophone incorporating the unit costs from 40 guineas, but it is hoped that arrangements will be made for marketing the record changer unit separately.

Automatic Radio Gramophone Co., Ltd., Crown Street Hall, Brighton.

AUTOTROPE (108)

A self-changing radiogramophone of unusually wide specification is the sole exhibit on this stand. The superheterodyne chassis and its 15-watt output feeding dual energised loud speakers are somewhat overshadowed, however, by the record-changing mechanism which is shown in operation. The machine will handle up to 30 records



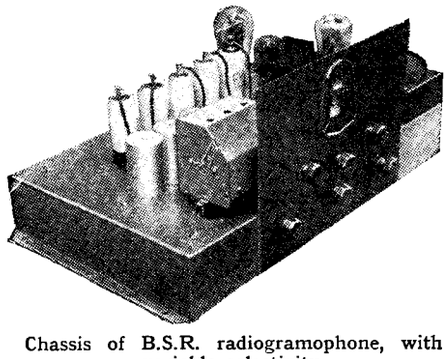
Record-changing mechanism in the Autotrope radiogramophone.

mixed indiscriminately, and is built on sound engineering lines. One of the most ambitious receivers in the show—price £150.

Anson and Hopwood, Ltd., 41, Cheval Place, S.W.3.

B.S.R. (235)

Among the more highly developed sets in the show is the new B.S.R. eight-valve superheterodyne, available as a radiogramophone at 85 guineas complete. Amplified and delayed A.V.C. is fitted, and there is a manually operated noise suppressor. The most important and interesting feature of the set is, however, the provision of variable selectivity. In the B.S.R. set, variation of band width is effected by mechanical



Chassis of B.S.R. radiogramophone, with variable selectivity.

adjustment of the coupling between the I.F. transformers; matters are ingeniously arranged so that manipulation of this control automatically cuts in or out of circuit a 9-kilocycle whistle suppressing filter as the band is widened or narrowed. It should be added that the set is fitted with dual loud speakers, one of the reproducers being a small high-note horn speaker which reproduces only the higher frequencies.

Three heterodyne test oscillators have also been produced. The frequency output is continuously variable between 5 and 15,000 c/s, and models with outputs of 300, 1,000 and 2,000 milliwatts are available. The instrument is directly calibrated.

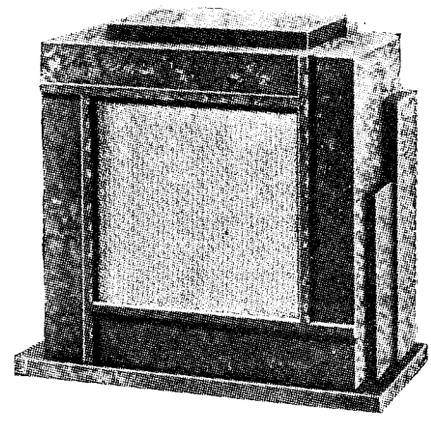
Birmingham Sound Reproducers, Ltd., Claremont Street, Old Hill, Staffs.

Baker Selhurst car radio receiver.

BAKER (242)

The main exhibit on this stand is a complete car radio receiver incorporating a four-valve "straight" circuit and a 6-volt energised moving-coil loud speaker. The set is housed in a metal screening box which is attached to the car at any convenient point by a single-hole universal fitting. The price is £9 15s. or, with remote control panel, £11.

The firm's range of quality moving-coil reproducers and extension loud speakers has been supplemented by the new "Fydelitone" extension speaker, which is of very compact design and is housed in a moulded bakelite cabinet.



Baker Selhurst Fydelitone extension loud speaker.

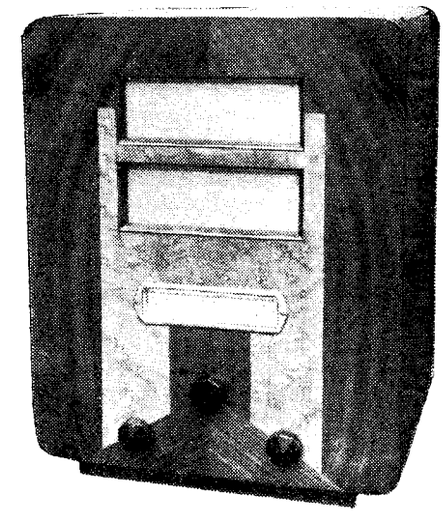
Baker's Selhurst Radio, Ltd., 75-77, Sussex Road, Croydon.

BEETHOVEN (57)

Table model receivers for A.C. mains and battery operation, a battery transportable, and two suitcase portables comprise the firm's programme for the coming season.

The Model 56 superheterodyne at 13 guineas is very good value, including, as it does, delayed A.V.C., inter-station noise suppression and twin loud speakers.

The Model P.85 suitcase portable at 9½ guineas also created a very favourable impression by the general excellence of the



Beethoven S.G.4 battery transportable.

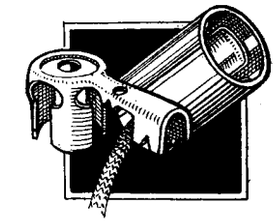
finish and the fact that a moving-coil loud speaker is included in the specification.

Beethoven Radio, Ltd., Beethoven Works, Great College Street, N.W.1.

BELLING-LEE (41)

Fuse holders, mains connectors, plugs and sockets in a wide variety of styles form the largest section in this exhibit. Among the newer items is a series of spring clips for valves with top grid connection. Four

Two styles of Belling-Lee valve top plug connector.



types are shown, including one that completely screens the top terminal. There are some new chassis valve-holders of the side contact type and a voltage adjusting unit costing 17s. 6d. for use with universal valves.

Interference suppressors are shown in many different forms; some are for domestic apparatus, others for advertising display signs, while there is a series for filtering out disturbances in the mains lead to the set.

An interesting feature is the demonstration proving the effectiveness of all these devices.

Belling and Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex.

BENJAMIN (42)

The latest addition to the Magnavox range of loud speakers—the Model "66"—attracted most attention on this stand. This is an excellent example of the trend towards better quality of reproduction, and while it is obvious that no expense has been spared in making it a first-rate job, the price of £5 17s. 6d. for the D.C. and £7 17s. 6d. for the A.C. model cannot be considered excessive.

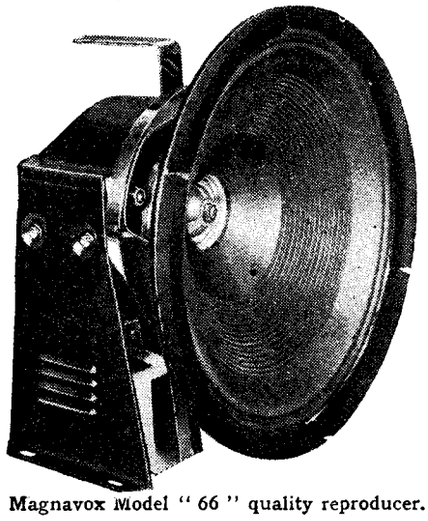
The "Standard," "Senior," and "Magna" types of moving-coil units are still available to the public, and the exhibit also includes a range of units for set manufacturers.

Among the components shown were noted five- and seven-pin valve-holders, intervalve

Stand-to-Stand Report—

coupling units, and a battery economy unit designed for use with a "Westector."

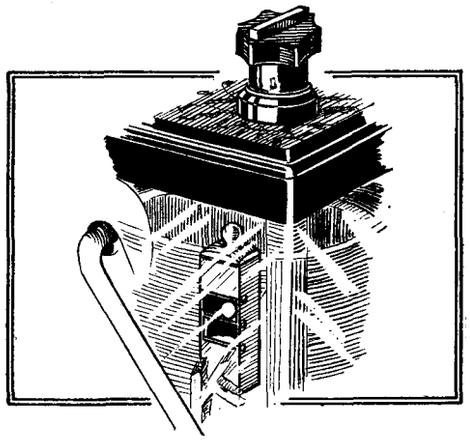
Benjamin Electric, Ltd., Brantwood Works, Tariff Road, N.17.



Magnavox Model "66" quality reproducer.

BLOCK BATTERIES (31)

The most interesting of the recent additions to the Block range of L.T. cells are the G.B.20 and the G.B.45 models, as these have glass containers and incorporate charge indicators. The elements are the same as fitted to the recently introduced B.20 and B.45 cells assembled in bakelite cases. The prices of the new cells are 4s. 6d. for the G.B.20 and 8s. 6d. for the G.B.45.



Charge indicators incorporated in the Block G.B.45 L.T. cell.

Several other L.T. batteries as well as a range of H.T. units, all of the Block plateless style, complete a very interesting exhibit.

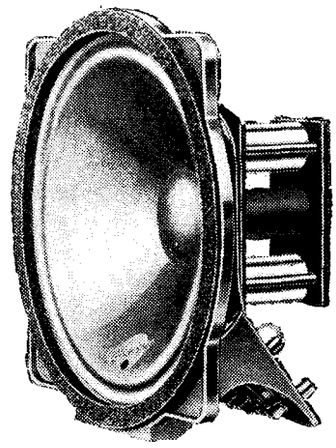
Block Batteries, Ltd., By-Pass Road, Barking, Essex.

BLUE SPOT (90)

The new "Super-Dual" loud speaker is a combination of a large-diameter cone for low-frequency response and an entirely distinct miniature moving-coil loud speaker for the extreme high frequencies. An internal filter ensures the correct distribution of energy between the two units, and an adjustable output transformer giving eight effective impedances from 750 to 10,000 ohms is included. A flux density of 11,500 lines is claimed, and the unit may be supplied with an energised field at 8 guineas or a P.M. field at 11 guineas. Nickel-aluminium alloy is used in the permanent magnet model, and other examples of its application are to be found in the "Star" and "Star Junior" models.

The 99PM and 45PM models with cobalt steel magnets are being continued, and the Blue Spot pick-up is now provided with a new type of lifting head.

British Blue Spot Co., Ltd., 94-96, Rosoman Street, E.C.1.



Blue Spot "Star Junior" loud speaker chassis.

BRIDGER (216)

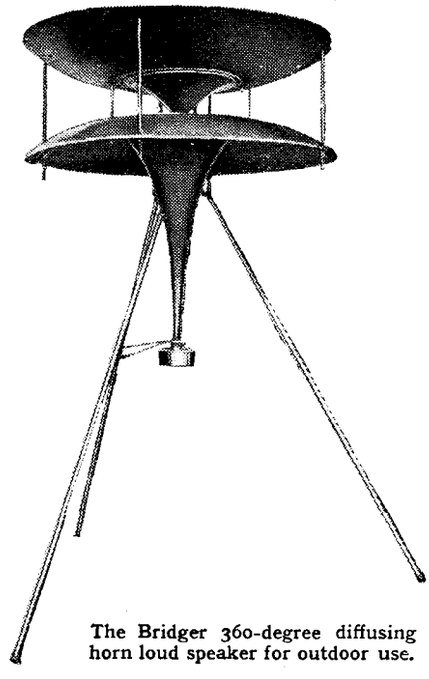
The production of cone diaphragms for loud speakers in a number of different materials, and to any desired specification, has hitherto represented the sole activity of this firm. This year cones and cone fittings still figure prominently, but a new type of radial diffusing public address loud speaker has been introduced.

R. O. Bridger and Co., Ltd., No. 4 Factory, Shelford Place, Church Street, N.16.

BRITISH PERMEL ENAMELLED WIRE (21)

A wide range of enamelled wire for all wireless purposes is displayed on this stand.

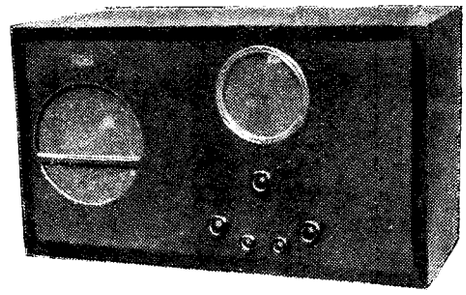
British Permel Enamelled Wire, Ltd., Charlton, S.E.7.



The Bridger 360-degree diffusing horn loud speaker for outdoor use.

BRITISH RADIOPHONE (97)

Two chassis in a wide range of cabinet styles form the exhibit of this firm. The Empire model has a tuning range of 15-55 and 190-560 metres, while the Continental model covers also the range of 800-2,000



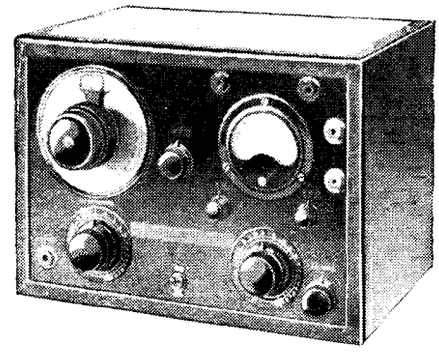
British Radiophone Model ETM 306 short- and medium-wave receiver.

metres, but is otherwise similar. The model ETM 306 is of the table type and has an output of 3.5 watts. Ganged tuning condensers are embodied with a dual-ratio tuning control, and the dial is calibrated in kilocycles. Q.A.V.C. is included, and particular attention is given to the mechanical construction being suitable for tropical conditions. This set is priced at 40 guineas. The model AWG 101, which covers the long waveband, is a radiogramophone with an output of 7 watts and an automatic record-changer; it is priced at 100 guineas.

British Radiophone, Ltd., Aldwych House, Aldwych, W.C.2.

BROWN RADIO (229)

Apparatus for servicing, testing, and for use in the development of receivers is shown on this stand. Modulated H.F. oscillators are made in five different types, three for mains and two for battery operation. With



Brown modulated H.F. oscillator for test-room use.

one exception all are single-valve models and function on the dynatron principle, the two-valve model, the type B.2, which is battery operated, having a separate modulating valve. This model costs £14.

All models cover the range of radio frequencies commonly met with in straight and superheterodyne receivers, and output meters are available as separate units.

There are two heterodyne type L.F. oscillators, both mains driven, and a range of valve voltmeters.

Wm. F. Brown Radio Co., Ossillo Radio Works, Brierley Hill, Staffs.

BULGIN (121)

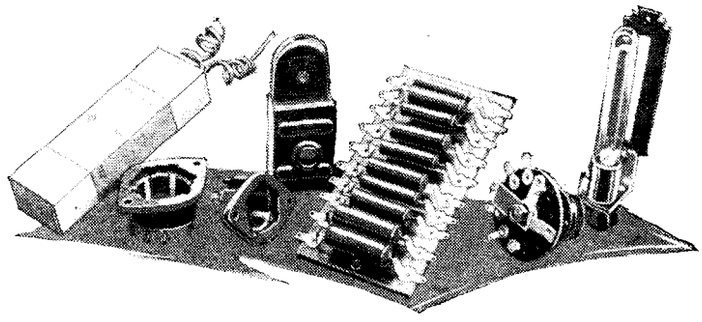
Bulgin has many more short-wave components this year; there is a five-way coil assembly costing 15s. 6d., and fitted with

Stand-to-Stand Report—

waveband selector switch, a series of plug-in coils on skeleton formers with types for the 5- to 10-metre band, low-loss valve-holders, and an H.F. choke.

Among other new items is a range of high-voltage dry electrolytic condensers in 4- and 8-mfd. sizes and for 500 volts D.C. peak working. They are assembled in waxed cardboard cases, and cost 3s. 9d. and 4s. 3d. each respectively. For grid bias decoupling there are low-voltage high-capacity models, a 25-mfd. 25-volt condenser costing but 2s. 9d.

The new bakelite cable plugs are interesting, and, incidentally, particularly well made. Five- and seven-way types are available at 1s. 6d. and 2s. each respectively. They have easily detachable plugs, a screw-on cover, and a novel wire-grip arrangement.



Group of new Bulgin components, showing high-voltage electrolytic condenser, side-contact valve-holders, mains plug fuse holder, group board stud switch and neon tube holder.

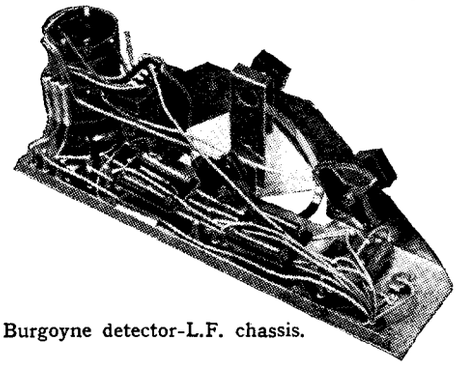
Switches have always been a speciality of this firm, in the design of which they excel. There are some new types available this year, the rotary action toggle pattern having been further developed. Single-pole stud-switches in 3-, 4- and 5-way types will be found very useful by experimenters, and they cost 1s. 6d., 1s. 9d., and 2s. each respectively.

There is a new De Luxe Controlatone at 7s. 6d. for tone correction, a range of valve-holders for all the new valves, Q.P.P. transformers, some 40- and 60-watt power resistances, and a host of other items that space forbids detailed mention of here.

A. F. Bulgin and Co., Ltd., Abbey Road, Barking, Essex.

BURGOYNE (102)

In the Burgoyne series of inexpensive receivers, low cost has been attained by avoiding complicated circuit arrangements and also by avoiding waste of material and unnecessary operations in manufacture. It is therefore natural that the programme has hitherto been confined to " straight "



Burgoyne detector-L.F. chassis.

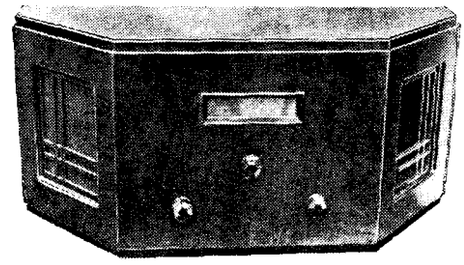
receivers. This year, however, there is a five-valve battery superheterodyne at 10 guineas, with a very modern specification including an H.F. pentode detector-oscillator, band-pass tuning and Class " B " L.F. amplification. There is also a new H.F.-det.-2 L.F. suitcase portable, and a new external-aerial battery set which employs two pentodes in an H.F.-det.-L.F. circuit, and costs only £5 17s. 6d. complete.

Burgoyne Wireless (1930), *Ltd., Great West Road, Brentford, Middlesex.*

BURNDEPT (81)

A feature of all the more ambitious Burndept receivers is the special disposition of the twin loud speakers, which gives an effect described as " flood lighting of sound." It is claimed that this plan gives good distribution of sound radiation over the whole room. The Ethodyne Superhet, with four receiver valves and a rectifier, which costs 18 guineas, will probably prove the most popular model. A similar set, with A.V.C. added, costs 20 guineas.

There is also a universal mains transportable set, which embodies an internal aerial; here, again, a superheterodyne circuit is employed. This is a single-speaker model, but the special arrangement of dual



Burndept Ethodyne Five.

speakers already referred to is embodied in the universal mains radiogramophone, Model 203.

Burndept, Ltd., Light Gun Factory, Erith, Kent.

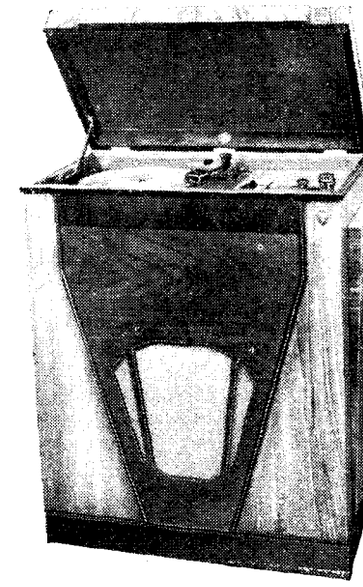
BURTON (3)

A series of " straight " receivers of robust construction, attractive appearance and relatively simple circuit design comprises the present programme of this firm. What will probably prove to be the most popular model is a three-valve H.F.-det.-L.F. set for A.C. mains operation, housed in a handsome console cabinet of walnut. The circuit arrangement contains nothing of an untried character. An output of two watts is obtained from a pentode.

The same chassis is built into a table cabinet and a radiogramophone. The latter instrument, fitted with a Garrard motor and pick-up and a Magnavox speaker, is sold at 17 guineas.

Other new productions include a four-valve battery set with H.F. amplification and Class " B " output, giving large volume for a total anode current consumption of only 11 mA.

C. F. and H. Burton, Progress Works, Bernard Street, Walsall.



The Burton A.C. radiogramophone.

BUSH RADIO (82)

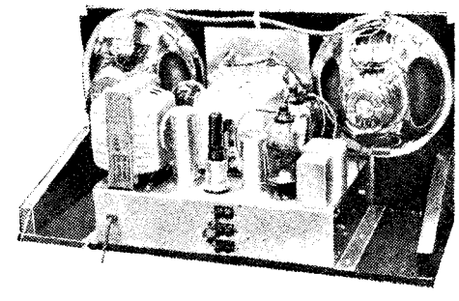
The model SAC7 shown by this firm is a five-valve A.C. mains receiver with built-in frame aerials for the two wavebands. Seven tuned circuits are included and there is a neon tuning indicator; the output is 3 watts and the set is priced at 16 guineas. The SAC5 is a somewhat smaller receiver distinguished by the inclusion of a form of Q.A.V.C.; it has an output of 3 watts and costs 13 guineas. Essentially the same system of control is included in a battery model.

Apart from a number of smaller receivers, a display of large cathode-ray tubes used for television purposes is of particular interest. The Baird-type mirror drum Televisor, which is priced at 30 guineas, is also on view.

Bush Radio, Ltd., Woodger Road, Shepherd's Bush, W.12.

C.A.C. (89)

The arrangement of valves in the circuit of the C.A.C. Austin A.C. Super comprises a heptode frequency-changer, a single I.F. valve, a duo-diode-triode providing A.V.C., and an output pentode delivering 3 watts to the dual loud speakers. It is priced at



Chassis of the C.A.C. Austin superheterodyne.

18 guineas in a table cabinet. The circuit details of the Austin Battery Super are similar, but the duo-diode-triode is followed by a driver and Class " B " output stage.

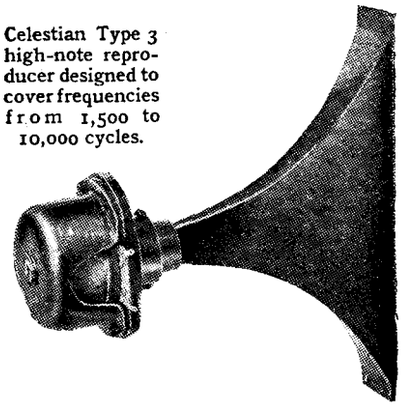
Stand-to-Stand Report—

A single loud speaker is used, and the set is priced at 16 guineas. *The Wireless World* Push-Pull Quality Amplifier is shown at the price of £25, including cabinet and gramophone equipment.

A particular feature of this exhibit is radio furniture, and models to suit all tastes are included. Special prominence is given to a Korean cabinet which houses an Austin superheterodyne, a Push-Pull Quality Amplifier, loud speaker and gramophone equipment, as well as providing a space for the storage of records. The complete apparatus is priced at 200 guineas.

A short-wave converter with its own mains equipment is shown at the price of £10, while a superheterodyne tuning unit at 52s. 6d., designed for use with a heptode frequency-changer and provided with band-pass signal-frequency circuits, is on view. This unit is fitted with air-cored coils, and not iron-cored as stated in error on page 123 of last week's issue, for the makers regard iron-cored coils as liable to cause high-note loss and certain ganging difficulties.

City Accumulator Co., Ltd., 18-20, Norman's Buildings, Central Street, E.C.1.



Celestian Type 3 high-note reproducer designed to cover frequencies from 1,500 to 10,000 cycles.

C.A.V. (234)

The C.A.V. range of batteries is complete, and comprises H.T. dry cells and accumulators, and all types of L.T. cells, including a new series of free-acid batteries for transportables. The charge indicator on the mass-type slow discharge cells is arranged on a new plan, capital being made of universal familiarity with the "stop-caution-go" coloured traffic signals.

The M-L rotary converters made by an associated company are also shown on this stand. Machines for converting D.C. between voltages of 6 and 250 to higher voltages are manufactured, and also D.C.-to-A.C. generators are produced. A recent introduction is a stabiliser unit for Class "B" and similar sets, which makes use of a neon tube. In addition to a large number of heavy-duty battery chargers for commercial use, there is also a domestic charger capable of dealing with from one to six cells.

C. A. Vandervell, Ltd., Well Street, Birmingham.

CELESTION (28)

Although in outward appearance the Celestion range of moving-coil units appears much the same as last year, many detail changes have been made which have resulted in improved performance.

To the connoisseur of quality the outstanding exhibit on the stand is the new Type 3 high-note speaker. This is a moving-coil exponential horn with a narrow rectangular flare designed to reproduce frequencies from 1,500 to 10,000 cycles. It is of the energised type and is specially adapted to work with the Celestion E.10 and Type 38 units. The price is £3 and an output transformer, wound for any specified output, costs 12s. 6d.

Celestion, Ltd., London Road, Kingston-on-Thames.

CENTRAL EQUIPMENT (4)

The principal production of this firm is the "No-Mast" aerial, which is intended for mounting on a chimney-stack or in a similar position. Complementary to this is the "Siltit" earthing device, which contains a hygroscopic compound.

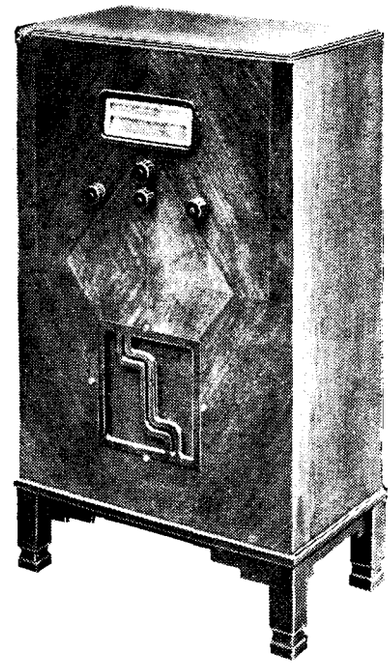
Central Equipment, Ltd., 188-192, London Road, Liverpool.

CLARKE'S "ATLAS" (85)

For this season one type of receiver only is standardised. It is a five-valve (including rectifier) superhet. for A.C. mains and embodies the latest type of circuit with A.V.C. The set is station-calibrated, but only the station names of one band are visible at a time. "Spectrum Tuning," as the system is described, is not mechanical but a very interesting application of a certain optical effect, for each range is illuminated in a different colour. In cabinet form the price is 14 guineas and as a Console model 16 guineas.

There is also the range of Atlas eliminators now extended to include some new models, one of which, the T10/30 has an adjustment to maintain a constant output voltage at widely different current loads.

H. Clarke and Co. (M/c), Ltd., George Street, Patricroft, Manchester.



Clarke's "Atlas" Console Model 7-5-8 superheterodyne.

CLIMAX (56)

The outstanding Climax receiver is the small superheterodyne which was recently reviewed in these columns. Its price is only 10 guineas, but our review showed that on all counts performance was highly satisfactory. The same chassis, in radiogramophone form, costs £18, and there is now a universal A.C.-D.C. superheterodyne on similar lines.

Battery sets with H.F. amplification, one of which has Class "B" output, are also produced, together with a simple detector-L.F. set, available either with moving-coil or moving-iron speaker.

Climax Radio Electric, Ltd., Haverstock Works, Parkhill Road, N.W.3.

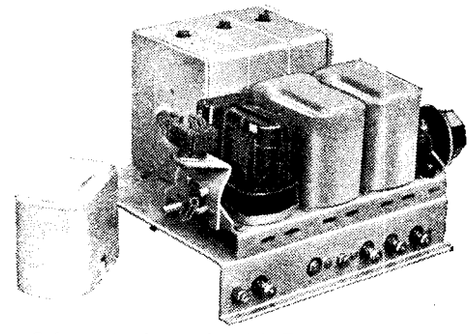
CLIX (218)

This stand is devoted chiefly to a display of various types of valve-holders. The standard type of chassis mounting valve-holder is available in 4-, 5-, 7-, and 9-pin types at prices from 8d. to 1s. 3d. "Air-sprung" anti-microphonic valve-holders are also shown in 4- and 5-pin types, and American models for 4-, 5-, and 6-pin valves. Continental 7-pin holders are also on view in both screened and unscreened types. A range of wall plugs and a wide variety of plugs and sockets complete the display.

Lectro Linx, Ltd., 79a, Rochester Row, S.W.1.

COLVERN (38)

A wide range of Ferrocart coils is to be found on this stand, and a high standard of accuracy in matching is claimed, the differences between any two coils being less than 0.25 per cent. The physical dimensions of the coils remain unaltered, but the shape of the screening can has been slightly changed to give increased rigidity. A pair of band-pass coils is priced at 25s., and a superheterodyne oscillator coil is listed at 12s. 6d.; several different types of oscillator coils are available for use with different frequency-changing circuits.



Colvern tuning unit with Ferrocart coils.

Tuning units comprising a three-gang set of Ferrocart coils with a three-gang condenser are shown for both straight and superheterodyne receivers; the wave-change switch is combined with a radiogramophone switch and also with a mains on-off switch. Compact I.F. transformers for 110 kc/s fitted with trimmers and adjustable coupling are also on view at 12s. 6d.

Colvern, Ltd., Mawneys Road, Romford, Essex.

CONCORDIA (238)

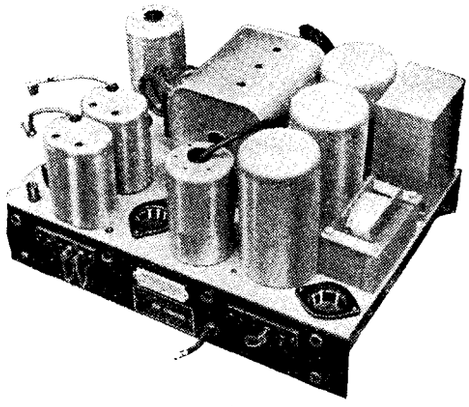
Wire of every description, and with every type of insulating covering, is manufactured by this firm; their products include Recepticon aerials, screened sleeving, braided wire, litz, and the fireproof Herculacker cables, with a smooth and glossy covering; this will be specially useful in positions where extreme heat is encountered.

Concordia Electric Wire Co., Ltd., New Sawley, near Nottingham.

Stand-to-Stand Report—

CONSOLIDATED RADIO CO. (20)

The Ranger series of receivers shown by this firm includes two universal mains sets and three for battery operation. In each class is a superheterodyne embodying the latest features. The De Luxe Battery Superhet has a self-contained frame aerial and one H.F. stage before the frequency-changer to give additional sensitivity. There is one I.F. stage, a double-diode triode providing A.V.C., a driver stage, and Class "B" output. In all, there are eight tuned circuits, and the price is 18 guineas.



Ranger universal mains superheterodyne chassis.

The Universal Band Pass Four—H.F.-det.-pentode, the fourth valve being the rectifier—is suitable for A.C. or D.C. supplies, and it covers the short-, the medium-, and the long-wave bands. It is a barretter controlled, and costs 11 guineas.

Consolidated Radio Co., Ltd., Warple Way, Acton, W.3.

COSMOCORD (243)

This firm specialises in the manufacture of gramophone accessories, and one of the most interesting exhibits is the Model 55 Gramo-Chassis, consisting of on A.C. motor, pick-up, and fully automatic stop assembled in a moulded one-piece base plate. The price of the complete unit is 55s., and it is also available in playing desk form at 75s.

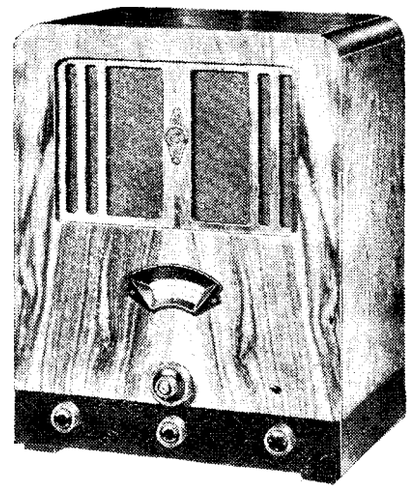
Cosmocord Model 55 Gramo-Chassis.

The Cosmocord pick-up has been redesigned, and is now offered at the very attractive price of 15s.

Cosmocord, Ltd., Cambridge Arterial Road, Enfield, Middlesex.

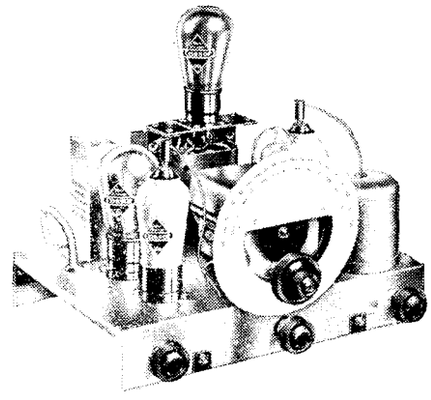
GOSSOR (73)

The new small A.C. superheterodyne is an excellent representative of this popular type of receiver, and is available as a table model at 12 guineas. The specification includes pentagrid frequency-changer, iron-cored signal-frequency coils, automatic volume control, and neon tuning indicator. Another attractive set is the Super-Ferrodyne A.C. straight set, with iron-cored coils in a three-valve H.F.-det.-L.F. circuit. There is also a battery version of this receiver with a similar specification. A chassis similar to that of the Super-Ferrodyne is included in an A.C. radio-gramophone sold at 16 guineas.



The latest Cossor Melody Maker.

For the present season, the well-known Melody Maker battery and A.C. kits for the home constructor have been entirely redesigned, and are now provided with iron-cored coils.



Chassis of the Cossor A.C. Melody Maker.

We must find room for Cossor valves, although the space available is woefully inadequate for discussing the very complete range that is now in production. The series of 0.2-amp. universal valves, most of which require 13 volts, is especially interesting, and includes almost everything that one is likely to need, not excepting a pentagrid frequency-changer. Another recent introduction is the plain double-diode valve, taking 4 volts at 0.5 amp. Battery users will be pleased to know that counterparts of most of the latest mains valves are available in the battery range.

A. C. Cossor, Ltd., Cossor House, Highbury Grove, N.5.

DAGENITE (226)

Accumulators being the speciality of this firm, the exhibits here consist of a comprehensive range of all their H.T. and L.T. types. A special feature is made of the "Tell-Tale" charge indicator which is now embodied in all the L.T. and H.T. units wherever the construction allows. Three different coloured floats are used, and, according to their respective positions, afford a ready means of ascertaining the state of the battery.

Peto and Radford, 50, Grosvenor Gardens, S.W.1.

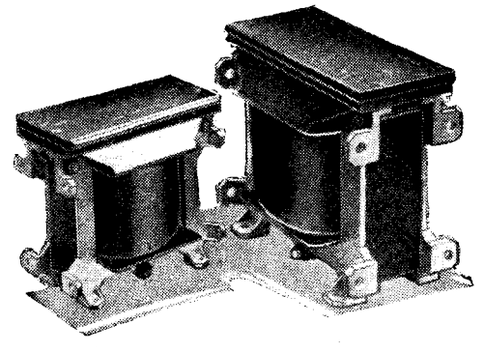
DARWINS (40)

The display of magnets on this stand includes examples of the many applications of new nickel-aluminium alloy, and some interesting miniature magnets for moving-coil microphones are shown.

Darwins, Ltd., Fitzwilliam Works, Sheffield.

DAVENSET (29)

Battery service station charging equipment forms the principal exhibit of this firm, and a wide range of models with single and multiple circuits is shown. The A class mains transformers and chokes occupy a prominent place on the stand, the fine finish and excellent materials used being the outstanding features of this range.



Davenset mains transformer and 30H.-100mA. choke.

There are several other interesting items, one being a neon-light mains-operated insulation tester for general-purpose use costing 50s.

Partridge, Wilson and Co., Ltd., Davenset Works, Evington Valley Road, Leicester.

DE LA RUE (5)

Examples of the application of bakelite and synthetic resin mouldings to radio components includes specimens of clear resin mouldings for short-wave coils and flexible bobbins designed to minimise flange breakages.

Thos. De La Rue and Co., Ltd., Shernhall Street, Walthamstow, E.17.

DIGGLE (13)

The "Reliance" range of charging equipment for battery service station use is shown on this stand. Separate motors and generators are employed, and each unit is self-contained with switchboard, meters and regulating resistances in all circuits. H.T. and L.T. batteries can be handled simultaneously by most models.

Alfred Diggle and Co., Ltd., Jane Street, Rochdale, Lancs.

DRUMMER (91)

The RG8 Super Radiogram, which is priced at 150 guineas, occupies pride of place on this stand, for not only is it a handsome piece of furniture, but it incorporates a receiver and gramophone equipment of outstanding merit. A superheterodyne circuit

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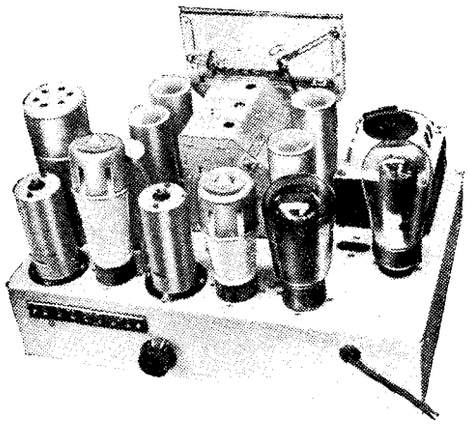
is, of course, used. There are eight valves plus a rectifier, giving ten stages and nine tuned circuits, in which the coils are of the iron-cored type.

One H.F. amplifier precedes a heptode frequency changer, then two I.F. stages with variable-mu H.F. pentode. A duo-diode-triode combines the functions of second detector, A.V.C. and first L.F. amplifier, followed by a further L.F. stage, and finally push-pull output feeding four loud speakers. One is an R.K., one a Brush Crystal, and

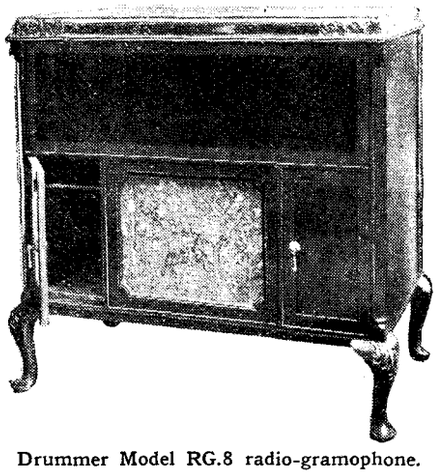


Drummer five-valve chassis for A.C. mains.

there is a pair of matched dual speakers. A.V.C. operates on four valves, and there is an inter-station noise suppressor.

The gramophone equipment includes an automatic record changer, while in the cabinet is embodied a cocktail bar and ample storage space for records.

The same chassis and electrical equipment is available in a less ambitious but equally handsome cabinet having one loud speaker only at 70 guineas.



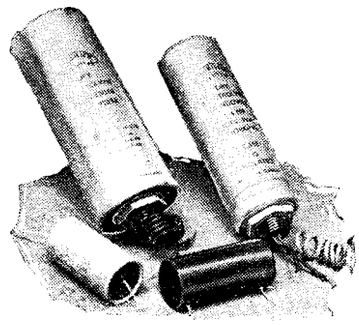
Drummer Model RG.8 radio-gramophone.

There are many other models for A.C. and battery operation ranging in price from 7½ to 18 guineas, a five-valve A.C. superheterodyne with all modern features being priced at 14 guineas. A choice of cabinet styles with the same chassis is offered in some cases.

Edge Radio, Ltd., Raphael Street, Bolton.

DUBILIER (96)

Several notable additions have been made to the Dubilier range of condensers, the most important of which is a series of multiple-capacity models in tubular cases approximately 2in. in diameter. They are shown as 8+8 mfds. and 8+4 mfds.; some have the case joined to the common negative while in others the case is isolated. The connecting leads are brought out through



Group of new Dubilier condensers.

the centre of the fixing bush, some have two, some three, and some four loose leads according to the type of condenser. There is also a series of reversible types for A.C.-D.C. sets. The working voltage is 500 peak D.C. and an 8+8 mfd. type with case isolated costs 8s. 6d.

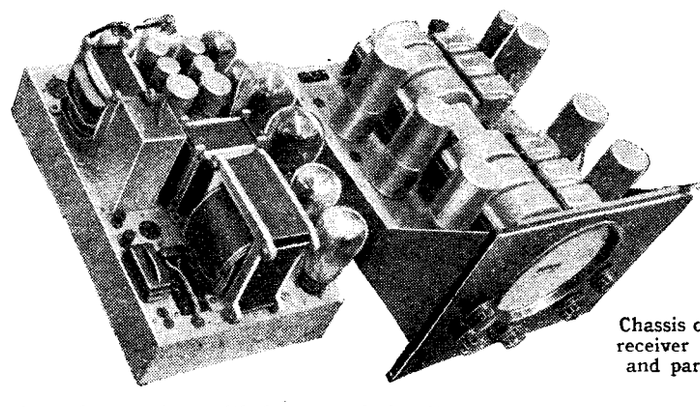
The low-voltage dry electrolytic range has been extended, as also has the small tubular series which now includes a paper non-inductive model in sizes from 0.001 to 0.5 mfd. at from 1s. to 2s. each.

High-grade mica condensers in bakelite cases are available in 0.01 to 0.1 mfd. sizes for 500 volts working, at from 3s. 6d. to 12s. each, and a new series, also for 500 volts working, of the type 620 is now made.

Dubilier Condenser Co. (1925), *Ltd., Victoria Road, North Acton, W.*3.

DYNATRON (116)

The most prominent feature on this stand is the Ether Emperor, a seventeen-valve all-wave receiver. For medium and long wavebands the set is of the straight type with three H.F. stages and six iron-cored tuned circuits; a diode detector is used, and a separate diode and amplifier valves are included to give amplified A.V.C. Eight valves, including the rectifier, are used in the L.F. circuits which are of the paraphase push-pull type. For short-wave reception, a three-valve converter is used in which an octode frequency-changer is preceded by an aperiodic H.F. stage, the third valve being an H.T. rectifier. Variable selectivity is fitted and is obtained by varying the coupling in the band-pass filters.



Chassis of the Dynatron TRF.66 receiver with three H.F. stages and paraphase L.F. amplifier.

A smaller receiver with four tuned circuits and two H.F. stages is known as the Matador and is priced at 19 guineas. This set is designed for universal operation, and the output valve is a pentode.

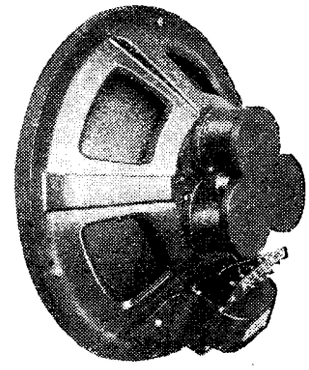
All sets shown by this firm are fitted with a neon searchlight tuning indicator.

H. Hacker and Sons, Perfecta Works, Ray Lea Road, Maidenhead.

EARL (240)

A fully floating diaphragm edge and a centring device of unusual lateral strength are features of the Earl range of moving-coil loud speakers. The "38" series with 8in. cones is being continued, and a new "Major" series with 10in. cones has been introduced.

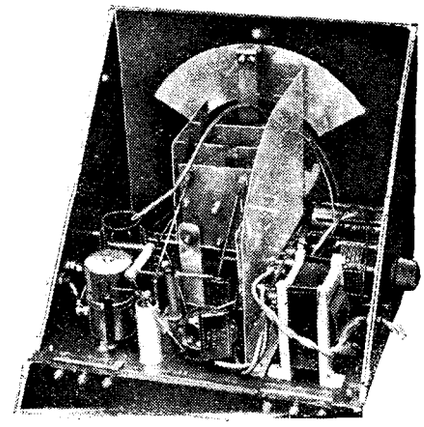
Cast chrome-steel magnets are used in all models with the exception of the P.M.



Earl "Major" permanent-magnet loud-speaker chassis, employing the new nickel-aluminium alloy.

"Major," which employs the nickel-aluminium alloy. This model, which in chassis form costs 60s., is fitted with a strong cast aluminium frame of new design.

*Earl Manufacturing Co., Ltd., Avenue Works, Hanover Park, S.E.*15.



(Above) Eddystone A.C. short-wave converter mounted in die-cast aluminium cabinet, and fitted with L.T. transformer.

EDDYSTONE (30)

The new Super Six, in its teak cabinet, is essentially an overseas or colonial model. This A.C. superheterodyne, designed to

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cover wavelengths between 13 and 550 metres in four ranges, embodies a Westector for detection and A.V.C., and is wavelength calibrated on all ranges.

The Sphinx model, available for either battery or A.C. feed, is a simpler "straight" receiver with an H.F. buffer stage, covering a similar wave-range. The well-known All-Wave Four battery model is now arranged for the "cross-feeder" system of aerial connection.

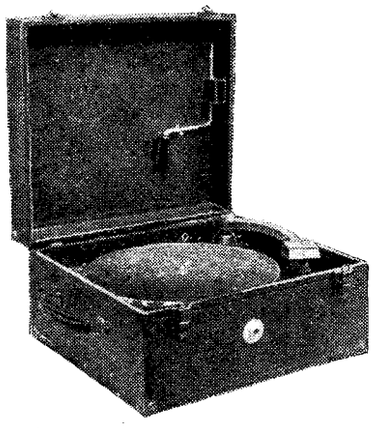
A new low-loss moulded insulating material is now being used for Eddystone components, which include coils, condensers, chokes, valve- and coil-holders—indeed, everything in the way of short-wave apparatus for the enthusiast.

Stratton and Co., Ltd., Eddystone Works, Bromsgrove Street, Birmingham.

EDISWAN (18 & 58)

The main stand is devoted to a display of the new Mazda valves, the redesigned R.K. loud speaker and a new cathode-ray tube.

The range of two-volt battery valves now includes two double-diode-triodes with separate filaments for the diodes (HL21/DD and L21/DD), a variable-mu pentode (VP.215),



Ediswan playing desk with spring motor.

and a triode-pentode frequency-changer (TP.22). The AC.2/Pen.DD is a valuable addition to the four-volt A.C. range. It combines the functions of detector and output valve and also provides A.V.C. An H.F. input of 7 volts R.M.S. is required to give the rated output of 3.4 watts. All the foregoing types have their equivalent in the very comprehensive new range of A.C./D.C. universal valves. A current of 0.2 amp. has been standardised, and the filament voltages vary from 13 to 40 volts, according to the power the valve is called upon to dissipate.

The most important alteration to the Senior R.K. loud speaker is the employment of a rear type of centring device giving greater freedom of movement to the cone. The output transformer is now incorporated in the base, with tappings at the back for adjustment.

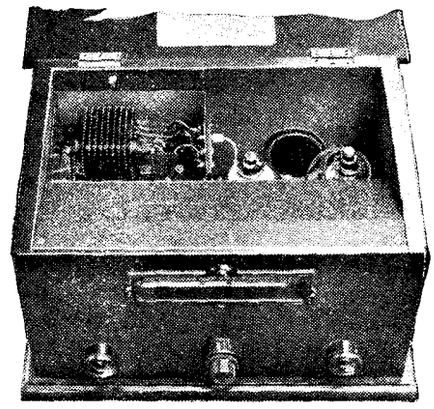
The new cathode-ray tube is of the so-called hard variety, and does not depend on the presence of residual gas for focusing. It is suitable for television work, and the price is 8 guineas.

On the second stand the new B.T.H. needle armature pick-up and the "Truspeed" range of gramophone motors are the principal exhibits. A general-purpose playing desk is a last-minute addition. This instrument includes the B.T.H. Minor pick-up and a spring motor and costs £3 12s. 6d.

Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2.

EELEX (T23)

As wholesalers, this firm is showing receivers and accessories by the leading manufacturers in addition to its own range of Eelex specialities which has been extended and now includes one new short-wave converter. This is described as the type M.2

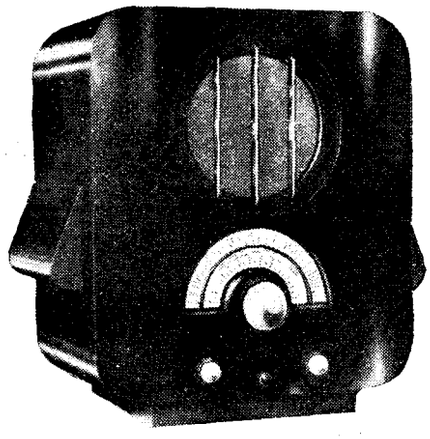


Eelex Model M2 Super short-wave converter.

Super Converter, a two-valve model for A.C. mains operation covering a waveband of 13 to 150 metres with two coils only. Each coil provides two ranges and switching complications are avoided by the use of the Eelex Duplex reversible coil.

Of the two valves, one functions as an H.F. amplifier and the other as an autodyne detector-oscillator. It includes its own H.T. supply unit and costs £8 15s.

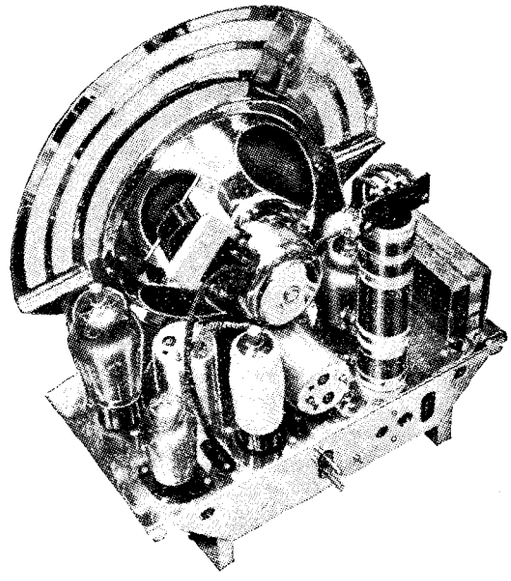
J. J. Eastick and Sons, 118, Bunhill Row, E.C.1.



Ekco A.C. frame aerial receiver.

EKCO (72)

There are few, if any, manufacturers producing medium-priced sets who have brought forward such an interesting programme, from the technical point of view, as this firm. Considering its modest price of 12½ guineas, the Model A.C. 85 may fairly be described as a highly developed modern superheterodyne; it works on A.C. mains and embodies an octode frequency-changer, one I.F. valve, a separate double diode for detection and A.V.C., an intermediate L.F. stage, and an output pentode. There are no fewer than six tuned I.F. stages—very unusual in a small superheterodyne—and a special device to avoid rise of tone due to slight mistuning. It would appear that, in



Chassis of the Ekco circular set.

referring recently to the noise suppressor as a sensitivity limiter, we hardly did the set justice. It is claimed that, even though the noise suppressor be set at a low level of sensitivity for reception of a strong signal, full sensitivity will be automatically restored if necessary, should fading set in.

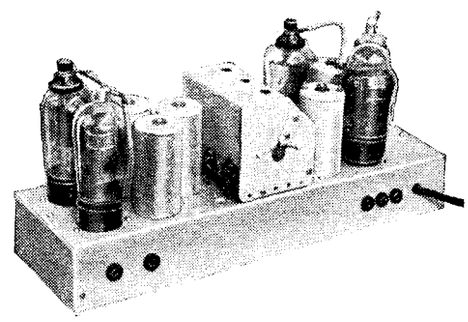
Although the moulded cabinet in which this set is housed is distinctly unconventional, the circular bakelite container of the smaller universal A.C.-D.C. superhet is still more provocative. But both are highly practical, and embody a tuning scale that could hardly be clearer.

Another interesting new type of set, appealing to those who either cannot or will not erect an aerial, is the Model A.D.95, a universal mains superheterodyne with a signal-frequency H.F. stage which operates with a built-in frame aerial. The refinements of Model 85 are included, and the long-wave frame is screened to reduce noise level.

E. K. Cole, Ltd., Ekco Works, Southend-on-Sea, Essex.

ELDECO (93)

In the larger Eldeco Stenode superheterodyne, which covers a wave-range of 12-2,000 metres, there are a total of eight receiver valves, plus rectifier; their functions are:—signal-frequency H.F. amplifier—1st detector—separate oscillator—I.F. amplifier—2nd detector and A.V.C.—tone corrector—output, consisting of two PX4's in push-



Chassis of Eldeco battery superheterodyne

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pull. A Magnavox "66" speaker is fitted, and the chassis is mounted either in a radio-gramophone or table cabinet. There are also portable and transportable superheterodynes with a signal-frequency H.F. stage and Q.P.P. output.

Eldeco Radio, Ltd., 62, Conduit Street, W.1.

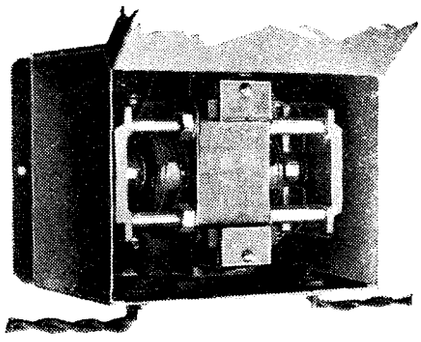
ELECTRICO (246)

Tables or stands for a number of the more popular receivers are manufactured by this firm. An interesting point to note is that grooved channels are provided in the rear legs in order that the wiring may be clipped neatly out of sight.

Electrico, 97, George Street, Croydon.

ELECTRO DYNAMIC (117)

The production of small rotary converters has for long been a speciality of this firm, and of the new models shown particular interest attaches to the car radio generator



Electro-Dynamic car radio H.T. generator.

in view of the growing popularity of mobile wireless. It is a very compact affair, as the machine and its filter measure only 5¾in. × 5¾in. × 3¾in. overall. The metal case is watertight, and designed for sinking below the floorboards. A machine giving 250 volts at 50 mA. and driven from the starter battery costs £4 6s. complete with filter.

Of interest to amateur transmitters and public address equipment engineers is a new petrol-driven alternator, which complete in every detail weighs only 40 lb. and can be mounted on the luggage grid of a car. This model is rated at 180 watts, and costs £37. Several larger types are available.

Electro Dynamic Construction Co., Ltd., Devonshire Grove, S.E.15.

ELECTRON (39)

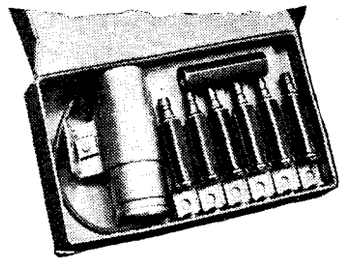
Aerial and earth wires for indoor and outdoor use and in a variety of different types form the largest section in this exhibit. One new and novel device is the Electron Globe Aerial shown for attaching to the top of an existing aerial mast or for fixing on a wall. In lacquered copper it costs 15s., and a chromium-plated model is available at 21s.

New London Electron Works, Ltd., East Ham, E.6.

ERIE (14)

This season all Erie resistances of five-watts rating and over are wire-wound, and this new series includes resistances up to 100 watts dissipation. The five-watt type cost 2s. 6d., the 50-watt 5s., and the 100-watt 9s. each. A tolerance of 2½ per cent. is allowed, and if required tappings can be included at an extra charge of 6d. for each tap.

The carbon impregnated volume controls are available with and without a mains switch at 5s. and 3s. 6d. each respectively



Kit of Erie car radio suppressors.

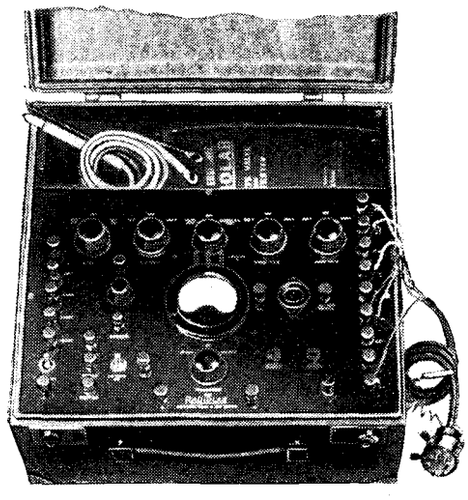
for all values from 25,000 ohms to one megohm, and other Erie products of interest comprise fixed resistors and motor car suppressor units.

Erie Resistor, Ltd., Waterloo Road, Cricklewood, N.W.2.

EVERETT, EDGCUMBE (212)

The principal exhibit on this stand is the Radiolab complete valve and set tester designed for fault location, testing, and initially adjusting receivers of every type. Facilities are provided also for testing valves under operating conditions in the set, and all voltages, A.C. and D.C., are read off from one meter by appropriate switching.

Adaptors are available for all modern valves, and the price complete with accessories is £12 12s.



Radiolab complete valve and set tester.

There is a Radiolab Universal Oscillator at £7 7s., giving a modulated H.F. signal at all frequencies required for ganging, testing and checking modern sets, including superheterodynes, and a range of precision meters with 2in., 2½in., and 2¼in. scales in moving-coil, moving-iron, and thermo-coupled types.

Everett, Edgcumbe and Co., Ltd., Colindale Works, Hendon, N.W.9.

EVER READY (25)

A very wide range of dry batteries for every conceivable wireless purpose forms the chief exhibit of this firm. H.T. batteries for any discharge rate up to about 50 mA. are on view, as well as grid bias batteries. L.T. accumulators also occupied a prominent position on the stand.

Ever Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, N.7.

EXIDE & DRYDEX (254)

The special feature of this exhibit is the new Exide charge indicator now embodied in all models in the "D" series of L.T. cells. It takes the form of a pivoted pointer moving over a white dial, and indicates at a glance the state of the battery, and it adds but 6d. to the cost.

H.T. accumulator units with and without crates are shown, also the full range of Drydex dry batteries which are now available in suitable voltages and dimensions to

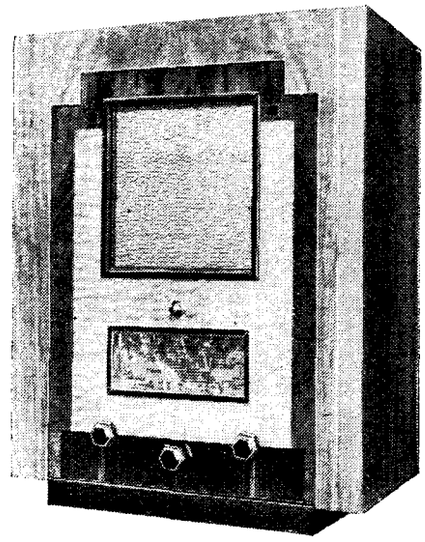
Exide charge indicator fitted to all models in the D series of glass-cased cells.

fit all the better-known self-contained battery sets.

Chloride Electrical Storage Co., Ltd., Clifton Junction, near Manchester.

FERRANTI (70)

Prominent amid the wide range of components, valves and receivers which form this firm's display is the Arcadia Consolette. This is a superheterodyne with a heptode frequency-changer, a single I.F. stage and a duo-diode-triode detector and A.V.C. valve. The output valve is a triode rated for 2.5 watts; the set is fitted with a tuning indicator and tone control, and is priced at 15 guineas. The Gloria Consolette has a similar arrangement of valves, but a signal-frequency H.F. stage is included. A battery



The Ferranti Arcadia Consolette superheterodyne.

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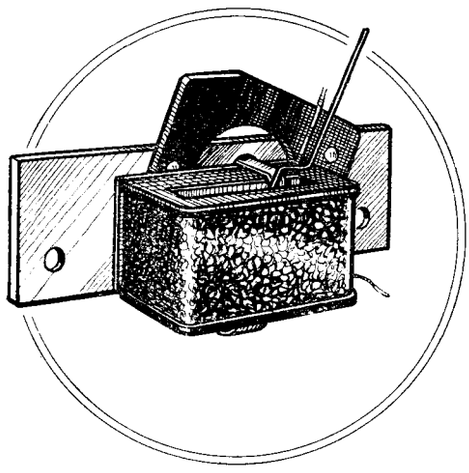
operated superheterodyne with built-in frame aerials is also shown at the price of 15 guineas; the set has a heptode frequency-changer and is rated for 2 watts output.

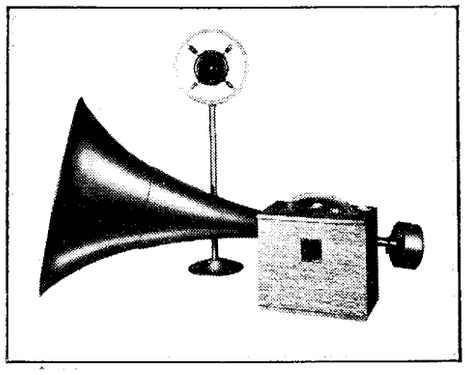


Ferranti tuning indicator.

The M.1 Super loud speaker is fitted with an aluminium alloy magnet and it is claimed that the flux density is 10,000 lines per sq. cm. The speaker is fitted with an 8in. diameter cone and is rated to handle 15 watts; its price is £10. A smaller speaker, the M.1, also with an aluminium alloy magnet, is also shown. Both speakers have a speech coil impedance of 6 ohms.

The range of A.C. valves has been extended by the addition of output pentodes, and a series of universal A.C./D.C. valves is also on view. These valves have heaters rated for 13 volts at 0.3 ampere, and are intended for series operation. High-grade voltmeters and milliammeters are prominent on the stand, and include both A.C. and D.C. types. Both moving-coil and moving-iron models are to be found among the latter, and A.C. instruments include rectifier and thermal types; electrostatic meters are also shown.

Ferranti, Ltd., Hollinwood, Lancashire.



Film Industries portable public address equipment.

FILM INDUSTRIES (207)

Moving-coil drive units for use in conjunction with horn loud speakers are specialised products of this firm, of which the activities are mainly associated with high-power sound amplification for public address and similar purposes.

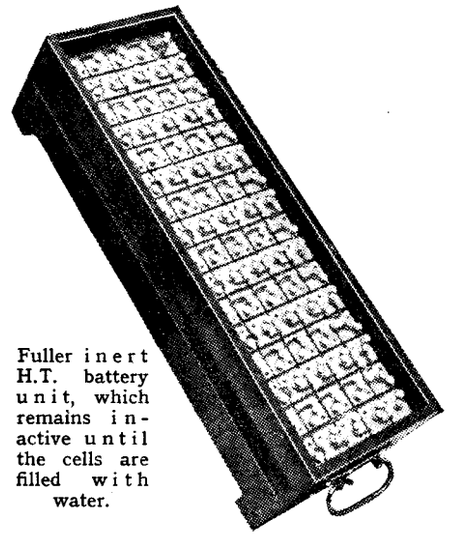
A universal A.C.-D.C. mains amplifier is one of the latest developments; this instrument gives an output up to 3½ watts, depending on mains voltage, and derives its H.T. supply through a Westinghouse rectifier.

Film Industries, Ltd., 60, Paddington Street, W.1.

FULLER (124)

A dry battery that remains inactive until its cells are filled with water is one of the chief exhibits on this stand. Intended mainly for tropical use, it can be discharged economically at 30 mA., and batteries of any voltage are supplied.

There is a new range of L.T. cells with thick plates, but for heavy discharge, and a 10-volt H.T. accumulator unit incorporating a grease barrier to prevent acid creeping, also the well-known Sparta range of H.T. batteries.

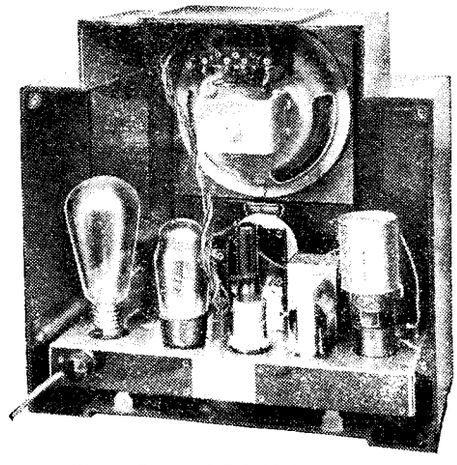


Fuller inert H.T. battery unit, which remains inactive until the cells are filled with water.

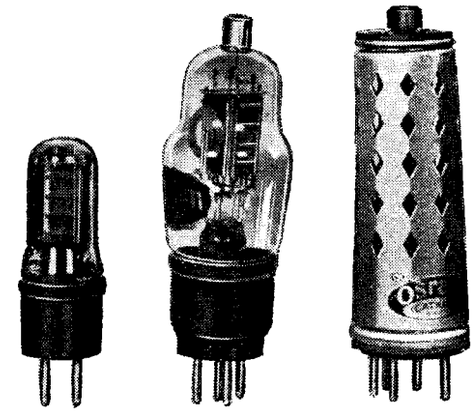
Fuller Accumulator Co. (1926), Ltd., Woodland Works, Chadwell Heath, Essex.

G.E.C. (34, 66 & 225)

Among the receivers displayed by this firm the Superhet 5, which is available in a number of different cabinet styles including a radiogramophone, is of particular interest. A heptode frequency-changer is used with a single I.F. stage; a duo-diode-triode provides A.V.C. and feeds the output pentode. Although the set is of the A.C. type, universal valves are used with their heaters connected in parallel. The sensitivity is claimed to be better than 10 μV., and the price as a table model is 14 guineas. The Compact 3 is a three-valve battery receiver of the straight type at £5 17s. 6d. Four valves are used in the model CB4, however, and are arranged as a screen-grid H.F. stage, a pentode detector, triode driver and Class "B" output stage. The price is £9 17s. 6d.



The G.E.C. AC/DC Mains Three.



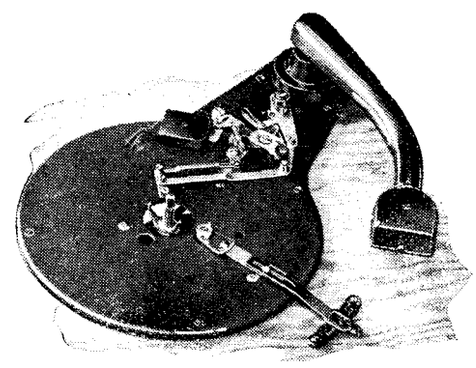
A group of Osram valves, including the PT2K, the HD.21, and the VMP4K.

A short-wave receiver, the Overseas 7, is designed specially to suit tropical conditions and has a tuning range with built-in coils of from 11.5 metres to 550 metres. A.V.C. is included, and an output of 3 watts can be obtained; the price is £24.

A new Catkin valve, the VMP4K, is shown, and is of importance in having the unusually low grid-anode capacity, for a variable-mu H.F. pentode, of 0.0025 mmfd. The PX25A is rated for an output of 8 watts with an anode dissipation of only 25 watts; it operates with an input of 100 volts peak and is intended chiefly for push-pull operation, with which 17 watts can be obtained from a pair of valves. A complete range of universal valves is shown with heaters of the 0.3 ampere type, while barretters for heater current regulation are also to be found. A neon tuning indicator, the Tuneon, is shown at the price of 4s.

A wide range of H.T., grid bias batteries and L.T. accumulators completes the exhibit.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.



Garrard Type "B" Radio-gram unit.

GARRARD (54)

The new type U5 universal motor and the Type "B" Radio-gram units are recent additions to the comprehensive range of gramophone motors associated with the name of Garrard. The U5 motor has been introduced to meet the demand created by the increase in the number of A.C.-D.C. receivers and radio-grams, and the price is 67s. 6d.

Garrard Engineering and Mfg. Co., Ltd., Newcastle Street, Swindon, Wilts.

Stand-to-Stand Report—

G.W.Z. (206)

The exhibit here consists exclusively of dry batteries, standard capacity and "power" types in a variety of different sizes and voltages being available. The full range includes the "Glorex," "G.W.Z." and "Progress" series and grid bias types in units of from 4½ to 18 volts.

British G.W.Z. Battery Co., Ltd., 205-207, Bedford Avenue, Trading Estate, Slough, Bucks.

GODWINEX (T4)

The wholesale section of this firm's activities is represented by a good selection of manufacturers' products, and in addition they are showing their own range of Godwinex mains units and components. There is one D.C. model and several A.C. units, the latter ranging in price from £2 2s. to £3 9s. 6d. There is a series of rectifier units for converting D.C. eliminators for A.C. operation, and one model for D.C. all-mains sets, as well as a wide range of mains transformers and chokes.

J. Dyson and Co. (Works), Ltd., 5, Godwin Street, Bradford.

J. GOODMAN (217)

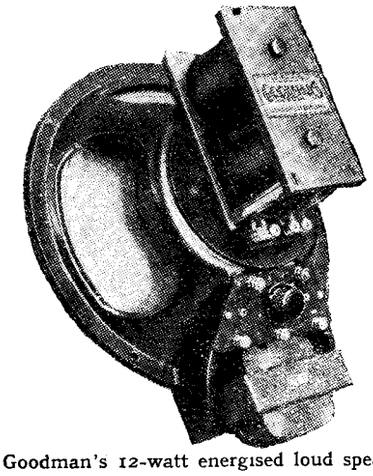
This stand is devoted to a display of all kinds of plywood which in most cases is veneered and suitable for use in the construction of cabinets.

J. Goodman, 28-30, Drysdale Street, N.1.

GOODMANS (125)

The "Grille" P.M. unit has been increased in price to 45s., but is now fitted with a nickel-aluminium magnet giving an increase in flux density of 2,000 lines above the earlier type.

The new "12-watt" model incorporates a massive cast aluminium frame and an output transformer of generous design. It has an 11in. diaphragm, and the air gap is sealed



Goodman's 12-watt energised loud speaker.

at the front by a porous spherical cap and at the back by a large-diameter soft leather seal. The permanent magnet model has a nickel-aluminium magnet, and the energised model an offset double-wound magnet system of ingenious design. The prices are £4 17s. 6d. and £4 10s. respectively.

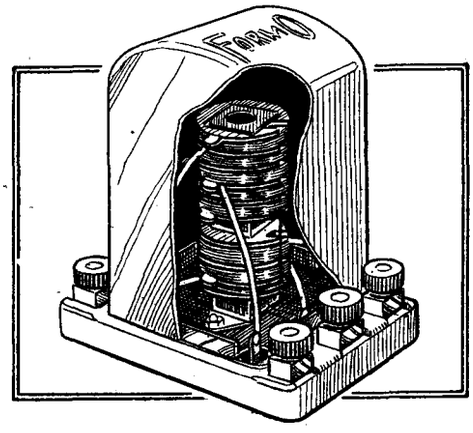
Goodmans (Clerkenwell), Ltd., Broadyard Works, Turnmill Street, E.C.1.

GRAHAM FARISH (59)

The feature of this exhibit is a wide range of components at extraordinarily low prices. For example, the extreme cheapness of the new Formo series of components is exemplified in a 2-gang condenser fitted with an improved tuning scale, which gives all the advantages and attractive appearance of an escutcheon viewing aperture without requiring anything more in the fitting than the drilling of a single hole. The condenser, complete with drive mechanism and scale, costs only 11s.

The Formo iron-cored coils, wound with litz wire on a low-loss bobbin and mounted on a steatite base, are available in three types (aerial coil with reaction, aerial coil without reaction, and H.F. coil) at a uniform price of 5s. They are fitted with metal covers, and are exceptionally compact. Formo screened paper condensers, rated at a working voltage of 375 volts D.C., cost 2s. in the 1-mfd. size, and 3s. for 2-mfds.; the screened containers should enhance the usefulness of the condensers in short-wave sets.

The Graham Farish range of components is equally modestly priced. One of the most interesting additions is the Quip transformer, with a tapped secondary and a ratio of 1 : 8, which makes it suitable for use in



Graham Farish-Formo dual-range iron-cored coil.

Q.P.P. circuits. The Max transformer, for use in parallel-feed circuits, costs only 4s. 6d.

Graham Farish, Ltd., 153, Masons Hill, Bromley, Kent.

GROSVENOR (104)

A wide range of batteries form the exhibit of this firm. Both the Grosvenor and the Adico H.T. and bias batteries are to be found, as well as a range of L.T. accumulators.

Grosvenor Electric Batteries, Ltd., 2-3, White Street, E.C.2.

H. & S. (209)

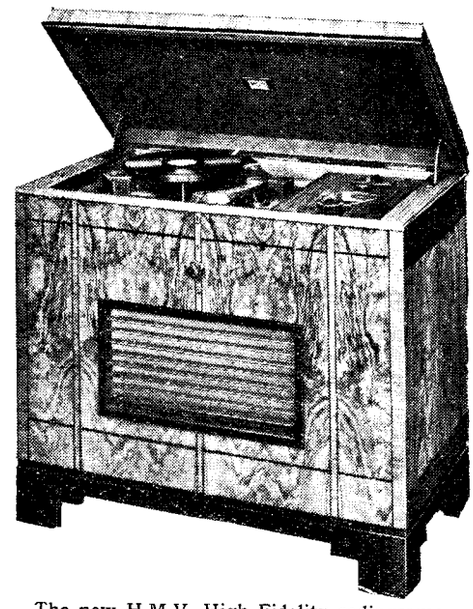
This stand is devoted to displaying H.T. eliminators, rectifying units, and trickle-chargers in which metal rectifiers are employed. A particular feature is made of the solidity and rigidity of the apparatus.

Harmer and Simmons, Ltd., 223, Hoe Street, Walthamstow, E.17.

H.M.V. (33 & 61)

It is just as well that *The Wireless World* Show Report was not written before Olympia opened; if it were, we should have missed the new and extraordinarily ambitious H.M.V. radiogramophone, which, with really dramatic effect, was released on the very eve of the exhibition.

This highly advanced and technically interesting set is described as the High Fidelity 15-valve Auto-radiogram, Model 800. We would describe it as a 13-valve set, two mains rectifiers being used. A bare list of its special features makes imposing reading. First we have variable selectivity, con-

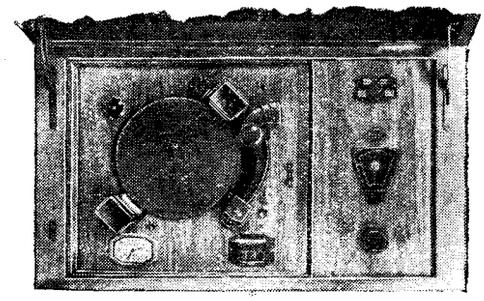


The new H.M.V. High Fidelity radiogramophone (Model 800).

trolled by a four-position switch giving 3 kc/s, 5 kc/s, 7 kc/s, or 8 kc/s separation at will. Next in importance comes the "contrast control amplification," which, in a word, acts more or less as an inverted A.V.C. system, operating in the L.F. circuits, and restores to the listener the original intensity levels which the transmitting control has tended to reduce to a common value.

The wide band of wavelengths covered by the receiver is another feature; in addition to the normal broadcasting bands, short waves between 13 and 80 metres are receivable. Naturally, there is Q.A.V.C., tone-compensated volume control, visual tuning, an anti-sideband-hiss device, and an improved automatic record-changing device. Provision is made for fitting a matched transmission-line type of screened aerial lead-in.

If little space remains for describing the remainder of the exhibit, the blame must be passed on to H.M.V. for having produced such an interesting piece of apparatus. An-



Motor board and control panel of the H.M.V. Model 800.

other of their luxury sets is the 48-guinea radiogramophone, and between that and the cheapest battery set (the Long Three, at £7 19s. 6d.) there is something for everybody.

Gramophone Co., Ltd. (H.M.V.), 98-108, Clerkenwell Road, E.C.1.

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The Wireless World

FOREIGN PROGRAMME SUPPLEMENT

SUNDAY

AUGUST THE TWENTY-SIXTH

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.**—**1.0 to 3.0 p.m.,** Records. **8.30,** Time Signal; Concert by the Station Instrumental Ensemble. **9.0,** Song Recital by O'Toole (Tenor). **9.15,** The Young Fellow—Play presented by the Dublin Repertory Society. **10.0,** Sports Talk. **10.15,** Jack MacGarvey (Entertainer). **10.30,** Concert by the Station Instrumental Ensemble. **11.0,** Time Signal; News; Weather. **11.15** (approx.), Close Down.

BARCELONA

795 kc/s, 377.4 metres, 5 kW.—**8.15 a.m.,** News; Records. **9.0,** Chimes; Gym; Records. **9.20,** News; Records. **10.0,** Obituary. **12 Noon,** Chimes; Weather. **2.0 p.m.,** Records. **2.30,** Theatre Notes; Amusement Guide; Records. **3.0,** Film Review; Sextet Concert: Selection from The Merry Widow (Lehár); A Night of Festival in Havana (Filippucci); Minuet (Albéniz); El camino de la Alhambra (Turina); Pieces (Clura); Rhapsody (Del Balle). **4.0,** Programme for Hospitals. **5.0,** Interval. **6.30,** Broadcast for Farmers. **7.0,** Concert by the Station Orchestra. **7.30,** Song Recital by Pilar Carlos (Soprano). **8.0,** Concert by the Station Orchestra; Soloist, Carasusán (Tenor). **9.0,** Dance Music relayed from the Hollywood Bar. **10.0,** Chimes; Records. **11.45,** Chess Lesson; Close Down.

BASLE.—Relays **Beromünster.**

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**6.10 a.m.,** Motto. **6.15,** See **Hamburg. 8.0,** Programme for Farmers. **8.50,** Talk: The Simple Life. **9.15,** Programme to be announced. **10.0,** See **Cologne. 11.0,** Talk: The Radio Exhibition. **11.15,** Weather. **11.30,** Records. **11.45,** Travelogue: Ehrenbreitstein. **12 Noon,** Greetings. **12.10 p.m.,** Military Band Concert from **Leipzig. 12.55,** Time. **1.0,** See **Leipzig. 2.0,** A Play for Children. **2.45,** Chess Talk. **3.0,** See **Frankfurt. 5.0,** See **Breslau. 6.0,** Dance Band Competition on Records: Barnabas von Geczy v. Carl Woitschach. **7.10,** Variety. **7.40,** Report: The Swiss Motor Grand Prix. **8.0,** See **Frankfurt. 10.0,** News. **10.15,** Report: The Boxing Match, Max Schmeling v. Walter Neusel. **10.30,** Weather. **11.0,** Programme from **Frankfurt** (contd.). **12 Midnight,** Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Gym. **6.15,** See **Hamburg. 8-15-8.20,** Between Town and Country. **8.30,** Recitations. **8.55,** Chimes. **9.0** Service from Potsdam Garrison Church. **10.0,** Berlin Cathedral Chimes. **10.5,** Weather. **10-10,** Interval. **11.0,** Concert by Snaga's Wind Instrument Orchestra: March, Am Brandenburger Tor (Snaga); Overture, Zampa (Hérold); Dances (Lewalter); Intermezzo (Kockert); March (Lehnhardt); Traumwalzer from Der Feldprediger (Millöcker); Polka, Bahn frei (E. Strauss); Radetzky March (Joh. Strauss). **12 Noon,** See **Königsberg.** In the interval at **12.55 p.m.,** News. **1.5,** Concert from **Königsberg. 2.0,** Orchestral Concert from the Radio Exhibition; Conductor, Preiss: March, Hoch Heidecksburg (Herzer); Waltz (Pachernegg); Overture, Das Nachtlager in Granada (Kreutzer); Fröhliches Wandern (Kaun); Ballet Music from The Merry Wives of Windsor (Nicolai); Selection from Die Puppenfee (Bayer); Waltz, España (Waldteufel); Intermezzo from The Arabian Nights (Joh. Strauss); Hungarian March from The Damnation of Faust (Berlioz). **3.0,** See **Frankfurt. 5.0,** Concert from the Radio Exhibition: Overture, Poet and Peasant (Suppé); Waltz, Fata Morgana (Einödshofer); Selection from The Bird-Fancier (Zeller); Waltz, Bad'ner Madln (Ziehrer); Gallop, Klipp-Klapp (Joh. Strauss); Radetzky March (Joh. Strauss, Sen.). **6.0,** Comradeship—Sequence (Harald von Koenigswald). **6.30,** Deutsches Liederspiel (von Herzogenberg) by Gertrude Baumann (Soprano), Roland Hell (Tenor), Eggert and von Bulté (Pianoforte), the Station Choir, and the Kalt Chamber Choir. **7.15,** Guitar Recital by Luise Walker. **7.40,** Sports Report. **8.0,** Songs and Dances of the Nations—Concert relayed from Pichelsberg Castle; The Boris Romanov Balalaika Orchestra, the Station Choir and Orchestra, Helen Cals (Soprano), Ludwig Hess (Baritone), Rudolf Watzke (Bass), Luise Walker (Guitar), and Rudolf Lessmann (Violin). **10.20,** News. **10.40,** Sports Notes. **11.0,** Light Music and Dance Music by Egon Kaiser's Orchestra with Soloists. **1.0 a.m. (Monday),** Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**7.30 a.m.,** Records. **8.0,** Interval. **10.0,** Protestant Address. **10.45,** Records. **11.30,** Reading. **12 Noon,** Records. **12.30 p.m.,** Time; Weather; News. **12.40,** Records. **12.45,** Commentary on the Swiss Motor Grand Prix. **1.45,** March Records. **2.30,** Interval. **3.0 to 4.15,** St. Jacob's Day Programme: Commentary on the Procession past St. Jacob's memorial. **3.30,** Talk: St. Jacob. **4.15,** Commentary on the Swiss Motor Grand Prix. **5.0,** Dance Records. **5.15,** Concert of Folk Music. **6.30,** Talk for Farmers. **7.0,** Time; Weather; Sports Notes. **7.5,** Records: Potpourri. **7.45,** Programme to be announced. **8.0,** Orchestral Concert; Conductor, Becker. **9.0,** Weather; News. **9.10,** 1812 Overture (Tchaikovsky) (on Records). **9.25,** During the Night—Napoleonic Sketch. **9.55,** First Movement from the Eroica Symphony No. 3 in E flat (Beethoven) (on Records). **10.15,** Sports Notes; Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

BRATISLAVA, 1,004 kc/s, 298.8 metres; 13.5 kW.—**6.30 a.m.,** See **Prague. 8.30,** See **Brno. 9.0,** Service. **10.0,** Relay of the Inauguration of the Danube Sample Fair. **11.0,** See **Prague. 12.15 p.m.,** See **Moravská-Ostrava. 1.30,** See **Prague. 1.45-1.50,** Water Level. **4.0,** See **Prague. 5.30,** Reading. **5.45,** Recital of Slovak Folk Songs by Hoza (Tenor). **6.10,** Egon and Emily—Dialogue (Morgenstern). **6.25,** Hungarian Transmission: Talk: The Danube Sample Fair. **6.55,** See **Prague. 7.25,** See **Brno. 10.0,** See **Prague. 10.20,** News in Hungarian; Sports Notes. **10.30,** See **Brno. 11.30** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.**—**5.0 a.m.,** Hymn; Motto. **5.10,** Records. **6.10,** Time; Weather. **6.15,** See **Hamburg. 8.15,** Address. **8.25** (from **Gleiwitz**), Choral Concert. **9.0** (from **Gleiwitz**), Chimes, and Service. **10.0,** See **Cologne. 11.0** (from **Gleiwitz**), Trio in F, Op. 97 (Reissiger) by the Upper Silesian Chamber Trio. **11.30,** Reading. **12 Noon,** See **Königsberg. 2.0,** Concert by Massed Argentine Police Bands, relayed from **Buenos Aires. 3.0,** News. **3.0,** See **Frankfurt. 5.0,** Announcements. **5.10,** Orchestral Concert. **6.0,** Talk with Records: English Student Life. **6.30,** Sports Notes. **7.0,** Scandinavian Folk Songs by Walter Zombat. **7.30,** Topical Report. **8.0 to 10.30,** See **Frankfurt. 10.30,** Time; News. **11.0,** See **Berlin (Funkstunde). 1.0 a.m. (Monday),** Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.30 a.m.,** See **Prague. 8.30,** Organ Recital by Vrána, relayed from the Huss House: Chromatic Fantasia and Fugue (Bach); Berceuse and Finale (Stravinsky); Passacaglia and Fugue in A minor (Veána). **9.0,** See **Prague. 9.15,** Schubert Song Recital by Bozena Stoegrová. **9.35,** Records. **9.45,** Broadcast for Workers. **10.0,** See **Prague. 12.15 p.m.,** See **Moravská-Ostrava. 1.30,** See **Prague. 1.55,** Record. **2.0,** German Transmission for Farmers. **2.30,** Records. **2.45 to 3.30,** See **Prague. 4.0,** See **Prague. 7.25,** Instroductory Talk to the following Programme. **7.30,** The Barber of Seville—Opera (Rossini), relayed from the State Theatre. **10.0,** See **Prague. 10.30,** Military Band Concert; Conductor, Hancl: Homage March (Vackár); Overture, Eine Nacht in Venedig (Joh. Strauss); Selection from Polenblut (Nedbal); Song (Dvorák); Czech Dance (Balling); Waltz (Oberthor); Potpourri of National Songs (Labsky). **11.30** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**10.0 a.m.,** Concert by the Radio Orchestra; Soloists, Demesmaeker (Clarinet) and Félicia Hizette (Songs). **11.0,** Concert by the Radio Orchestra; Soloists, Misson (Violin) and Félicia Hizette (Songs): Selection from Fedora (Giordano); Russian Suite (Akimenko); Extracts from the Spanish Symphony (Lalo); Two Songs: (a) Cantabile from Samson and Delilah (Saint-Saëns), (b) Song from La Vivandière (Godard); Two Czech Polkas (Ridky); English Scenes (Bantock). **12 Noon,** Concert of Belgian Music by the Symphony Orchestra; Conductor, Meulemans; Soloist, Stoefs (Flute): Fantasia on a Walloon Air (Ysaye); Au pays du lin (Vandermeulen); Fantasia on Two Flemish Airs (De Boeck); Fanfallucca for Flute and Orchestra (Gilson); Tournai Airs (Daneau); Records; Walloon Rondo (Jongen); Records; Old Flemish Songs (Degreef). **1.0 p.m.,** News. **1.10,** La Gioconda—Opera (Ponchielli), on Records. **3.45,** Report of the International Grand Prix, relayed from Ostend Racecourse. **4.15,** Dance Records. **4.45,** Commentary on the Walloon Festival at Malmédy. **5.30,** Dance Records. **6.0,** Light Music by the Radio Orchestra; Soloist, Misson (Violin). **7.15,** Religious Address. **7.30,** Wireless Review. **8.0,** Opera Records. **8.15,** Talk. **8.35,** Records. **8.45,** Monologues by René Dorin (on Records). **9.0,** Part-relay of Lakmé—Opera (Delibes), from **Knocke. 10.0,** News. **10.10,** Dance Music, relayed from the Casino, Blankenberghe. **12 Midnight,** Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish.—**10.0 a.m.,** Records. **10.30,** Pontifical High Mass. **11.45,** Records; Missa Solennis (Beethoven). **1.0 p.m.,** News. **1.10,** Blockx Concert; The Symphony Orchestra; Conductor, Meulemans: Ballet Music from Milenka; Selection from La Princess l'auberge; Selection from La fiancée de la mer; Flemish Dances. **2.0,** Blessing of a Memorial Tablet at the House of Father Poppe. **3.0,** Relay from the Grande Place. **5.0,** Dance Music from the Casino, Blankenberghe. In the interval, Sports Notes. **6.15,** Concert by the Symphony Orchestra; Conductor, Meulemans; Soloist, Berthe Bernard (Pianoforte); The Unfinished Symphony (Schubert); Pianoforte Concerto (Mozart); Aus dem Mittelalter (Glazunov); Ballet Suite (Glazunov). **7.15,** Religious Address. **7.30,** News. **7.55,** Music Review by Jef Van Durme. **8.0,** Quartets Nos. 1 and 2 (Beethoven), by the Pro Arte Quartet. **8.45,** Recitations; Orchestral Concert relayed from the Kursaal, Ostend; Conductor, Ruhlman; Soloists, Ansseau (Songs), Frezin ('Cello) and Wagemans (Violin): Overture, Leonora No. 3 (Beethoven); 'Cello Solo, Kol Nidrei (Bruch); Aria from Hérodiade (Massenet); Violin Solo, Danse macabre (Saint-Saëns); Aria from Lohengrin (Wagner); The Ride of the Valkyries (Wagner). **10.15,** News. **10.25,** Dance Music from the Continental Palace Hotel, Blankenberghe. **12 Midnight** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**10.30 a.m.,** Religious Notes. **10.45,** Sacred Music. **11.0,** Concert by the Station Orchestra. **12 Noon,** Amusement Guide; Water Level; Records. **12.45 p.m.,** Recitations. **1.15,** Time; News. **1.40,** Records. **2.0,** Interval. **5.0,** Programme for Peasants. **6.0,** Time; Weather. **6.5,** Concert of Popular Romanian Music by the Steian Matza Orchestra. **7.30,** Educational Programme. **7.45,** Records. **8.0,** Talk. **8.15,** Concert by the Station Orchestra: Impressions d'Italie (Charpentier); Piece (Ketelbey); The Red Poppy (Percy). **9.0,** Sports Report. **9.10,** Concert of Ballet Music by the Station Orchestra: Ballet Suite from The Bartered Bride (Smetana); Ballet Music from Manon (Massenet); Ballet Music from Sylvia (Delibes). **10.0,** News. **10.30,** Light Music from the Lido.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**9.15,** News. **10.0,** Divine Service. **11.15,** Divine Service. **12.20,** News. **12.30,** Recital of Hungarian Folk Songs by Nicolas Szedö with the Imre Magyari Cigány Band. **2.0,** Light Music by the Losonczy Schweitzer Orchestra. **3.0,** Notes for Farmers. **3.45,** Pianoforte Recital by Béla Nagy. **4.30,** Talk. **5.0,** Concert by the Opera Orchestra. Conductor: Louis Rajter. Overture, Preciosa (Weber); Symphony No. 3 in D (Tchaikovsky); Piece (Falk); Scènes pittoresques (Massenet). **6.30,** Talk. **7.0,** Recital by Elisabeth Antal (Songs), Jules Revere (Harp), André Berend (Violin) and Antoine Friss ('Cello). **8.0,** Comedy in Three Acts (Sardou-Najac). **9.55,** News. **10.25,** Concert by the Georges Setét Jazz Band from the Café Dunakorso. **11.15,** Concert of Hungarian Folk Music by the Jules Lakatos Cigány Band from the Zöld fa Restaurant.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**6.15 a.m.,** See **Hamburg. 8.0,** Time; News. **8.10,** Report: The Mosel Wine Festival at Winningen. **8.20** (approx.), Talk: The New Laws of Inheritance. **8.30 to 9.0,** Service. **9.15,** Surprise Programme. **10.0,** Opening of the Saar Exhibition in Cologne by Dr. Goebbels. **11.0,** Relay of the Unveiling of the Friedrich Wilhelm Weber Memorial at Bad Driburg. **11.25,** Light Music. **11.35,** Reading. **12 Noon,** Folk Music: Marga Bäuml (Guitar); Willy Overzier (Songs to the Lute); Richard Boeren (Mouth Organ), and a Village Band. **12.55 p.m.,** Greetings. **1.0,** Report: The Swiss Motor Grand Prix. **1.30,** Concert by the Small Station Orchestra; Conductor, Eysoldt.

In the interval at 2.0, Announcements. 3.0, Talk: Holidays in Germany. 3.20, Anecdotes about Famous People, with Music. 3.40, An Interview with an Agricultural Labourer. 4.0, Concert by the Remscheid Municipal Orchestra, relayed from Remscheid; Conductor, Horst Tanu-Margraf; Soloist, Josef Kalenberg (Tenor): Prelude to Figaro (Mozart); Aria from Der Freischütz (Weber); Minuet (Reger); Ballet from Sylvia (Delibes); Prelude to Die Irrfahrt ums Glück (Suppé); Two Songs from Eine Nacht in Venedig (Strauss); Mazurka, Frauenherz (Strauss); Waltz, Weaner Madln (Strauss); Gallop (Strauss). In the interval at 4.50, Report: The Swiss Motor Grand Prix. 5.30, A Trip down the Rhine—Humorous Sequence (Lodenstein). 6.15, Concert by the Station Chamber Quintet; Soloist, Josef Grimberg (Bass): Stelldichein mit Colombine (Heykens); Waltz (Krome); Two Songs (Walter): (a) Alleweil ein wenig lustig, (b) In vino veritas; Für lustig' Leut' (Komzak); Leggenda d'amore (Becce); Songs (Schulz): (a) Der Freier, (b) Liebeszauber; Serenade (Czibulka); Quellengeister (Hayer). 7.0, Variety Programme. 8.0 to 12 Midnight, See **Frankfurt.** In the interval at 10.30, Time; News. 12 Midnight, Light Music and Dance Music. 1.0 a.m. (Monday), Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**10.0 a.m. to 12 Noon,** Programme in English arranged by the International Broadcasting Company of London. **10.0,** Light Music. **10.15,** A Night out in London. **10.30,** Sacred Music. **10.45,** Songs by Jack Buchanan and Elsie Randolph (on Records). **11.0,** Sacred Music. **11.30,** Light Music. **12 Noon to 2.0 p.m.,** Programme in French. **2.0 to 6.30,** Programme in English by the I.B.C. **2.0,** Dance Music. **2.30,** Concert of Gramophone Records. **3.0,** Light Orchestral Concert. **3.30,** Military Band Concert. **4.0,** Tango Band. **4.30,** The I.B.C. Nursery Corner. **4.45,** Songs from Alice in Wonderland. **5.0,** I.B.C. Member's Request Programme: Say it with Flowers. **5.30,** Sunny Days. **5.45,** Orchestral Selections. **6.0,** Dance Music. **6.30 to 9.30,** Programme in French. **9.30** till Close Down, Programme in English by the I.B.C. **9.30,** Dance Music. **10.0,** Old Favourites. **10.15,** Orchestral Music. **10.30,** Light Music. **11.0,** Variety. **11.30,** Concert arranged by the I.B.C. (Ireland), Ltd.; Dance Music. **12 Midnight,** Club Concert for Chester Listeners; Dance Music. **12.30 a.m. (Monday),** I.B.C.; Time Signal. **12.31,** Dance Music (contd.). **1.0,** I.B.C. Goodnight Melody and Close Down.

FLENSBURG. — Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**6.15 a.m.,** See **Hamburg. 8.15,** Time; News. **8.25,** Gym. **8.45,** Sacred Music. **9.0,** Roman Catholic Service. **10.0,** See **Cologne. 11.0,** Interval. **11.15;** Dialogue: The History of the Ehrenbreitstein Fortress. **11.30,** Ethnology. **12 Noon,** Concert. **1.0 p.m.,** Request Records. **2.0,** See **Stuttgart. 3.0,** Commentary on the Ehrenbreitstein Demonstration. **5.0,** See **Berlin (Funkstunde). 6.0,** Radio Play. **6.30,** Concert. **7.30,** Talk: Waine. **7.45,** Sports Notes. **8.0,** German Wine—Variety Concert for the Radio Exhibition; The Station Orchestra, the Station Dance Band, Peasants' Bands, John Gläser (Tenor), Gottlieb Zeithammer (Baritone), Hermann Hauth (Baritone), and other Soloists; Conductor, Rosbaud. **10.30,** News. **10.45,** Local News; Weather; Sports Report. **11.0,** Variety Concert (contd.). **12 Midnight,** Contemporary Music and Classical Dances on Records. **2.0 a.m. (Monday),** Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg,** and **Hanover, 1,330 kc/s, 225.6 metres.**—**6.15 a.m.,** Bremen Harbour Concert. **8.15,** Time; News. **8.30,** Gym. **8.45,** Wireless Notes. **9.0,** Records. **10.0,** See **Cologne. 11.0,** Talk: The German Intellect. **12 Noon,** See **Königsberg.** In the interval at **12.55,** Time; Weather. **2.0,** Programme for Children. **3.0,** See **Frankfurt. 5.0,** See **Breslau. 6.0,** Variety Programme from **Bad Sachsa. 7.0** (from **Flensburg**), Recital by the Flensburg Travelling Choir. Conductor and Organist: Ilse Struck. Passacaglia in C minor (Bach); Es ist das Heil uns kommen her (Praetorius); Erhalt uns Herr, bei deinem Wort (Praetorius). **7.35,** Sports Report. **7.55,** News. **8.0,** See **Frankfurt.** In the interval at **10.30,** News. **12 Midnight,** Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Kootwijk,** 50 kW, from **3.40 p.m.**—**8.40 a.m. to 5.40 p.m.,** Programme of the Workers' Radio Society (V.A.R.A.). **8.40,** Record; Announcements; Talk for Gardeners. **9.15,** Records. **9.30,** Recitations. **9.40,** Organ Recital by Jong. **10.20,** Talk. **10.40,** Choral Concert. Conductor: Krelage. **11.10,** Talk: Adama van Scheltema. **11.40,** Concert by the Small V.A.R.A. Ensemble. Conductor: Bakels. **12.40 p.m.,** Recitations. **12.55,** Concert by the V.A.R.A. Orchestra. Conductor: de Groot. Overture, Maximilian Robespierre (Litolff); Selection from From the Far West (Bantock); Overture, The Bo'sun's Mate (Dame Ethel Smyth); Overture, Masaniello (Auber); Suite No. 1 from L'Arlesienne (Bizet); Romance from the Symphony, La Reine (Haydn); Schubert Potpourri (Urbach). In the interval at **1.40,** Recitations. **2.40,** Records. **2.55,** Light Music. **3.25,** Orchestral Concert of Light Music. **3.55,** Recitations. **4.10,** Organ Recital of Light Music by Steyn. **4.40,** Concert by a Jewish Male Voice Choir. Conductor: Lindeboom. **5.10,** Talk. **5.40 to 7.40,** Programme of the Liberal Protestant Radio Society (V.P.R.O.). **5.40,** Book Review. **6.25,** Divine Service. **7.40** till Close Down, V.A.R.A. Programme. **7.40,** Announcements. **7.43,** Concert by the V.A.R.A. Orchestra. Conductor: de Groot. Soloist: Mme. Hekkert van Eysden (Songs). Jubilee Ouverture (Weber); Piece (Rood); Melody (Gaveaux); Overture, Prometheus (Beethoven); Song (Broeckx); March (Carstens); March (Kricka); Two Sons (Broeckx); Song Potpourri (Gaffel). In the interval at **8.10,** Talk. **8.55,** Play (Pleysier). **9.40,** News. **9.55,** Light Music by the V.A.R.A. Orchestra. **10.40,** Records. **11.40,** Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. (until **6.40 p.m.**)—20 kW. from **6.40 p.m.**—**8.10 a.m.,** Religious Programme of the Christian Radio Society (N.C.R.V.). **9.10 to 4.40 p.m.,** Programme of the Catholic Radio Society (K.R.O.). **9.10,** Organ Recital by Fritjers: Prelude in D minor (Bach); Sonata No. 2 (Mendelssohn); Andantino (Franck); Toccata in G (Dubois). **9.40,** Records. **9.55,** Pontifical High Mass, relayed from Breda Cathedral. **11.40,** Records. **11.55,** Concert by the K.R.O. Orchestra. Conductor: Van 't Woud. Florentine March (Fucik); Overture, Flotte Bursche (Suppé); Four Ballet Airs (Drigo); Marienwalzer (Bayer); Selection from The Bird Fancier (Zeller). **12.40 p.m.,** Literary Talk. **1.0,** Concert by the K.R.O. Orchestra: Der alte Brummbär (Fucik); Selection from The Geisha (Jones); Murmelndes Lüftchen (Jensen); Waltz, Gold and Silver (Lehár); Le Régiment du Sambre et Meuse (Turlet). **1.50,** Talk. **2.10,** Concert by the K.R.O. Boys. **2.35,** Records. **4.10,** Programme for Invalids. **4.40,** N.C.R.V. Programme: Service and Records. **7.30** till Close Down, K.R.O. Programme. **7.30,** Talk. **7.55,** Concert by the K.R.O. Boys: Wellenspiele (Robrecht); Wir sind Matrosen (Krome); Hochzeit bei Kater Murr (Landschulz); Potpourri (Morena); Piece (Box); Waltz, Hochzeitsreigen (Lincke); Hallo, daar is de K.R.O. (de Leur). **8.40,** News. **8.45,** Concert by the K.R.O. Orchestra. Conductor: Van 't Woud. Soloist: Mlle. Louise Wijngaarden (Violin). Selection from Prince Igor (Borodin); Violin Concerto in F minor (Lalo); Violin Solos: (a) Arioso (Fiocco), (b) Poupée valsante (Poldini-Kreisler), (c) Ouasi Ballata (Suk); Appassionata (Suk); Ernst und Scherz für's Wiener Herz (Komzak); Marche lorraine (Ganne). In the interval at **9.30,** Records. **9.55,** News. **10.10,** Epilogue by the Small Choir. **10.40** (approx.), Close Down.

INNSBRUCK.—Relays **Vienna**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres;** and **Skamlebaek, 49.5 metres.**—**7.57 a.m.,** Weather. **8.0,** Gym. **8.30,** Weather. **9.0 to 9.30,** Talk. **10.0,** Service. **11.30,** Weather. **11.40,** News. **12 Noon,** Chimes from the Town Hall; Weather. **12.5 p.m.,** Choral Concert of Scandinavian Music. **1.0,** Talk in English. **1.20,** Talk in German. **1.40,** Talk in French **2.0,** Service from Christiansborg Castle Chapel. **3.30,** Talk for Children. **4.0,** The Fourteenth Copenhagen Community Concert, relayed from the Park; Orchestra, conducted by Hye-Knudsen; Soloist, Aarkrogh (Trombone): March (Fröhlich); Waltz (Lumbye); Finale from Napoli (Lumbye); Extract from The Royal Guest (Borresen); Dance from Wayland the Smith (Henriques); Gallop from The Little Mermaid (Henriques); March (Blankenburg); Invitation to the Dance (Weber); Overture, The Merry Wives of Windsor (Nicolai); Trombone Solo, The Two Grenadiers (Schumann); The Teddy Bears' Picnic (Bratton); Louise (Benatzky); March (Sousa). **6.0,** Chimes. **6.5,** Song Records. **6.20,** Talk. **6.50,** Weather. **7.0,** News. **7.15,** Time. **7.30,** Talk. **8.0,** Chimes. **8.5,** Concert of Scandinavian Folk Dances by the Station Orchestra; Conductor, Gröndahl: Extract from A Summer Day in the Country (Gade); Norwegian Dances No. 3 in G and No. 4 in D (Grieg); Dances from Spillemand and Degn Soren Nielsens Nodeborg (arr. Gröndahl); Swedish Rhapsody, Midsommervaka (Alfvén). **8.45,** The Hansen Family—Sketch (Locher); Weather. **9.0,** Concert by the Radio String Orchestra; Conductor, Gröndahl. **9.30,** Report of the Firemen's Regatta at Silkeborg. **10.0,** News. **10.10,** Opera Music by the Station Orchestra; Conductor, Gröndahl. **11.0,** Dance Music from the Ritz Restaurant. **12 Midnight,** Chimes from the Town Hall. **12.5 a.m. (Monday),** Dance Music (contd.) **12.30,** Close Down.

KIEL.—Relays **Hamburg. KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—**6.15 to 8.15 a.m.,** See **Hamburg. 9.0** (from **Danzig**), Protestant Service. **10.0,** See **Cologne. 10.50,** Talk: Children and the Nation. **11.0,** Weather; Programme Announcements. **11.10,** Topical Report. **11.30,** Our Daily Bread—Legends and Customs. **12 Noon,** Concert for the Radio Exhibition: The Small Station Orchestra; Conductor, Wilcken: Overture, Der Wildschütz (Lortzing); Selection from Martha (Flotow); Scene from Das Nachtlager in Granada (Kreutzer); Selection from The Merry Wives of Windsor (Nicolai); Overture, Lysistrata (Michels); Waltz (Leuschner); The Black Forest Chiming Clock (Richke); The First Letter (Reggov); Selection from Der Tenor der Herzogin (Künneke). **2.0,** Chess Lesson. **2.30,** Records: Light Music and Songs. **3.15,** Talk: Transylvania. **3.45,** Songs to the Lute by Oscar Besemfelder. **4.10,** Reading. **4.30,** Report on the Swiss Grand Prix. **5.10,** Orchestral Concert, relayed from the Zoological Gardens. **6.30,** Racing Notes. **6.40,** Talk: The Population of the Earth. **7.0,** Song Recital by Henny Wolff (Soprano). **7.25,** Liebe im Traum—One-Act Play (Unger). **8.0,** Sports Report. **8.0,** See **Frankfurt. 12 Midnight,** Close Down.

KOSICE.—Relays **Prague. LAUSANNE.**—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.**—**6.15 to 8.15 a.m.,** See **Hamburg. 8.30,** Service. **9.0,** Choral Concert. **9.30,** Programme Announcements. **10.0,** See **Cologne. 11.0,** Talk: The Leipzig Fair. **11.30,** Radio Report from an Old Thuringian Manor. **12 Noon** (from **Dresden**), Military Band Concert. **1.0 p.m.,** Concert by the Station Orchestra. Conductor: Schröder. Overture, Pique Dame (Suppé); Piedmontese Dance No. 1 (Sinigaglia); Petite Suite (Debussy); Selection from Der Waffenschmied (Lortzing); Humoresque (Humperdinck); Swedish Dances (Bruch); Overture, The Bartered Bride (Smetana); Styrian Dances (Kienzl); March (Schröder). **2.30,** Talk: Thuringian National Costumes. **3.0,** See **Frankfurt. 5.0,** See **Berlin (Funkstunde). 6.0,** Variety. **6.30,** Report from the Luther Celebrations in Wittenberg. **7.0,** A Rustic Idyll—Scandinavian Folk Song Play (Lotte Theile). The Station Orchestra and Chamber Choir. Conductor: Blumer. **8.0 to 12 Midnight,** See **Frankfurt.** In the interval, News; Sports Notes. **12 Midnight,** Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 150 kW.—**7.45 a.m.,** Records. **8.0,** News in French; Record; News in German; Record. **11.30,** Religious Address; Records. **11.50,** News in French and German. **12 Noon** till Close Down—English Programme. **12.0,** Variety Programme. **12.30 to 2.57 p.m.,** Concert arranged by I.B.C. (Ireland), Ltd., Dance Music. **2.30,** All-Star Variety Concert: Records. **4.45,** Relay from the Ostend Races. **5.15,** Variety Concert. **8.0,** Dance Music. **8.30,** Racing Results; News in French and German. **9.0,** Variety Concert. **10.0,** Light Music. **10.30,** Dance Music.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**9.0 a.m.,** News. **10.0,** Announcements. **10.30,** Interval. **2.0 p.m.,** Time; Chimes; Light Music. **2.30,** Sextet Concert. **3.0,** Announcements; Light Music. **3.30,** Sextet Concert. **4.0,** Light Music. **4.30,** Sextet Concert. **5.0,** Interval. **6.0,** Chimes; Light Music. **7.0,** Concert of Spanish Music. **8.30,** Dance Music. **10.0,** Chimes; Time; Sextet Concert. Soloists: Gutiérrez (Guitar); Martinez (Songs); Pepito (Saxophone). **11.30,** Concert by the Municipal Band from the Rosales. Conductor: Villa. **1.0 a.m. (Monday),** Chimes. **2.0,** Dance Music arranged by the International Broadcasting Company, Ltd., of London. **3.0,** I.B.C. Good-night Melody; Close Down.

MADRID

EAQ, 10,000 kc/s, 30 metres; 20 kW.—**11.15 p.m.,** News. **11.30,** Spanish Music; Programme from **Madrid (EAJ7).** After the Relay, News. **12 Midnight to 12.30 a.m. (Monday),** Programme in English, arranged by the International Broadcasting Company of London. **12 Midnight,** Light Music. **12.30 a.m. (Monday),** I.B.C. Good-night Melody and Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.**—**9.40 a.m.,** News. **10.0,** See **Rome. 11.0,** Mass from the Church of the Annunciation, Florence. **12 Noon to 12.15 p.m.,** Bible Reading. **12.30,** Records. **1.0,** Time; News. **1.5,** Records. **2.15,** Interval. **4.15,** Records; Sports Notes. **5.15,** Light Music. **6.15,** Weather. **6.20 to 6.50,** Sports Notes. **7.30,** Time; News; Dopolavoro Notes; Records. **8.0,** Sports Notes; Announcements; Records. **8.45,** La Gran Via—Comic Opera (Chueca Valverde); Conductor, Ricci. **9.45,** Fourth Symphony (Beethoven). After the Concert, Dance Music. **11.0,** News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**11.30 a.m.,** Announcements; Bible Reading **12 Noon,** Time; Weather. **12.5,** Concert by the Station Orchestra: March (Sousa); Künstlerleben (Joh. Strauss); Overture, Les Dragons de Villars (Maillart); Selection from The Barber of Seville (Rossini); Ständchen (Schubert). **12.40,** News. **12.45,** (approx.), See **Beromünster. 1.45** (approx.), Interval. **4.0,** Records: Marches. **4.15,** See **Beromünster. 5.0,** to be announced. **5.15,** Selection from La Bohême (Puccini) (on Records). **5.45,** Guessing Competition. **5.55,** Record: The Blue Danube (Strauss). **6.0,** Programme for Children. **6.15,** Records: Hawaiian Guitar Music. **6.30,** Talk for Boys. **6.45,** Sports Results; News; Records. **7.15,** Report: The Cycle Tour of Switzerland. **7.30,** Clarinet Solos by Bruto Mastelli: Gnomenklänge, Op. 38 (Baermann); Petite pièce (Debussy). **7.45,** News. **8.0,** Selection from La Fête des Vignerons (Doret). **8.15,** Talk. **8.30,** Concert of Folk Music; Conductor: Vicari. **9.30,** Concert by the Station Orchestra: Musica proibita (Gastaldon); Mattinata (Leoncavallo); Ave Maria (Gounod); Ideale (Tosti); Romance from Mignon (Thomas); Intermezzo from Cavalleria rusticana (Mascagni); Waltz from Faust (Gounod). **10.0,** Sports Report; Close Down.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.30 a.m.,** See **Prague. 8.30,** See **Brno. 9.0,** See **Prague. 12.15 p.m.,** Concert by the Station Orchestra; Conductor, Divis; Overture, Eva (Lehár); Selection from La Traviata (Verdi); Humoresque (Dvorák); Spanish Dance (Czernoch); Potpourri (Labsky); Waltz (Rehor); Gallop (Harapát). **1.30,** See **Prague. 1.55,** See **Brno. 2.45 to 3.30,** See **Prague. 4.0,** See **Prague. 7.25,** See **Brno. 10.0,** See **Prague. 10.30,** See **Brno. 11.30** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.,** News. **5.30,** Fanfare. **5.45,** Gym. **6.15,** Programme Announcements. **7.30,** Records. **9.0,** Musical Programme. **9.55,** Time. **10.0,** News. **10.15,** Orchestral, Choral and Vocal Soloist Concert. **11.15,** Literary Talk in Swedish. **12 Noon,** English Programme: Social Assurance; Letterbox. **2.45 p.m.,** News. **3.15,** Concert Version, Eugene Onegin—Opera (Tchaikovsky). **4.15,** Book Review. **5.30,** Military Talk; Military Band Concert, with Soloists. **6.30,** Dramatic Programme; Dance Music. **8.0,** Open-Air Symphony Concert; Conductor, Sankan. **9.0,** German Programme: Weekly Review; Letterbox. **9.55,** Chimes. **10.0,** English Programme: Weekly Review; Literary Talk. **11.0,** Literary Talk in Swedish.

MOTALA. — Relays **Stockholm. MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nürnberg, 1,267 kc/s, 236.8 metres;** and **Kaiserslautern, 1,195 kc/s, 251 metres.**—**6.15 a.m.,** See **Hamburg. 8.15,** Wireless Notes. **8.45,** Sonata in D, Op. 102, No. 2, for 'Cello and Pianoforte (Beethoven) by Anton Walter and Ludwig Schmidmeier. **9.30** (from **Nürnberg**), Protestant Service. **10.0,** See **Cologne. 10.10,** Chimes. **10.15,** Reading. **10.40,** From the Life of a Good-for-Nothing—Play with Old Folk Songs (Eichendorff). **11.20,** From Lindau to Berchtesgaden—Sequence with Folk Songs (Ebbinghaus). **12 Noon,** Military Band Concert from the Feldherrnhalle. **1.0 p.m.,** Concert by the Small Station Symphony Orchestra; Conductor, Fritz; Overture, Mignon (Thomas); Prelude, Intermezzo and Homage March

AUG. 26th SUNDAY *continued*

from Sigurd Jorsalfar (Grieg); Waltz, Die Werber (Lincke); Selection from Carmen (Bizet); Albumblatt (Wagner); Overture, Alessandro Stradella (Flotow). **2.0,** Time; Weather; Programme Announcements. **2.10,** Report for Farmers. **2.30,** Zither Music from Bad Reichenhall. **3.20,** A Musical Fairy Play for Children. **4.0,** Concert. **5.40,** Reminiscences by Contemporaries, of Ludwig Thomas as a Boy. **6.0,** Walter Niemann Pianoforte Recital by the Composer, Twelve Ländler; Suite. **6.30,** Der siebente Bua—Peasant Comedy in Three Acts (Neal and Ferner). **7.50,** Weather; Sports Report. **8.0,** See **Frankfurt.** **10.20,** See **Berlin (Funkstunde).** **11.0,** See **Frankfurt.** **12 Midnight,** Close Down.

NAPLES.—Relays **Rome.** **NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jelöy, 6,990 kc/s, 42.92 metres.—5.0 p.m.,** Talk, relayed from **Bergen, 850 kc/s, 352.9 metres.** **5.20,** Records. **6.0,** Recital by Bergh (Violin) and Hveem (Pianoforte). Sonata in B flat (Mozart); Impromptu and Minuet (Brögger). **6.30,** Talk for Farmers. **7.0,** Sacred Song Recital by Duveland. **7.15,** Weather; News. **7.30,** Time. **7.31,** Talk by Mr. Harry Hopewell. **8.0,** Concert by the Station Orchestra. Soloist, Naess (Songs). Conductor: Kramm. Overture, Don Giovanni (Mozart); Air from Alceste (Gluck); Aria from Der Freischütz (Weber); Selection from Die tote Stadt (Korngold). **8.40,** Talk. **9.10,** Concert (contd.). Suite, Carmen (Bizet). **9.40,** Weather; News. **10.0,** Topical Talk. **10.15,** Sports Notes. **10.30,** Dance Records. **11.30** (approx.), Close Down.

OSTERSUND.—Relays **Stockholm.**

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8 a.m.,** News. **8.30,** Organ Recital by Girard. **9.30,** Programme for Children. **10.0,** Sports Notes. **10.15,** Records. **11.0,** Symphonic Jazz by the Dervaux Orchestra. **12.15 p.m.,** Concert of Waltzes by the Locatelli Orchestra. **1.0,** News. **1.15,** Orchestra (contd.). **3.30,** Concert, relayed from **Vichy.** Conductor: Brouillac. **6.0,** Talk on Economics. **6.30,** News. **7.45,** Talk. **7.53,** Talk: Wine in French History. **8.0,** Records. **8.30,** Four One-Act Comedies: (a) The Proposal (Tchehov), (b) He makes the Typists cry (Nino), (c) A Brother (Elie de Bassan), (d) Since this morning (Mycho). In the interval, News. After the Plays, Dance Music by the Pascal Band.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**10.0 a.m.,** Press Review. **10.20,** Announcements. **10.25,** Records. **11.20,** Concert. **11.50,** Records. **12.5 p.m.,** Interlude by Kito the Clown. **12.15,** Records. **12.45,** News. **12.50,** Song Records of Paul Weill. **1.20,** Interval. **1.30,** Concert. **2.0,** Interval. **5.30 to 6.30,** Programme in English arranged by the International Broadcasting Company of London. **5.30,** Knocking about the World. **6.0,** Celebrity Concert (Gramophone Records). **6.50,** Talk by Rev. Father Tauzin: Cardinal Lavigerie. **7.20,** News. **7.25,** Sports Talk. **7.35,** Records: Selection from The Merry Widow (Lehar). **7.50,** Light Music. **8.0,** Interval. **8.10,** Music Hall Programme. **10.20,** News. **10.30** till Close Down, Programme in English by the I.B.C. **10.30,** Light Music. **11.0,** Old Favourites. **11.30,** I.B.C. Good-night Melody and Close Down.

PARIS

RADIO-PARIS, 182 kc/s, 1,648 metres; 75 kW.—**7.0 a.m.,** Records. **7.15,** News. **7.45,** Gym. **8.0,** Records. **10.15,** Concert, relayed from **Vichy.** **11.30,** Recital by Marthe Braquemond (Organ), relayed from the Cavaillé-Colle: Toccata and Fugue in D (Bach); Chorals (Bach); Le Tombeau de Nicolas de Grigny (Migot); Symphonic Variations (Libert). **12 Noon,** Religious Address. **12.20 p.m.,** Records of Sacred Music. **12.30,** Bilboquet on a Cruise. **12.45,** Records. **1.0,** Concert by the Victor Pascal Orchestra. **3.0,** Programme for Children. **4.0,** Records. **5.0,** Play (Quintero Brothers), translated by Camp. **6.0,** Concert by the Derveax Orchestra. **7.0,** Radio Paris Guignol. **7.30,** Topical Talk. **8.0,** Pianoforte Recital by Léon Kartun. **8.30,** News. **8.45,** Records: Bolero (Ravel). **9.0,** Tosca—Opera in Three Acts (Puccini), relayed from **Vichy;** Conductor, Salfi. In the interval, Sports Notes.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres** and **25.27 metres.**—**3.0 p.m.,** Southernaires. **3.30,** Samovar Serenade. **3.45,** First Presbyterian Church. **5.15,** Gould and Shefter. **5.30,** Radio City Concert. **6.30,** Highlights of the Bible. **7.0,** South Sea Islanders. **7.30,** Concert Artists. **8.0,** Organ Recital. **8.30,** Temple of Song. **9.0,** Programme to be announced. **9.30,** Vespers—Shadyside Church. **10.30,** Radio Explorers' Club. **10.45,** Programme to be announced. **11.0,** Those Three Girls. **11.15,** Baseball Resumé. **11.30,** Baltimore Municipal Band. **12 Midnight,** Silken Strings. **12.30 a.m. (Monday),** Musical Art Programme. **1.0 to 6.0,** Popular Programme.

PORSGRUND.—Relays **Oslo**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.30 a.m.,** Gym; Music; News. **7.0,** Concert by the Municipal Orchestra from **Karlsbad.** **8.30,** See **Brno.** **9.0,** Prayers. **9.15,** Violin Recital of Spanish Music by Rybár. Spanish air (Laserna-Manén); Jota aragoneza (Albèniz); Two Pieces (Falla); Songs of Spain (Nin). **9.45,** Notes for Workers. **10.0,** Chamber Music by Brand (Violin), Fronek ('Cello), and Krcmárová (Pianoforte); Ten Variations, Op. 44 (Beethoven); Nocturne, Op. 148 (Schubert). **10.30,** Talk, with Recitations. **11.0,** Concert of Czech Music by the Station Orchestra; Conductor, Parík. Soloist: Viktorie Švihlíková (Pianoforte). Overture in C (Vranikcy); Pianoforte Concerto in C (Tomásek); Serenade in E, Op. 22 (Dvorák). **12.0 Noon,** Chimes; News. **12.15 p.m.,** See **Moravská-Ostrava.** **1.30,** Talk for Farmers. **1.45 to 1.55,** Social Notes. **2.45,** Part Relay of Jan Rohác—Play (Jirásek) from **Hronov.** **3.30,** Interval. **4.0,** Military Band Concert from the Rieger Park; Conductor: Uhlír. French March (Pesta); Overture, Les Dragons de Villars (Maillart); Waltz (Oberthor); Fragments (Blodek); Polka (Smetana); March (Koehler); Extracts from The Geisha (Jones); Potpourri (Händl); Sokol March (Pehlík); Torch Dance (Meyerbeer); Ballet Music from The Bartered Bride (Smetana); Homage March (Uhlír). **5.30,** Talk. **5.45,** Records. **5.55,** German Transmission: Programme relayed from the Municipal Theatre, **Franzensbad.** **6.55,** News in German. **7.0,** News. **7.5,** Records. **7.10,** Talk: Modern England. **7.25,** See **Brno.** **10.0,** Time; News. **10.20,** Record. **10.25,** News in German. **10.30** till Close Down, See **Brno.** **11.30,** Close Down.

RJUKAN.—Relays **Oslo.**

ROME

CALL 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan (No. 2), 1,348 kc/s, 222.6 metres; Turin (No. 2), 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.—9.40 a.m.,** Announcements. **10.0,** Rural Programme. **11.0,** See **Milan.** **12 Noon to 12.15 p.m.,** Bible Reading. **12.30,** Records. **1.5,** See **Milan.** **2.0,** Time; News. **4.15,** Talk. **4.30,** Records; Sports Notes. **5.0,** Vocal and Instrumental Concert. **6.0,** Light Music and Dance Music. **6.15,** Weather. **7.30,** Sports Notes; Dopolavoro Notes; Announcements. **8.0,** Time; News; Records. **9.0,** Maris Stella—Opera (Pietri). **11.0,** News.

RUYSSELEDE

10,330 kc/s; 29.04 metres; 8 kW.—**7.45 p.m.,** News in French. **8.0,** See **Brussels (No. 1).** **8.45,** Spanish Caprice (Rimsky-Korsakov) on Records. **9.0,** News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by **W2XAF** on **31.48 metres** and by **W2XAD** on **19.56 metres.—7.0 p.m.,** Talkie Picture Time; Sketch. **7.30,** Dancing Shadows; Conductor, Max Dolin. **11.45,** Fitch Programme; Irene Beasley (Songs). **12 Midnight,** Chase and Sanborn Hour; Jimmy Durante. **1.0 to 4.30 a.m. (Monday),** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW.; and **Geneva, 401 kc/s, 748 metres.—9.40 a.m.,** Chimes. **9.45,** Protestant Service from the Cathedral. **10.45,** Report: The Cycle Tour of Switzerland, from **Davos.** **11.15,** Military Band Concert from **La Chaux-de-Fonds;** Conductor, Quinet: March (Baudonck); Overture, Oberon (Weber); Selection, Véronique (Messager); Waltz (Bayer); Czardas from Der Geist des Wojewoden (Grossmann); March (Quinet). **12.30 p.m.,** News. **12.45,** See **Beromünster.** **1.45,** Records. **2.0,** Interval. **3.30,** Records. **4.0,** Report on the Swiss Motor Grand Prix. **5.0,** Interval. **6.0,** Records. **7.0,** Religious Address. **7.30,** Report: The Cycle Tour of Switzerland. **7.57,** Interval. **8.0,** Sports Notes. **8.5,** Concert of

AUG. 26th SUNDAY *continued*

Light Music by the Station Orchestra; Conductor, Echenard; Soloist, Capoulade (Violin); Overture, Le Roi l'a dit (Delibes); Poème for Violin and Orchestra (Chausson); Scherzo Waltz (Chabrier); Havanaises for Violin and Orchestra (Saint-Saëns); Extracts from l'Enfant prodigue (Debussy); La Nurserey (Inghelbrecht). **9.15,** News. **9.25,** 'Cello Recital by Burger: Sonata in G minor (Handel); Yamilé (Bazelaire); Papillon (Fauré); Sonata in A (Boccherini). **10.0,** Sports Notes. **10.15** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.—9.30 a.m.,** Talk for Farmers. **10.0,** Brahms Records. **11.0,** Divine Service. **12.45 p.m.,** Weather. **1.0,** Report from Oslo of the Finals of the Sports Championships, Norway v. Sweden. **4.0,** Records. **5.0,** Weather. **5.5,** Talk. **5.35,** Choir Concert; Conductor, Körling. **6.0** (from **Göteborg**), Evensong. **7.15,** News. **7.35,** The Silver Chord—Play (Howard). **9.0,** Orchestral Concert; Conductor, Grevillius; Soloists, Margareta Högfors (Songs), Ballet Music from Count Orlando (Respighi); Two Songs (Marx): (a) Und gestern hat er mir Rosen gebracht, (b) Japanisches Regenlied; Suite, Le Tombeau de Couperin (Ravel); Three Songs (Marx): (a) Marienlied, (b) Venetian Lullaby, (c) Hat dich die Liebe berührt; Overture, Donna Diana (Reznicek). **9.45,** Weather. **10.0,** Concert of Light Music by the Station Orchestra; Conductor, Grevillius: Overture, Zampa (Hèrold); Selection from The Land of Smiles (Lehár); Praeludium (Järnefelt); Meditation from Thaïs (Massenet); Tango (Albéniz); Dances from Prince Igor (Borodin); Selection from Oh, Kay (Gershwin). **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**9.30 a.m.,** Records. **10.45,** Protestant Service in German. **11.30,** Roman Catholic Service. **12 Noon,** Records; Announcements. **12.15 p.m.,** Orchestral Concert; Conductor, de Villers: Overture, Mignon (Thomas); Le Pas des Fleurs (Delibes); Rhapsodies sur des airs du pays d'Oc (Lacombe); Selection from Samson and Delilah (Saint-Saëns); Fête Polonaise (Chabrier). **1.0,** Time; News. **1.15,** Concert (contd.): Ballet Suite, Le Miracle (Huë); Scènes Alsaciennes (Massenet); Tambourin Chinois (Kreisler); Offenbach Potpourri (Conradi). **2.0,** Interval. **3.0,** Records. **3.30,** Report of the International Cycle Race, Paris-Verdun. **5.0,** Orchestral Concert; Conductor, Roskam; Soloist, M. Briqueteur (Viola): March (Sousa); Minuet in D (Mozart); Moment musical (Schubert); Selection from La Bohême (Puccini); Viola Solo; Waltz (Lanner); Hymn to the Sun, from The Golden Cockerel (Rimsky-Korsakov); Chant sans paroles (Tchaikovsky); March (Bosc). **6.0,** Medical Talk in German. **6.15,** Talk: Sports. **6.30,** Concert of Light Music; Conductor, Roskam. **7.30,** Time; News; Sports Results. **7.45,** Records. **8.0,** Press Review in German; Lottery Results; Announcements. **8.30,** Four One-Act Comedies: (a) Les Bleuets (Messis), (b) Au Petit Bonheur (Anatole France), (c) Le retour (Loiseau), (d) L'Agence Matrimoniale (Georges Barthélemy). In the interval, at **9.30** (approx.), Press Review. **10.30,** Dance Music from the Caveau de l'Aubette. **12 Midnight** (approx.), Close Down.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**6.15 a.m.,** See **Hamburg. 8.15,** Time; News. **8.25,** Gym. **8.40,** Announcements. **9.0,** Roman Catholic Service. **9.45,** Interval. **10.0,** See **Cologne. 11.0,** Readings (Knut Hamsun). **11.30,** Strauss Records. **12 Noon,** Programme to be announced. **1.0 p.m.,** Topical Programme. **1.15,** Accordion Concert. **2.0,** Punch goes to the Films—Play for Children (Kernmayr). **3.0,** With the Microphone by Lake Constance. **3.45,** Records. **4.30,** Report on the Swiss Motor Grand Prix. **5.10,** Concert from **Breslau. 6.0,** Records. **6.30,** See **Munich. 7.50,** Sports Report. **8.0,** See **Frankfurt. 10.20,** Time; News. **11.0,** See **Berlin (Funkstunde). 12 Midnight,** See **Frankfurt. 2.0 a.m. (Monday),** Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**11.0 a.m.,** Dance Refrains. **11.30,** Symphony Concert. **11.45,** Songs. **12 Noon,** Light Music. **12.15 p.m.,** Opera Arias. **12.30,** Roman Catholic Service. **1.0,** Notes for Farmers. **1.15,** Military Band Music. **1.30,** Protestant Service. **2.0,** News; Amusement Guide. **6.0,** News. **6.15,** Popular Songs. **6.30,** Opera Music. **6.45,** Operetta Songs. **7.0,** Viennese Orchestra. **7.15,** Light Music. **7.30,** News; Racing Results. **7.45,** Bal Musette. **8.15,** Symphony Orchestra: Overtures; Tannhäuser (Wagner) and The Mastersingers (Wagner). **8.30,** Songs. **9.0,** Concert Version of The Tales of Hoffman (Offenbach). **10.0,** Au caveau de dix heures—Fantasy. **10.15,** News; Announcements. **10.30,** Operetta Songs. **11.0,** Military Band Music. **11.15,** Opera Arias; Arias from Les Brigands (Offenbach), Les dragons de Villars (Maillart), Le bon roi Dagobert (Rousseau), Si j'étais roi (Adam). **11.30** Soloist Programme: Liebesträum (Liszt); Serenade (d'Ambosio); Berceuse de Jocelyn (Godard); Allegro (Kreisler); Ballade (Chopin). **11.50,** Vocal Tangos. **12 Midnight,** News; Weather; Programme Announcements. **12.5 a.m. (Monday),** Sound Film Music. **12.15,** Operetta Music; Selection from Le petit Duc (Lecocq); Viennese Operetta Potpourri (Robrecht). **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo.** **TURIN.**—Relays **Milan.**

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz,** and **Salzburg, 1,294 kc/s, 231.8 metres.—8.15, a.m.,** Time; Announcements. **8.20,** Gym. **8.40,** Hints for the Week. **8.55,** Service from St. Peter's Church, Salzburg. **10.0,** Records. **11.0,** Humorous Stories. **11.20,** Symphony Concert by the Vienna Symphony Orchestra; Conductor, Pless: Overture Oberon (Weber); Rondo for Strings and Two Horns (Pless); Siegfried Idyll (Wagner); Symphony in E flat (Mozart). **12.30 p.m.,** Concert of Light Music by the Vienna Symphony Orchestra; Conductor, Holzer; Soloists, Salzmann ('Cello), Hanny Haumer (Harp), Rosner (Violin). **2.40,** Time; News. **2.50,** Talk for Farmers. **3.10,** Book Review. **3.35,** Quartet in C, Op. 59, No. 3 (Beethoven), by the Philharmonic String Quartet. **4.15,** Commentary on the Swiss Automobile Grand Prix from the Berne Racing Track. **5.0,** Records of Orchestral Music. **6.20,** Reading for Young People. **6.45,** Lecture-Recital with Records: Indian Wedding Customs. **7.10,** Time; News. **7.25,** Pianoforte Recital by Emerich. **8.0,** Motto. **8.5,** Concert of Light Music, from the Burggarten, by the Vienna Symphony Orchestra; Conductor, Holzer. **10.0,** Variety Programme. **10.10,** Records. **10.30,** Announcements. **10.50,** Records. **11.30,** Orchestral Concert of Light Music; Conductor, Weber; Soloist, Marie Schneider (Harp): Overture, Si j'etais roi (Adam); Waltz, G'schichten aus Osterreich (Mader); Intermezzo (Ganglberger); Potpourri (Uhl); Harfe und Spieluhr (Harmston); Overture, Der Göttergatte (Lehár); Accelerationenwalzer (Joh. Strauss); Potpourri (Komzak); Character Piece (Rathka); March Potpourri (Uhl). **1.0 a.m. (Monday),** Close Down.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**8.30,** Hymn. **8.35,** Records. **8.38,** Gym. **8.53,** Records. **9.5,** News. **9.10,** Records. **9.20,** Programme for Housewives. **9.25,** Records. **9.55,** Announcements. **10.0,** Service from **Cracow, 986 kc/s, 304.3 metres;** Sacred Music on Records. **11.57,** Time. **12 Noon,** Fanfare from St. Mary's Church, Cracow. **12.3 p.m.,** Weather. **12.10,** Concert by the Station Symphony Orchestra; Conductor, Górzynski; Soloist, Irène Gadejska (Songs). **1.0,** Music Talk. **1.10,** Concert of Light Music by the Station Orchestra; Conductor, Górzynski: Overture to Der Opernball (Heuberger); Waltz (Strauss); Romance (Renee); Polka (Dvorakovski); Intermezzo (Heykens); March (Leopold). **1.45,** Talk from **Poznan, 868 kc/s, 345.6 metres:** Ethnology. **2.0,** Concert of Polish Folk Dances and Music. **3.0,** Reading from **Poznan. 3.15,** Light Music on Records. **3.25,** Market Prices. **3.35,** Records. **3.45,** Gardening Talk. **4.0,** Concert by the Nina Manska Chamber Orchestra. **5.0,** Theatre Review. **5.10,** Records of Little-known Operas. **6.0,** Dramatic Programme. **6.15 to 6.45,** Violin and Pianoforte Recital by Mme. Eug. Uminska and Lefeld. **6.45,** Reminiscences of the Outbreak of War—Dialogue from **Wilno, 536 kc/s, 559.7 metres:** Literary Talk. **7.0,** Announcements. **7.15,** Pianoforte Recital. **8.0,** Great Thoughts. **8.2,** Topical Talk. **8.12,** Concert by the Station Symphony Orchestra; Conductor, Oziminski; Soloist, Czaplicki (Songs); Overture, Mignon (Thomas); Aria from The Flying Dutchman (Wagner); Aria from A Masked Ball (Verdi); Aria from Faust (Gounod); Two Spanish Dances (Moszkowski); Mon âme est trist (Gedejski); Tout passe (Rachmaninov); Mazurka (Mlynarski). **8.50,** News. **9.0,** Fanfare from Gdynia. **9.2,** Variety Programme from **Lwow, 795 kc/s, 377.4 metres. 10.0,** Letterbox. **10.15,** Sports Notes. **10.30,** Respighi Music on Records. **11.0,** Weather. **11.5,** Dance Music from the Bristol Hotel.

ZURICH.—Relays **Berömunster.**

MONDAY
AUGUST THE TWENTY-SEVENTH

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.**—**1.30 to 2.30 p.m.,** Time Signal; Weather; Exchange; Records. **6.0,** Programme for Children. **6.45,** News. **7.0,** Irish Lesson. **7.15,** Ballads by Shuibhlaigh. **7.30,** Time Signal; Station Orchestra. **7.45,** Song Recital by O'Farrell (Baritone). **7.55,** Pianoforte Recital by Dina Copeman. **8.10,** Song Recital by O'Farrell (Baritone). **8.20,** Talk: Chinese Civilisation. **8.35,** Original Sketches—Songs by John MacDonagh and Company, with Orchestra. **9.35,** Traditional Fiddle Solos by May Kavanagh. **9.45,** Song Recital by Erni Ritter (Soprano). **10.0,** Variety Programme. **10.30,** Time Signal; News; Weather. **10.40,** Records. **11.0** (approx.), Close Down.

BARCELONA

795 kc/s, 377.4 metres; 5 kW.—**12 Noon,** Chimes; Weather. **1.0 p.m.,** Programme for Women. **2.0,** Records. **2.30,** Theatre Notes; Amusement Guide; Records. **3.0,** Film Review; Sextet Concert. **4.0,** Programme for Hospitals. **5.0,** Interval **7.0,** Trio Concert. Selection from Tosca (Puccini). Chant russe (Lalo); Serenade (Margutti); Phantom Melody (Ketelbey); Minuet (Gervasio); Andante (Mozart); Selection from Werther (Massenet). **7.30,** News; Concert (contd.). **8.0,** Request Records. **8.20,** Sports Notes. **8.30,** Exchange; Records. **9.0,** Educational Talk. **9.10,** Talk on Aviation. **9.20,** Records. **9.45,** Press Review. **10.0,** Chimes; Weather. **10.5,** Social Notes. **10.10,** Humorous Programme. **10.50,** Sardanas by the Cobla Barcelona. **11.0,** Concert by the Station Orchestra. Soloists, Jarque and Prior. Gavotte from Overture in D (Bach); Romance in G (Beethoven); Largo appassionato (Beethoven); Comme autrefois (Popper); Ninna—nanna (Sgambati); Hungarian Dance No. 6 (Brahms). **12 Midnight,** Dance Music by the Melody Boys from the Shanghai Bar. **1.0 a.m. (Tuesday),** News.

BASLE.—Relays **Beromünster.**

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.20,** See **Hamburg.** In the interval at **7.0,** News. **8.0,** Interval. **8.45,** Gym. **9.0,** Interval. **9.40,** Talk: Foreign Domestic Economy Schools. **10.0,** News. **10.10,** Old Germanic Legends. **10.50,** Gym. for Schools. **11.15 to 11.30,** Weather. **11.55,** Weather. **12 Noon,** See **Frankfurt. 1.45 p.m.,** News. **2.0,** Interval. **2.45,** Greetings; Announcements. **3.0,** Weather; Exchange. **3.15,** Discussion: Women and National Labour Service. **3.40,** Talk: With a Camera to the Ocean-bed. **4.0,** Concert by the Station Orchestra, relayed from the Radio Exhibition; Conductor, Willi Genssler: Overture, The Bohemian Girl (Balfe); Selection from Tiefland (d'Albert); Fröhliches Wandern (Kaun); Quadrille from Waldmeister (Strauss); Waltz, Münchner Kindl (Komzak); March (Büchsenschütz-Lincke); Overture, Gri-gri (Lincke); Selection from Der Obersteiger (Zeller); Ballet Suite (Armandola). In the interval, Topical Talk. **5.30,** Book Review: "Deutsche Aufbaukräfte in der Entwicklung Polens" (Kurt Lück). **5.45,** Handicrafts for Young People. **6.5,** Recital of Brahms and Strauss Songs by Jessy Bühler. **6.30,** Talk: The Forthcoming Theatre Season. **6.45,** Topical Talk. **6.55,** A Poem; Weather. **7.0,** Concert from **Stuttgart. 8.10,** Close Down: See **Munich.** In the Interval from **10.0 to 10.30,** News; Report of the start of the International Six Days' Race from Paternkirchen; Weather.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Gym. **6.15,** Weather; Prayer. **6.20,** See **Hamburg.** In the interval at **7.0,** News. **8.0 to 8.20,** Gym. **8.30,** Records; Announcements. **9.45,** Cookery Notes. **10.0,** News. **10.0 to 10.25,** Market Prices. **11.25 to 11.30,** Exchange. **12 Noon,** Concert from **Hamburg.** In the interval, Weather. **1.0 p.m.,** News. **1.15,** Records. **2.0,** News. **2.15,** Concert from **Munich.** In the interval, Exchange. **4.0,** See **Berlin (Deutschlandsender). 6.0,** Announcements. **6.5,** Songs for Young People. **6.30,** Heinrich Sattler Trio by Isa Berger (Soprano), Margarete Schreber - Sattler (Mezzo - Soprano) and Elise Hartwig (Contralto): Hoffnung auf Gott; Sonntagslied; Lied der Vögelein; Herbstmorgen; Murmender Bach; Die Fenster auf; Wanderlied; Blauer Himmel. **6.45,** String Trio in A minor, Op. 77b (Reger). **7.20,** An Interview with Hans Dominik. **7.40,** Echoes of the Day. **7.50,** News. **8.0,** Gala Variety Programme relayed from Pichelsberg Castle: Massed Orchestras, Choirs, Accordion Ensemble and Soloists. **10.20,** News. **10.50,** Concert from **Königsberg. 12 Midnight,** Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**10.45 a.m.,** Commentary on the Cycle Tour of Switzerland. **11.15,** Interval. **12.30 p.m.,** See **Sottens. 2.0,** Interval: **3.59,** Time Signal. **4.0,** Concert of Chamber Music. **5.0,** Children's Songs (Heinrich Pastalozzi), sung by Claire Adelmann. **5.30,** Gustav Schaub plays his own Compositions. **6.0,** Programme for Children. **6.30,** Records. **7.0,** Time; Weather. **7.2,** Talk: Holidays. **7.20,** Records. **7.30,** Commentary on the Cycle Tour of Switzerland. **8.0,** See **Sottens. 8.45,** See **Paris (Ecole Supérieure). 11.15,** Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Announcements. **10.0,** See **Prague. 10.30,** See **Moravská-Ostrava. 11.0,** Water Level. **11.5,** See **Brno. 12.0 Noon,** See **Prague. 12.5 p.m.,** Talk for Farmers; Market Prices. **12.10,** News in Slovak. **12.15,** Record. **12.20,** See **Prague. 1.40,** News and Weather in German and Hungarian. **1.50,** See **Prague. 2.0 to 2.5,** Market Prices. **3.15,** See **Moravská-Ostrava. 4.15 to 4.20,** See **Prague. 5.40,** Records. **6.0,** Records. **6.10,** Talk for Housewives. **6.15,** Hungarian Transmission: Reading; Pianoforte Recital by Berenyi; Talk. **6.55,** See **Prague. 7.10,** Organ Recital by Ledvina, relayed from the Franciscan Church. **7.40,** Talk. **7.50,** See **Moravská-Ostrava. 8.20,** See **Prague. 10.45,** News in Hungarian. **11.0** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.**—**5.0 a.m.,** Hymn; Motto. **5.10,** Records. In the interval at **5.40,** Time; Weather. **6.0,** Time; Weather; Gym. **6.25,** See **Cologne. 8.0,** Cookery Notes. **8.10,** Records. **8.40,** Gym. **9.0,** Time; News. **10.10 to 10.40,** Broadcast for Schools: The Battle of Tannenberg. **11.30,** Time; News. **12 Noon,** See **Frankfurt. 1.30 p.m.,** Time; News. **1.45,** Records. **2.20,** Exchange. **2.25,** Announcements; Records. **2.50,** Market Prices. **3.10,** Review of Books on Early Germanic History. **3.30** (from **Gleiwitz**), Harvest in Silesia—Sequence. **4.0,** See **Berlin (Deutschlandsender). 5.30,** Weather; Market Prices. **5.35,** Reading. **5.55,** Discussion: The New German Trades Unions. **6.15,** Topical Talk. **6.35,** Children—Recital of Fritz Woike Poems. **6.50,** Announcements. **7.0,** Choral Concert. Conductor: Karl Bolt. Mädel flink auf den Kranz (Nagler); Folk Song; Vergänglichkeit (Erk); Banger Tag (Schmidt); Hunters' Chorus from Der Freischütz (Weber); Gute Nacht (Knöchel). **7.30,** To be announced. **8.0,** News. **8.10,** See **Munich.** In the interval at **10.20,** Time; News. **12 Midnight,** Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 10.30,** See **Moravská-Ostrava. 11.0,** Record. **11.5,** Orchestral Concert; Conductor, Hanousek. March (Pelikán); Hofballtänze (Strauss); Operetta Potpourri (Hruby); Intermezzo, The Phantom Brigade (Myddleton); Intermezzo (Lincke). **12.0 Noon,** See **Prague. 1.30 p.m.,** Labour Exchange; Social Notes. **1.40,** See **Prague. 2.0 to 2.5,** Talk for Farmers. **3.15,** See **Moravská-Ostrava. 4.15 to 4.20,** See **Prague. 5.40,** Announcements. **5.45,** German Transmission: Talk; Programme for Children. **6.20,** Recital of Moravian Folk Songs by Konvalinka. **6.40,** Record. **6.45,** Broadcast for Workers. **6.55,** See **Prague. 7.10,** A Farce in Dialect. **7.50,** See **Moravská-Ostrava. 8.20,** Talk. **8.38,** See **Prague. 11.0** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Orchestral Concert of Light Music; Six Sketches (Darcy); Guitar (Thomé-Gauwin); Rêverie for 'Cello (Goffin); Barcarolle (Novi); Et tu passais (Novi); Entr'acte from A Midsummer Night's Dream (Vreuls); Walloon March (Ernotte). **1.0 p.m.,** News. **1.10,** Records. **2.0,** Interval. **4.55,** Announcements. **5.0,** Concert by the Radio Orchestra: Suite, The Golden Age (Hervé); Serenade (Langlois); Rêve d'antan (Novi); Cadence and Oriental Dance for Violin and Orchestra (Marsick); Dance and Cortège (Leblanc); Chanson de mai (Dupuis); March (Planquette). **6.0,** Programme for Young People. **6.30,** Orchestral Concert of Light Music; March (Wéry); Gracieuse pirouette (Wéry); Au printemps de la vie (Mouton); Printemps d'amour (Kalkman); Largo in Old Style for Strings (Rogister); Crâmignons liègeois (Meurice). **7.0,** Pianoforte Recital by Alice d'Haene; Les petits moulins à vent (Couperin); Wiegenlied (Chopin); Jeux d'eau (Ravel). **7.15,** Walloon Review. **7.30,** Theatre and Cinema Review. **8.0,** Light Music by the Radio Orchestra. **9.0,** Talk: Zénobe Gramme. **9.15,** Light Music (contd.). **10.0,** News. **10.10,** Dance Records. **11.0,** Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW.—Programme in Flemish. **11.57 a.m.,** Weather. **12 Noon,** Records. **12.15 p.m.,** Jean Ecrard (Accordion). **12.30,** Records. **1.0,** News. **1.10,** Orchestral Concert, Descriptive Music: Les chasseurs ardennais (Ledieu); March of the Gnomes (Armandola); Intermezzo (Brumagne); Tarantella (Caludi); The Railway (Brusselmans); Le coeur de ma mie (Dalcroze); Badinage (d'Agréves); Cortège catalan (De Sévérac); Petite Polonaise (De Joncker); Sérénade mutine (Gabriel Marie); Alméria (Mahy). **2.0,** Interval. **4.55,** Announcements. **5.0,** Orchestral Concert; Conductor, Meulemans: Prelude to Le Cavalier maudit (Lagye); Three Dances (Michielsen); Two South American Sketches (De Bourguignon); Divertissement (Leemans); Ballet Music from Sept péchés capitaux (Candael). **5.45,** Programme for Children. **6.30,** Quartet (Milhaud) by the Mathys Quartet. **7.0,** Records: Music to Shylock (Fauré). **7.15,** Medical Talk. **7.30,** Discussion: Football in Belgium. **8.0,** Symphony Concert; Conductor, Meulemans; Soloist, Van der Smissen (Violin): Suite in D (J. E. Bach); Violin Concerto in E flat (Mozart); Ballet Music from Les Troyens à Carthage (Berlioz); Suite algérlienne (Saint-Saëns). **8.45,** Recitations. **9.0,** Meulemans Concert: Overture, Ondergang; Extract from Béatrice; Arlequin; Five Songs; Ballet Suite, Josaphat Park; Elégie d'automne; Scherzo and Prelude from Stadspark. **10.0,** News. **10.10,** Dance Records. **11.0** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15,** Time; News. **1.40,** Records. **6.0,** Time; Weather. **6.5,** Concert by the Station Orchestra: Florentine March (Fucik); Celtic Overture (Foulds); Waltz, Hofballtänze (Lanner); Selection from Mignon (Thomas); Suite (Suk). **7.0,** Educational Programme. **7.15,** Concert by the Station Orchestra: Weber Potpourri (Urbach); Song of the Volga Boatmen (arr. Artok); Andante (Clemus); Selection from The Czarevitch (Lehár). **8.0,** Talk. **8.15,** Quartet in F (Mozart). **8.45,** Anthology. **9.0,** Recital of Russian Songs by Csenzov. **9.30,** 'Cello Solos by Marica Bernard: Sonata (Galliard); Habanera (Ravel); Malaguena (Albéniz); Granadina (Nin); Three Negro Melodies (Brown). **10.0,** News. **10.30,** Light Music from a Restaurant.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym. **9.45,** News. **10.0,** Talk. **10.40,** Horticultural Talk. **11.10,** Water Level. **12 Noon,** Chimes. **12.5 p.m.,** Concert. **12.30,** News. **1.30,** Concert by the Police Band. **2.40,** News. **4.0,** Programme for Schools. **4.45,** News. **5.0,** Concert by the Kalmar-Balázs Quintet from the Rajna Café. **5.50,** Talk. **6.25,** Choral Concert. **7.25** (approx.), Medical Talk. **7.45,** Concert by the Kiss Cigány Band. **8.50,** News. **9.10,** Verdi Concert by the Opera House Orchestra. Conductor: Rajter. Soloist: Imre Pallo. Overture and Aria from La Traviata; Overture, Nebuchadnezzar; Aria from Don Carlos; Monologue from Othello; Ballet Music from Aïda; Aria from A Masked Ball; Overture, Sicilian Vespers. **10.30,** Dance Music. **11.0,** Concert by the Budapest Chamber Orchestra.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Greetings; Records. **6.5,** Gym. **6.25,** Concert by the Dortmund Symphony Orchestra; Conductor, Theo Erpenbach. In the interval at **6.50,** Greetings; Time; News. **8.0,** Time; Weather. **8.5,** Gym. **8.20 to 8.30,** Cookery Notes. **10.0,** Time; News. **10.10,** Recital by Carla Weithöner (Soprano), Florentine Hanisch (Violin), and Egbert Grape (Pianoforte). Three Songs (Ramrath): (a) Blumen allerwege, (b) Holdgefangen, (c) Leise klingklarei; Capriccio for Violin and Pianoforte (Gade). **10.30,** Three Talks. **11.30,** Post Office Concert. **12.0 Noon,** Records. **12.45 p.m.,** News; Greetings. **1.0,** Concert by the Station Chamber Orchestra; Conductor, Rolf Hartmann. In the interval at **1.45,** News. **2.45,** Time; Exchange. **3.15,** Talk for Gardeners. **3.30,** Time; Exchange. **3.50,** Topical Talk. **4.0,** Concert by the Small Station Orchestra; Conductor, Eysoldt: Prelude to Genoveva (Schumann); Ballet Music from Prometheus (Beethoven); Lullaby (Dvorák); By the Black Sea (Dvorák); Ballet Music from Rosamunde (Schubert); Minuet (Mozart); Turkish March (Mozart). **5.0,** Reading (Richard Euringer). **5.15,** Recital by Trude Fischer (Contralto) and Hans Haass (Pianoforte). Three Rudolf Binding Lieder (Siegl): (a) Schicksal, (b) Flieg' dahin, (c) Finsteres Gesicht; Pianoforte Solos: (a) Kleine Fantasie (Lemacher), (b) Irrlichter (Unger), (c) Dämmerstunde (Siegl), (d) Toccata (Pillney); Three Rudolf Binding Lieder (Siegl): (a) Traum-Verkündung, (b) Wie bald, (c) Tag der Liebe. **5.40,** Talk: Walter v. Plettenberg. **6.0,** Gym. **6.20,** Italian Lesson. **6.40,** Topical Review. **6.50,** Time; News. **7.0,** Weekly Review. **7.30,** Sonatina in D, Op. 137 No. 1 (Schubert) by Terese Sarata-Kuermann (Violin) and Egbert Grape (Pianoforte). **8.0,** News. **8.10,** See **Munich. 10.0,** Time; News. **10.30,** Records. **11.0,** The Art of Healing—Humorous Sequence (Stefan Andres). **12.0 Midnight,** Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**11.30 a.m. to 12 Noon,** Programme in English arranged by the International Broadcasting Company of London; Light Orchestral Music. **12 Noon to 4.30 p.m.,** Programme in French. **4.30, to 6.0,** Programme in English by the I.B.C. **4.30,** Chichester, Bognor, Hastings and Eastbourne Concert; Part I—at the Cinema. **5.0,** Part II—Dance Music. **5.30,** Southend Concert; Gramophone Records. **6.0 to 11.0,** Programme in French. **11.0** till Close Down, Programme in English by the I.B.C. **11.0,** Talkie Time; Tunes from the Talkies and Shows. **11.30,** In the Club this week. **12 Midnight,** Club Concert for Nantwich Listeners; Dance Music. **12.30 a.m. (Tuesday),** I.B.C. Time Signal. **12.31,** Dance Music (contd.). **1.0,** I.B.C. Good-night Melody and Close Down; Trumpets.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.40,** Time; News. **6.50,** Weather. **6.55,** Military Band Concert. **8.10,** Weather. **8.15 to 8.35,** Gym. **10.0,** News. **11.0,** Concert. **11.40,** Announcements. **12 Noon,** Concert for the Radio Exhibition, The Saarlouis-Schwarzenholz Miners' Band. **1.0 p.m.,** Time; News. **1.10,** Announcements. **1.20,** Concert for the Radio Exhibition (contd.); Orchestra; Conductor, Limpert. **1.50,** Time; News. **2.0,** See **Stuttgart. 2.30,** English Suite in G minor (Bach) by Henni Schmitt (Contralto) and Ilse Kuhlmann (Harpsichord). **3.30,** Weather. **3.35,** Industrial Review. **3.50,** Time; Exchange. **4.0,** Concert from **Kaiserslautern. 5.30,** Dialogue: Professor Haushofer. **5.45,** Recital of Bavarian Folk Dance Songs by Gusti Korhammer (Bass). **6.0,** Programme for Young People: The Young Schiller—Sequence (Dieter Bassermann). **6.25,** See **Stuttgart. 6.45,** Announcements; Time. **6.50,** Topical Talk. **7.0,** Concert of Folk Music relayed from **Cassel.** In the interval at **7.30,** Local Review. **8.0,** Time; News. **8.10,** See **Stuttgart. 8.45,** The Maid of Orleans—Tragedy (Schiller). **10.35,** Time; News. **10.45,** Local News. **11.0,** Concert. **12 Midnight,** See **Stuttgart. 1.0 a.m. (Tuesday),** Close Down.

FREDRIKSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg,** and **Hanover, 1,330 kc/s, 225.6 metres.**—**5.45 a.m.,** Time; Report for Farmers. **6.0,** Gym. **6.15,** Time; Weather. **6.20** (from **Kiel**), Orchestral Concert. Conductor: Döring. In the interval at **7.0,** Time; News; Talk. **8.0,** Weather; Talk for Housewives. **8.10,** Announcements; Records. **10.50,** News. **11.0,** Folk Songs. **11.30** (from **Hanover**), Concert by the Hanover Symphony Orchestra. Conductor: Otto v. Sosen. Comedy Overture (Theil); Selection from The Bartered Bride (Smetana); German Folk Dance (Uldall); German Folk Melody (arr. Robrecht). In the interval, Notes for Housewives; Time; Announcements; Talk for Farmers. **1.0 p.m.,** Exchange. **1.15,** Weather. **1.20,** Light Music. **2.15,** News. **2.30,** Records of Alpine Folk Music. **3.0,** Exchange. **3.40,** Shipping and Aviation Notes. **4.0,** See **Berlin (Deutschlandsender). 5.30,** Visits to Boys' Camps and Youth Leaders' Schools. **6.0,** Dialect Talk. **6.45,** Exchange. **6.55,** Weather. **7.0,** Summer Evenings—Concert by the Station Orchestra. Conductor: Gerhard Maass (Pianoforte). Soloist: Carmen Paulsen-Raben (Soprano). **8.0,** News. **8.10** (from **Hanover**), The Lanzknechts' Concert by the Hanover Chamber Orchestra. Conductor: v. Sosen. Soloists: Heinz Bensing (Tenor) and Willy Lantelms (Bass and Lute). March (Gätke-Weninger); Two Duets to the Lute (Gätke); Fröhliche Gesellen (Klughardt); Bass Solo: Landsknechte müssen tanzen (Gättke); Strampedemi, Folk Melody for Tenor, Lute, Drum and Flute; Fifteenth and Sixteenth Century Lanzknechts' Songs arranged for Instruments; Duets (a) Seventeenth Century War Song, Ich habe Lust im weiten Feld zu streiten mit dem Feind, (b) Song of the Thirty Years' War, Es geht wohl zu der Sommerszeit. **8.45,** See **Frankfurt. 10.20,** News. **10.40,** Musical Interlude. **11.0,** Dance Music relayed from the Boccaccio. **12 Midnight,** Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Kootwijk** 50 kW. from **3.40 p.m.**—Programme of the General Broadcasting Society (A.V.R.O.). **7.40 a.m.,** Time. **7.41,** Records. **9.40,** Service. **9.55,** Sacred Music on Records. **10.10,** Records. In the interval, Recitation. **11.10,** Light Music by the Rentmeester Chamber Orchestra. **12.10**

AUG. 27th **MONDAY** *continued*

p.m., Records. 1.10, Light Music by the Rentmeester Chamber Orchestra. 1.55, Records. 2.10, Organ and Violin Recital by Piet van Egmond and Jan Felderhof. Organ Concerto (Handel); Sonata in D for Violin and Organ (Handel); Organ Solos: (a) Adagio molto (Guilmant), (b) Prelude (Saint-Saëns), (c) Intermezzo (Chip); Violin and Organ: (a) Air from the Violin Concerto, Op. 28 (Goldmark), (b) Largo from the Sonata, Op. 12, No. 1 (Raphael), (c) Aria (Felderhof). Organ Solos: (a) Toccata (Dubois), (b) Improvisation (Van Egmond). 3.10, Records. 3.40, Interval. 3.55, Records. 4.10, Lecture Recital. 5.10, Light Music by the Kovacs Lajos Orchestra. In the intervals: Records. 6.40, Talk: Animals. 7.10, Pianoforte Recital by Miss Judith de Leeuw. Concert Etude (Tausig); Rondo brillant (Weber); On Wings of Song (Mendelssohn-Liszt); Liebeslied (Schumann-Liszt); Valse brillante (Moszkowsky). 7.40, Time. 7.41, News. 7.45, Concert of Opera Music, The A.V.R.O. Orchestra—Conductor, Parenti. Soloists: Luigi Fort (Tenor); Saturno Meletti (Baritone); Dario Caselli (Bass); Edmea Limberti (Mezzo-Soprano); and Hilde Reggiani (Soprano). Overture, The Italian Girl in Algiers (Rossini); Extracts from Rigoletti (Verdi); Overture, Tancred (Rossini); Intermezzo from Cavalleria Rusticana (Mascagni). Bass Solo: Pif, Paf, Pouf, from The Huguenots (Meyerbeer); Mezzo Soprano Solo: Aria from La Gioconda (Ponchielli); Act 4 of Manon Lescaut (Puccini). In the interval at 8.40, Talk: The Rotterdam Port. 9.40, Records. 9.55, Light Music by Kovacs Lajos' Orchestra. 10.40, News. 10.50, Records, 11.40, Time and Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. (until 6.40 p.m.); 20 kW. from 6.40 p.m. Programme of the Christian Radio Society (N.C.R.V.).—7.40 a.m., Bible Reading; Meditation. 7.55, Records. 9.10, Interval. 10.10, Religious Programme. 10.40, Bible Reading. 11.10, Records. 11.40, Police Messages. 11.55, Records. 12.10 p.m., Organ Recital by Zwart. Fantasia in D minor (Hesse); Sacred Songs (Zwart); Choral Preludes (Bach); Prelude and Fugue in B minor (Bach); Psalms (Zwart); Choral No. 3 (Franck); Prelude, Fugue and Variations (Franck); Songs (Zwart); Fantasia in C minor (Hesse). 1.40, Violin Recital by Albert Jansen; Sonata in A (Franck); Record; La Folia (Corelli-Leonard). 2.25, Dietetics. 2.55 to 3.25, Records. 3.40, Bible Reading; Songs; Organ Solos. 4.40, Records. 4.55, Recital of Sacred Songs by Johannes de Heer and Verver (Violin). 5.55, Records. 6.10, The Letter Box. 6.40, Police Messages; Religious Notes. 6.55, Records. 7.10, The Letter Box. 7.40, Choral Concert. 8.40, Talk. 9.10, Concert by a String Quartet and Bouwmeester (Organ). Organ Solos: (a) Prelude (Bach), (b) Fantasia (Handel); Prelude (Bach-Berkhout). Organ Solo: Andante maestoso (Handel); Adagio and Allegro (Marcello), Preghiera (Forino). Organ Solos: (a) Allegretto (Thomas), (b) Träumerei (Schumann); Berceuse (Fritzenhagen); Impromptu (Marx-Marcus). Organ Solo: Melody and Improvisation (Bouwmeester); Valse de concert (Fritzenhagen). In the interval at 9.35 (approx.), News. 10.25, Records. 11.25 (approx.), Close Down.

INNSBRUCK.—Relays **Vienna.**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres;** and **Skamlebaek, 49.5 metres.**—7.0 a.m., Gym. 7.27, Weather. 8.30, Service from Copenhagen Cathedral. 11.0, Weather. 11.10, Fish Prices. 12 Noon, Chimes; Weather. 12.5 p.m., Concert by Andersen's String Ensemble, relayed from the Bellevue Strand Hotel. 2.0, Interval. 3.20, Talk for Housewives. 3.30, Concert by the Station Orchestra; Conductor, Fritz Mahler; Soloist, Ebba Hertz (Songs); Overture in D (K. P. E. Bach); Ballet Suite No. 2 from Hippolyte et Aricie (Rameau); Sarabande and March from the Couperin Suite (R. Strauss); Turkish Suite from Zaïde (M. Haydn); Overture, Les Petits Riens (Mozart); Divertimento in G (Haydn); Yugoslav, Russian and Yiddish Folk Songs; Overture, La vie parisienne (Offenbach); Laura Waltz from Der Bettelstudent (Millöcker); Polka (Jos. Strauss); March (Joh. Strauss); Overture, Der Triumph der Empfindsamkeit (Krenek); Waltz, Wiener Bonbons (Joh. Strauss); March from Boccaccio (Suppé). 5.30, Exchange. 5.42, A Poem. 5.45, Talk: Johann von Bülow, Tutor of Frederick the Seventh of Denmark. 6.15, English Lesson. 6.45, Weather; Wireless Notes. 7.0, News. 7.15, Time. 7.30, Talk: The Coming Season's Broadcasts for Schools. 8.0, Time. 8.2, Talk for Girls. 8.30, Accordion Duets. 9.30, Reading (Priestley). 9.55, News. 10.10, Concert of Danish Music by the Station Orchestra; Conductor, Reesen: Four Pieces (Hartmann): (a) Prelude to Syvsoverdag, (b) Extract from The Valkyrie, (c) Prelude to Act II of Et Folkesagn, (d) Selection from Hakon Jarl; overture. Aladdin (Hornemann); Selection from In the Alhambra (Lange-Müller); Overture, Mascarade (Nielsen). 9.20, Poetry Reading. 9.45, News. 10.0, Accordion Recital. 11.0, Dance Music relayed from the National Scala. In the interval, at 12 **Midnight,** Chimes. 12.30 a.m. **(Tuesday),** Close Down.

KIEL.—Relays **Hamburg. KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—5.0 a.m., Records. 5.50, Weather. 6.0, Gym. 6.20, See **Hamburg.** In the interval at 7.0, News. 8.0, Service. 8.30, Gym. 9.5, Talk for Schools: The Battle of Tannenberg. 10.40, News. 10.55, Weather. 11.30, See **Hamburg.** In the interval, Weather. 1.0 p.m., Time; Weather. 1.5, Records. In the intervals, News. 2.30, Exchange; News. 3.0, Market Prices. 3.15, Book Review. 3.45, Reading. 4.0, Concert by the Small Station Orchestra; Conductor, Wilcken. In the interval at 5.0, Technical Wireless Talk. 5.50 (from **Danzig**), Reading of Lyrics of Old Danzig Poets. 6.15, Market Prices. 6.25, Book Review for Young People. 6.55, Weather. 7.0, Mozart Pianoforte Recital by Hans Riebensahm. 7.30, Talk: The History of the German Knights Templars. 8.0, News. 8.10, Das Gleichnis—Lyric Cantata (Donisch); Gesche Storch (Soprano), Irma Drummer (Contralto), the Station Choir and the Opera House Orchestra. 9.0, Other People's Children—Play (Illing). 9.40, Report from a Stud Farm. 10.0, News. 10.30, Concert by the Small Station Orchestra; Conductor, Wilcken. 12 **Midnight,** Close Down.

KOSICE.—Relays **Prague.**

LAHTI

166 kc/s, 1,807 metres; 40 kW. Relayed by **Helsinki, 895 kc/s, 335.2 metres.**—7.5 to 7.20 a.m., Service in Swedish. 7.30 to 7.45, Service. 11.0, Exchange. 11.5, Records. 11.30, Exchange. 11.45, News in Finnish and Swedish. 11.59, Time Signal; Weather. 5.0 p.m., Recitations. 5.25, Saxophone Solos by Rajula. 5.50, News in Finnish. 5.59, Time; Weather. 6.10, News. 6.15, Announcements. 6.25, Talk. 6.45, Song Recital by Ari Hänninen. 7.5, Concert by the Station Orchestra: Conductor: Linko; Overture, Marietta (Gade); Finnish Melodies (Leander-Johansson); Waltz (Palmgren-Ekman); Norwegian Songs (Svendsen); Minuet (Pesola). 7.50, Two Talks. 8.45, News. 9.0, News in Swedish. 9.10, **Music,** relayed from the Kappeli Restaurant. 10.0 (approx.), Close Down.

LAUSANNE.—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.**—5.50 a.m., Report for Farmers. 6.0, Gym. 6.25, See **Cologne.** In the interval, News. 8.0, Gym. 8.20, Records. 9.0, Interval. 9.40, Exchange; Programme Announcements. 9.55, Weather. 10.10 to 10.40, French for Schools. 11.0, Records; Announcements. 11.30, News; Time. 11.40, Weather. 11.45, Notes for Farmers. 12 Noon, Announcements. 12.25 p.m., Concert from **Hamburg.** 1.0, News; Time. 1.10, Concert by the Fuchs Quartet: Prelude (de Micheli); Waltz (Carena); Poetic Suite (Dvorák); Nocturne (Chopin); Catalan Rhapsody (Ailbout); Minuet (Bolzoni); Waltz and Foxtrot (Henning). 2.0, News. 2.15 to 2.25, Art Review. 3.20, Book Review. 3.40, Exchange. 4.0, Concert by the Leipzig Symphony Orchestra. Conductor: Theodor Wünschmann. Soloist: Claire Spengler (Soprano). 5.0, Talk: Johann Linck, the Apothecary and Naturalist. 5.15, Orchestral Concert (contd.). 5.50, Exchange; Weather; Time. 6.0, German Youth Day—Sequence (Horst Lehmann). 6.40, Talk: Germany's Trade Relations with Yugoslavia. 7.0, Das Dienstjubileum—One-Act Play (Quensel). 7.35, Talk: Germany's Inland Waterways. 8.0, News. 8.10, Concert of Marches and Waltzes by the Station Orchestra. Conductor, Theodor Blumer. March, In Wehr und Waffen (Blon); Waltz, Roses from the South (Strauss); March, Aus eigener Kraft (Rupprecht); Waltz, Nachtschwärmer (Ziehrer); Entry March of the Gladiators (Fucik); Waltz, Lieder der Liebesnacht (Lincke); March, Brüder vom Rhein (Blankenburg); Hofballtänze (Lanner); March (Voigt); Waltz, Aquarellen (Jos. Strauss). 9.20 till Noon, Variety Sequence (Kuhnert). 10.20, News. 10.50, Concert from **Königsberg.** 12.30 a.m. **(Tuesday),** Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 150 kW.—7.45 a.m., Records. 8.0, News in French; Record; News in German; Record. 12 Noon, Concert by the Station Orchestra. Conductor, Pensis. Overture, The Bohemian Girl (Balfe); Waltz, Tout Paris (Waldteufel); L'Elfe dans la Plaine (Brusselmans); Selection from Hérodiade (Massenet); Le Tango jaune (Niemann); Selection from The Merry Widow (Lehár); Chanson d'amour (Caludi); In a Persian Market (Ketelbey); March, Salve Imperator (Fucik). In the interval at 12.30 p.m., News in French and German, and at 1.0, Exchange. 1.15, Records. 1.30, Exchange. 1.35, Records (contd.). 2.0, Exchange. 3.45, Exchange. 6.30 till Close Down, Czech Evening. 6.30, Variety. 7.30, Racing Results. 7.35, Concert by the Station Orchestra. Conductor, Pensis. Overture, Raymond (Thomas); Chants d'Espagne (Albéniz); Piece (Blaauw); Berceuse (Vreuls). 8.0, News in French and German. 8.20, Czech Concert by the Station Orchestra. Conductor, Pensis. Overture, Libussa (Smetana); Dance Suite, The Bartered Bride (Smetana); Ziguener (Königsberger); Slav Dances Nos. 10 and 6 (Dvorák). In the Interval at 8.30, Exchange. 9.0, Symphony Concert by the Station Orchestra. Conductoir, Pensis. Soloist, Serres ('Cello). Concerto for 'Cello and Orchestra (Schumann). 9.30, Violin Recital by Godowsky, relayed from **Mondorf les Bains.** Fandago (Godowsky); Chants sans Paroles (Godowsky); Waltz, Tales from the Vienna Woods (Strauss-Godowsky); Souvenir de Luxembourg (Godowsky); Spanish Dance (Sarasate); Prelude (Bach-Kreisler); Liebesleid (Kreisler); Valse bluette (Drigo-Auer); Finale from Carmen (Bizet-Sarasate). 10.0, Concert from **Vichy.**

LYONS

LA DOUA, 648 kc/s, 463 metres; 15 kW.—8.0 a.m., News. 10.15, Concert, relayed from **Vichy.** 11.30, Concert by the Station Orchestra. 12 Noon, News; Amusement Guide. 12.15 p.m., See **Paris (Ecole Supérieure).** 2.0, Records. 3.30, See **Strasbourg.** 6.30, News. 7.30, Local News. 7.50, Talk. 8.0, Legal Notes. 8.10, Music Review. 8.20, Concert by the Station Orchestra. 8.45, See **Strasbourg.**

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—2.0 p.m., Chimes; Time; Weather; Light Music. 2.30, Sextet Concert. 3.0, Amusement Guide; Exchange; Light Music. 3.30, Sextet Concert: Overture, Fingal's Cave (Mendelssohn); Selection from Fedora (Giordano). 4.0, Light Music. 4.30, Sextet Concert: Bolero (Albéniz); Romanian Song and Dance (Volpatti); Hindu Song from Sadko (Rimsky-Korsakov); Catalan Caprice (Albéniz); Czardas (Gingt). 5.0, Interval. 6.0, Chimes; Light Music. 7.0, Announcements. 7.10 (approx.), Choral Music. 7.30, Exchange. 7.35 (approx.), Orchestral Concert: Overture, Ramuntcho (Pierné); Waltz, Over the Waves (Rosas); Selection, from Ariadne (Massenet); Selection from Rigoletto (Verdi); Minuet (Boccherini); La Lettre de Manon (Gillet); Ukranian Dance (Sorozábal). 8.0 (approx.), Song Recital: Elégie (Massenet); L'uomo e fumatore (Ronzato-Borella); Extracts from Carmen (Bizet); Seven Spanish Folk Songs (Falla). 8.30, News; Sextet Concert. 9.15, Sports Notes; Sextet Concert (contd.). 10.0, Chimes; Time. 10.30, Extracts from Maruxa—Opera (Vives) on Records. In the interval at 11.0, News. 12.45 a.m. **(Tuesday),** News. 1.0, Chimes; Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.**—7.30 a.m., Gym. 7.45, Time; News. 8.0, Interval. 11.30, Records. 12.45 p.m., News. 1.0, Concert by the Chesi-Zanardelli-Cassone Trio. In the interval at 1.30, Records; Exchange. 2.15 to 2.25, Exchange. 4.35, News. 4.45, Programme for Children. 5.10, Dance Music. 5.55, Weather. 6.0 to 6.10, Report for Farmers. 7.0, Announcements; News. 7.15, News in Foreign Languages. 8.0, Time; News; Records. 8.30, Government Announcements. 8.45, Request Concert. 9.45, Talk. 10.0, Chamber Music, followed by Records. 1.0, News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—12 Noon, Records. 12.29 p.m., Time from Neuchâtel Observatory; Weather. 12.33, Dance Records. 12.55, News. 1.5, Dance Records. 1.15, Cookery Talk. 1.30, Interval. 3.59, Time from Neuchâtel Observatory. 4.0 to 6.0, See **Beromünster.** 7.45, News. 8.0, Talk. 8.15, Beethoven and Saint-Saëns Concert by the Lang Trio; Trio in D No. 1, Op. 70 (Beethoven); Talk: Beethoven; Trio in E minor, Op. 92 (Saint-Saëns). 9.15, Tango and Waltz Records. 10.0, Report on the Cycle Tour of Switzerland.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—6.0 to 7.15 a.m., See **Prague.** 10.0, See **Prague.** 10.30, Concert by the State Police Band. 11.0, See **Brno.** 12 Noon to 2.0 p.m., See **Prague.** 3.15, Concert by the Station Orchestra; Conductor, Musil: Suite, Rossininana (Respighi); Two Dances (Provaznik); Romanian Sketches (Suchy); Krakowiak (Leopold); Humoresque (Bayer); March (Napravnik). 4.15 to 4.20, See **Prague.** 5.40, See **Prague.** 6.0, Local Report. 6.5, Record. 6.10, Talk. 6.20, German Transmission: Programme for Workers; Topical Talk; Opera Arias (on Records). 6.55, See **Prague.** 7.10, See **Brno.** 7.50, Concert of Dances by the Station Band; Conductor, Cicek. 8.20, See **Prague.** 8.35, Vavrik Song Recital. 9.5, See **Prague.** 10.45, Records. 11.0 (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—5.0 a.m., News. 5.30, Fanfare. 5.45, Gym. 6.15, Programme Announcements. 7.30, Records. 9.0, Musical Programme. 9.55, Time. 10.0, News. 10.15, Ukrainian Programme. 2.15 p.m., News. 3.35, Programme for Collective Farm Workers. 4.30, Communist Party Programme. 5.30, Sound Film Music. 8.0, Seven Minutes—Comedy (Vinnikoff) with Music by Mossoloff. 9.0, German Programme: Authors' Conference. 9.55, Chimes. 10.3, English Discussion for Women. 11.5, Literary Talk in Hungarian.

MOTALA.—Relays **Stockholm. MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nürnberg, 1,267 kc/s, 236.8 metres;** and **Kaiserslautern, 1,195 kc/s, 251 metres.**—6.30 a.m., Gym. 6.45, Motto; Records. 7.15, Time; News. 7.25, Concert by a Schrammel Trio. 9.50, Gym. 11.5, Market Prices. 11.15, Time; News. 11.30, Report for Farmers. 12 Noon, Records. 1.15 p.m., Time; News. 1.25, Violin and Pianoforte Recital. 1.35, News. 2.0, Concert by the Small Symphony Orchestra and the Station Schrammel Quartet. 4.0, Programme for Children. 4.20, Concert by the Small Station Orchestra; Conductor, Erich Kloss: Overture, The Maid of Artois (Balfe); Selection from Märchenbilder (Bendel); Extracts from Faust (Gounod); Jota Navarro (Sarasate); Andalusian Serenade (Sarasate); Waltz, Flattergeister (Jos. Strauss); Selection from The Gipsy Baron (Strauss). 5.30, Talk: The Victor of Tannenberg. 5.50, Recital of Austrian Songs by Anton Maria Topitz (Tenor); Two Songs (Riester): (a) Herbsttag, (b) O Heimatland Tirol; Two Songs (Kolleritsch): (a) In der Fremde, (b) Das Letzte; Three Songs (Reiter): (a) Mit dir allein, (b) Frieden, (c) Gebet. 6.10, Book Review. 6.30, Burlesque for Pianoforte and Orchestra (R. Strauss) by Elly Ney. 6.50, Hints for Farmers. 7.0, Concert from **Stuttgart.** 8.0, Time; News. 8.10 till Close Down, Gala Bavarian Evening for the Radio Exhibition: From Spessart, through Bavaria to the Zugspitze; Folk Song and Dance Groups; Village Bands and Soloists.

NAPLES.—Relays **Rome. NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jelöy, 6,990 kc/s, 42.92 metres.**—11.15 a.m., Service. 11.50, Exchange. 12.45 p.m., News. 12.55, Nauen Time Signal. 1.0 to 2.0, Records. In the interval at 1.15, Weather; Talk for Farmers, and at 1.45, Exchange. 5.30, Orchestral Concert. 6.30, Reading by Oscar Braaten. 6.50, Records. 7.0, Announcements. 7.15, Weather; News. 7.30, Time. 7.31, Talk for Farmers. 8.0, Dramatic Programme. 9.10, Review of Foreign Affairs. 9.40, Weather; News. 10.0, Topical Talk. 10.15, Recital by Brustad (Viola) and Stephansen-Smith (Songs); Norwegian Suite (Brustad); Folk Song (Olsen); Song (Hall); Berceuse and Song (Backer-Gröndahl); Piece (Liebich); Two Pieces (Brustad): (a) Linden Leaves, (b) Ninon; Orientale (Cui); Le cygne (Saint-Saëns); Chanson, Louis XIII, and Pavane (Couperin). 11.0 (approx), Close Down.

OSTERSUND.—Relays **Stockholm.**

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—8.0 to 8.30 a.m., News. 10.30, See **Strasbourg.** 12 Noon, Tourist Report. 12.15 p.m., Concert by the National Orchestra: Conductor: Rosenthal; Soloists: Mlle. Cuvillier (Songs) and Dufrêne (Flute). In the Interval at 1.0, News. 3.30, Concert, relayed from **Vichy:** Conductor: Brouillac. 5.30, Talk. 5.45, Temperance Talk. 6.0, Talks on Economics. 6.30, News. 7.45, Aviation News. 7.53, Assurance Societies' Report. 8.0, Records. 8.45, Wagner Festival Programme, relayed from the Casino, Vichy; Conductor: Emile Cooper; Extracts from Parsifal; Extracts from The Dusk of the Gods. In the Interval, News. 11.15 p.m., Close Down.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—7.10 a.m., Fanfare; Records. In the interval at 7.20, News. 8.0 to 8.30, Concert. In the interval at 8.20, News. 8.45, Cookery Talk. 12 Noon, Exchange. 12.5 p.m., Concert by the Station Orchestra: Overture, The Merry Wives of Windsor (Nicolai); Alsatian Dances (Levadé); Andante and Minuet from Ariane (Massenet); Florentine Serenade (Godard); Spanish Dance (Falla); Dans les champs (Brusselmans); La chevelure (Debussy); Selection from Mignon (Thomas); Sous bois (Staub); Ballet Music from Le Cid (Massenet); March (Ganne). 12.25, News. 1.5, Exchange. 1.30, Exchange. 2.0, Exchange. 3.15, Exchange. 3.45, Exchange. 4.50, Exchange. 6.45, Exchange. 6.49, Records. 7.10, News. 7.30, Records. 8.0, Interval. 8.10, Sea Shanties

by a Vocal Quartet. **8.40**, Exchange. **8.50**, Variety Concert. **9.30**, Interval. **9.45**, Jazz Records. **10.15**, News. **10.30** till Close Down, Programme in English arranged by the International Broadcasting Company of London. **10.30**, Orchestral Concert: Some Modern Compositions. **10.45**, Instrumental Music. **11.0**, I.B.C. Goodnight Melody and Close Down.

PARIS

RADIO-PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.**, Gym. **7.0**, Records. **7.15**, News. **7.45**, Gym. **8.0**, Records. **10.15**, Concert, relayed from **Vichy:** Military March (Epinat); Gavotte, Amélie (Monteils); Overture, Rip van Winkle (Planquette); Two Eastern Dances (Scassola); Selection from Véronique (Messager); Polichinelle ture (Barat); Chanson d'Aout (Barat); Suite, Madhia (Epinat); Waltz, Manola (Waldteufel). **12 Noon,** Light Music by the Victor Pascal Orchestra. In the interval at **1.20 p.m.**, Exchange; News. **3.45**, Exchange. **6.20**, Weather; Programme for Farmers; Exchange; Racing Results. **6.45**, Talk: The Sahara Exhibition at the Trocadero. **7.0**, Reading (Demaison). **7.30**, Topical Talk. **8.0**, Concert of Light Music; Conductor, André; Soloists, Mmes. Maxa, Caro Martel, M. Marjal and M. Garrick: March (Bagley); Waltz, Amoureuse (Berger); Songs; Serenata (Toselli); Overture (Litoff); Suite, The Nursery (Inghelbrecht); Songs; L'église du village (de la Presle); Selection from La jolie Parfumeuse (Offenbach); Overture and Waltz from Le petit Faust (Hervé); Songs; Persian Dance (Guiraud); Songs; Selection from A Waltz Dream (O. Straus); Piece (Thurban); Nogent sur Marne (Paradis). In the intervals at **8.30** and at **9.15**, News. **10.30**, Dance Music.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres** and **25.27 metres.**—**3.0 p.m.**, Harvest of Song. **3.15**, Sammy Fuller. **3.30**, To-day's Children. **3.45**, News; Cooking School. **4.0**, Uncle Tom and Betty. **4.15**, Platt and Nierman. **4.30**, Melody Mixers. **5.0**, Honey Dean. **5.15**, Fields and Hall. **5.30**, Vic and Sade. **5.45**, Hotel William Penn Orchestra. **6.0**, Market Reports. **6.15**, Hon. Archie and Frank. **6.30**, Farm and Home Hour. **7.30**, KDKA Home Forum. **8.0**, Radio Guild. **9.0**, Betty and Bob. **9.15**, Programme to be announced. **9.30**, Market Reports. **9.45**, Chicago Symphony Orchestra. **10.15**, KDKA Kiddies' Klub. **10.30**, Jackie Heller (Tenor). **10.45**, Orphan Annie. **11.0**, Dan and Sylvia. **11.14**, Baseball Resumé. **11.30**, Comedy Stars of Hollywood. **11.45**, Lowell Thomas. **12 Midnight,** Music; News; Drama. **12.15 a.m. (Tuesday),** Victor Merry-Makers. **12.30**, Nancy Martin. **12.45**, Frank Buck. **1.0 to 6.0**, Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 to 7.15 a.m.**, Time; Gym.; Music and Songs; News. **10.0**, Record. **10.5**, News. **10.20**, News in German. **10.25**, Record. **10.30**, See **Moravska-Ostrava. 11.0**, See **Brno. 12 Noon**, Time; Report for Farmers. **12.10 p.m.**, Records. **12.20**, News. **12.30**, Concert by Erno Kostal's Salon Orchestra. **1.30**, Labour Exchange. **1.40**, Records. **1.50**, Exchange. **1.55**, Exchange and Weather in German. **3.15**, See **Moravská-Ostrava. 4.15 to 4.20**, Exchange; Weather. **5.40**, Educational Talk. **5.50**, Records. **6.0**, Local Report. **6.5**, Market Prices. **6.10**, Records. **6.20**, German Transmission: Educational Discussion; Talk: The Prague Sample Fair, 1934. **6.55**, News in German. **7.0**, Time; News. **7.10**, See **Brno. 7.50**, See **Moravská-Ostrava. 8.20**, Astronomical Talk. **8.35**, Constantinople in Music—Pianoforte Recital by Emil Mikelka, with Commentary: Stamboul (de Bréville); Rondo, alla Turca (Mozart). **9.0**, Time. **9.1**, Concert by the Station Orchestra; Conductor, Jirak: Allegro vivace (Jirovec); Slav Rhapsody (Grinsky); Suite, Scheherazade (Rimsky-Korsakov). **10.0**, Time; News. **10.15**, Records. **10.45**, Announcements in German. **11.0** (approx.), Close Down.

RØUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan (No. 2), 1,348 kc/s, 222.6 metres; Turin (No. 2), 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.**—**7.30 a.m.**, Gym. **7.45**, Time; News. **8.0**, Interval. **12.30 p.m.**, Records. **1.0**, See **Milan.** In the interval at **1.30**, Time; News. **2.15**, Interval. **4.30**, Programme for Boys. **4.50**, News. **5.0**, Recital, Luigi Silva ('Cello), Franca Daidone (Mezzo-Soprano), Giuseppina Marciano and Maria Baratta (Soprano): 'Cello Solos: (a) Greek Melody (Seligmann-Guerrini), (b) Intermezzo (Lalo); Mezzo-Soprano Solos: (a) Ich grolle nicht, (b) Era la sera (Santoliquido), (c) Aria from A Masked Ball (Verdi): 'Cello Solo: Song and Arab Dance (Mulè-Silva); Soprano Duets: (a) Non ti sognare (Clari), (b) Sento un certo non so che (Monteverdi), (c) Ma fille, veux-tu un bonnet (Anon.). **5.55**, Corn Prices. **6.0**, Interval. **7.0**, Announcements. **7.15**, News in Foreign Languages. **8.0**, Time; News. **8.10**, Records. **8.30**, Government Announcements. **8.45**, See **Milan. 9.45**, Talk. **10.0**, Light Music. **11.0**, News.

RUYSSELEDE

10,330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.**, News in French. **8.0**, Records. **9.0**, News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SAN SEBASTIAN

1,258 kc/s, 238.5 metres; 3 kW.—**2.0 to 3.0 a.m. (Tuesday),** Programme in English arranged by the International Broadcasting Company of London. **2.0**, Half an Hour with the Gipsies. **2.30**, Light Music. **3.0**, I.B.C. Goodnight Melody and Close Down.

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by **W2XAF** on **31.48 metres** and by **W2XAD** on **19.56 metres.**—**7.0 p.m.**, Dreams Come True. **7.15**, Health Hunters—Sketch. **7.30**, Women's Radio Review; Talks; Orchestra. **11.30**, Exchange. **12 Midnight,** Topical Talk. **12.30 a.m. (Tuesday),** Voice of Firestone Garden Concerts. **1.0 to 3.0**, Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW.; and **Geneva, 401 kc/s, 748 metres.**—**6.0 a.m. to 6.15**, Gym. **10.45**, Report of the Cycle Tour of Switzerland. **11.15**, Interval. **12.29 p.m.**, Time. **12.30**, News in French and German. **12.45**, Concert by the Small Radio Lausanne Orchestra; Waltz, Wiener Blut (Joh. Strauss); Polka, Tritsch-Tratsch (Strauss); Selection from Phi-phi (Christiné); Two Pieces: (a) Alter Wiener Refrain, (b) Kleiner Weiner Marsch; Two Gipsy Dances (Barch); Overture, Cosi fan tutte (Mozart); Persian Dance (Guiraud); Suite from L'Arlésienne (Bizet); Chants d'Espagne (Albeniz); Selection from Manon (Massenet); Spanish Dance (Falla). **2.0**, Interval. **3.59**, Time. **4.0 to 7.30**, See **Beromünster. 7.30**, Commentary on the Cycle Tour of Switzerland. **7.59**, Weather. **8.0**, Concert of Popular Music by the Lyrette de Montreux; Conductor, Held. **8.30**, News in French and German. **8.45**, See **Paris (Ecole Supérieure). 11.15** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.**—**7.45 a.m.**, Divine Service. **8.0**, Weather. **12.30 p.m.**, Weather. **12.45**, Exchange. **12.55**, Time. **1.0** (from **Göteborg**), Pianoforte Recital by Hilding Domellöf—Three Pieces (Chopin): Etude in A flat, Waltz in C sharp minor, Ballad A flat; Silhouette (Reger); Tarantella from Venezia e Napoli (Liszt). **1.30**, Talk. **2.0-3.0**, Light Music by the Gösta Säfbom Orchestra. **5.0**, Weather. **5.5**, Talk from **Falun, 1,086 kc/s, 276.2 metres. 5.30**, Records. **6.30**, Reading. **7.0**, Guitar Recital by Bo Peters: Minuet (Sor); Spanish Dance No. 5 (Granados); Old Spanish Melodies (Mozzani). **7.15**, Weather; News. **7.30**, Talk, relayed from **Malmö, 1,312 kc/s, 228.7 metres. 8.0**, Military Band Concert; Conductor, Widner. **9.0**, Talk. **9.25**, Trio in A minor, Op. 77b, for Violin, Viola and 'Cello (Reger). **9.45**, Weather, News. **10.0**, Cabaret Programme. **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.30 a.m.**, Orchestral Concert; Conductor, Roskam. **12 Noon,** Records. **12.45 p.m.**, News. **1.0**, Time; Exchange. **1.5**, Records. **1.15**, Concert from **Paris (Ecole Supérieure). 3.30**, Concert from **Vichy. 5.0**, Concert of Chamber Music: String Quartet in G (Haydn); Violin and Pianoforte Sonata in D (Schubert); Pianoforte and String Quartet in E Minor (Mozart). **6.0**, Literary Talk. **6.15**, Weekly Review. **6.30**, Variety Concert; Conductor, Roskam. **7.30**, Time; News. **7.45**, Records. **8.0**, Press Review in German; Lottery Results; Announcements. **8.30**, Records. **8.45**, See **Paris (Ecole Supérieure). 11.15** (approx.), Press Review.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.45 a.m.**, Hymn; Time; Weather. **5.50**, Gym. **6.15**, Records. **6.40**, Time; News. **6.55**, Records. **7.25**, See **Munich. 8.10**, Weather. **8.15**, Gym. **8.35**, Interval. **9.0-9.15**, Programme for Women. **10.0**, News. **10.10**, Cinema Organ Recital by Kurt Albrecht: Versuchung (Sommer), Fantastiches Nachtstück (Huppertz), Spukgiester (Lindner), Piece (Roland), Nächtliche Weile (Noack), Der Giftbecher (Engelmann), Crainte (Porret). **10.40**, Recital by Willy Esterl ('Cello) and Thea Bischoff-Esterl (Pianoforte): Variations on a Theme of Handel (Beethoven), Air (Bach), Andante cantabile (Tartini). **11.5**, Recital of Seventeenth and Eighteenth Century Italian Songs by Emmy Rust. **11.25**, Post Office Concert. **11.55**, Weather. **12 Noon,** Concert by the Baden-Baden Symphony and Kurhaus Orchestra; Conductor, Assmus: Overture, Martha (Flotow); Perpetuum mobile (Strauss); Selection from The Bartered Bride (Smetana); Ballet Music from Le Cid (Massenet); Carillon (Scherz); Tarantella (Cui); Waltz (Fucik). **1.0 p.m.**, Time; Announcements. **1.5**, News. **1.20**, Records; Extracts from Der Bettelstudent—Operetta (Millöcker). **1.50**, Time; News. Records. **2.0-2.30**, Millöcker Records. **3.0**, Von Schillings and Mattiesen Song Recital by Ines Metzger-Clum (Contralto). **3.30**, Programme for Gardeners. **4.0**, See **Munich. 5.30**, Talk: Old Swabian Wooden Houses. **5.45**, Soldiers' Songs to the Lute by Heinz Eschwege. **6.0**, Programme for Young People: An Interview with Karl Köster on his return from America. **6.25**, French Lesson. **6.45**, Concert of Operetta Music by the Station Orchestra; Conductor, Fritz Wallenborn; Soloist, Gerda Hansi (Soprano): Overture, Indigo (Strauss); Recitative and Aria from Die schöne Galathee (Suppé); Waltz from Der Obersteiger (Zeller); Dance Song from The Geisha (Jones); Song, The Sun and the Moon, from the Mikado (Sullivan); Overture, Gri-gri (Lincke); Song (Lincke); Folies bergères (Lincke). **7.30**, Local Review. **7.40**, Time; Weather; Programme for Farmers. **8.0**, News. **8.10**, The Crazy Xylophone—a Musical Joke (Ludwig Hofmeier). **8.45**, See **Frankfurt. 10.20**, Time; News. **10.35**, Talk. **10.45**, News. **11.0**, Dance Music by the Waldmann-Gietmann Band relayed from Baden-Baden. **12 Midnight,** Concert. **1.0 a.m. (Tuesday),** Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.**, Dance Refrains. **8.30**, News. **8.35**, Popular Songs; Bal Musette. **12 Noon,** Opera Arias. **12.15 p.m.**, Military Music. **12.30**, News; Exchange. **12.45**, Request Programme. **1.0**, News; Market Prices. **1.5**, Viennese Orchestra. **1.15**, Songs. **1.30**, Symphony Orchestra. **1.45**, Operetta Arias. **2.0**, News; Amusement Guide. **6.0**, News. **6.15**, Opera Music. **6.30**, Sound Film Music. **6.45**, Light Music. **7.0**, Popular Songs. **7.15**, Military Music. **7.30**, News; Racing Results; Exchange. **7.45**, Opera Arias: Arias from Fortunio (Messager), Thaïs (Massenet); La Bohème (Puccini), Carmen (Bizet). **8.15**, Symphony Orchestra: Overtures, Le Roi d'Ys (Lalo), Anacreon (Cherubini). **8.30**, Humorous Sketches. **9.0**, Concert Version, La Dame Blanche—Opera (Boieldieu). **9.30**, Bal Musette. **10.0**, Choirs. **10.15**, News; Announcements. **10.30**, Dance Music. **11.0**, Request Programme. **11.15**, Operetta Songs. **11.30**, Viennese Orchestra. **11.50**, Songs. **12 Midnight,** News; Weather; Programme Announcements. **12.5 a.m. (Tuesday),** Au Caveau de minuit—Fantasy. **12.15**, Operetta Music: Selection from Rip Van Winkle (Planquette) and La vie parisienne (Offenbach). **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo. TURIN.**—Relays **Milan.**

VATICAN CITY

15,120 kc/s, 19.48 metres; 10 kW **(Morning). 5,970 kc/s, 50.26 metres (Evening).**—**11.0 to 11.15 a.m.**, Religious Information in Italian. **8.0 to 8.15 p.m.**, Religious Information in Italian.

VIENNA

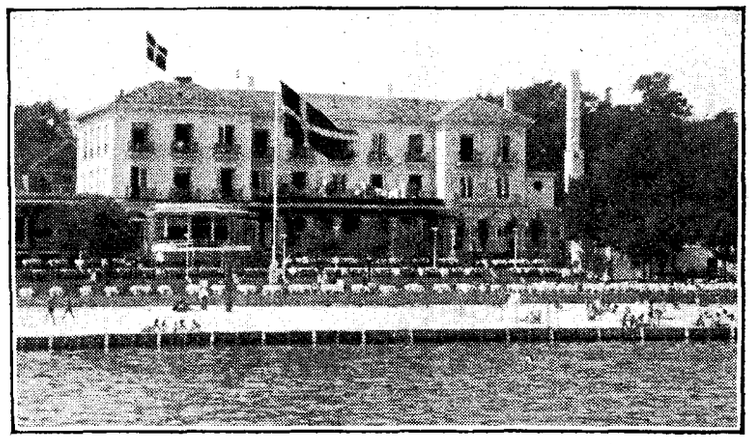
592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz,** and **Salzburg, 1,294 kc/s, 231.8 metres.**—**9.0**, News. **9.20**, Market Prices. **9.30**, Weather. **10.50**, Water Level. **11.30**, Records. **11.55**, Weather. **12 Noon,** Records. **1.0 p.m.**, Time; News; Programme Announcements. **1.10**, Records. **2.0**, Announcements. **3.30**, Time; Weather; Exchange. **3.50**, Programme for Women. **4.10**, News. **4.15**, Talk for Young People. **4.40**, Recital by Frieda Müller (Soprano) and Hein (Bass). **5.10**, A Stroll through Vienna—the Roman Remains. **5.35**, Books of Reference for the Week's Talks. **5.40**, Records. **6.35**, Talk: The Austrian Timber Problem. **6.45**, Talk: Photography. **7.0**, Time; Weather; News. **7.10**, Talk: The Vienna Fair. **7.25**, Concert by the Vienna Symphony Orchestra; Conductor, Holzer; Soloist, Bergauer (Songs); Overture, Morning, Noon and Night (Suppé); Waltz, Wiener Bürger (Ziehrer); Viennese Songs: (a) Geboren in Liechtenthal (Rosenzweig), (b) Geringste Idee (Sióly), (c) Die Sterne von Wien (Bergauer); Selection from A Waltz Dream (O. Straus); Annen-Polka (Joh. Strauss, Jun.); Reparatur-Couplet (Ziehrer); Two Songs (Bergauer): (a) Praterlied, (b) Donauweiberl; Potpourri, Wien bei Nacht (Komzák); Liechtenthaler March (Silber). **8.30**, Light Music. **8.40**, Reading (Heinrich Suso Waldeck). **9.10**, Concert by the Vienna Symphony Orchestra and the Graf Kurz Quartet; Soloist, Tausche (Baritone): Concerto for Strings, Op. 78 (Siegl); Lieder an eine Treulose, for Baritone and Orchestra, Op. 80 (Siegl); Symphony in C, Op. 37 (Fuchs). **10.30**, News; Announcements. **10.50**, Light Orchestral Music; Conductor, Jecha: Overture, Poet and Peasant (Suppé); Waltz, Nordsee-Bilder (Joh. Strauss); Grieg Potpourri (Urbach); Intermezzo, In a Persian Market (Ketelbey); Selection from Cavalleria rusticana (Mascagni); Song, Ich hab' einmal ein Rauscherl gehabt (Kapeller); Song and Czardas from Mariska (Lehár); Potpourri, Operettenrevue (Robrecht); Overture, Martha (Flotow); Waltz, Tanzen möcht' ich (Kálmán); Lehár Potpourri (Hruby).

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.**, Hymn. **6.35**, Records. **6.38**, Gym. **6.53**, Records. **7.5**, News. **7.10**, Records. **7.20**, Notes for Housewives. **7.25**, Programme Announcements. **7.30**, Announcements. **7.40**, Interval. **11.57**, Time. **12 Noon,** Fanfare from St. Mary's Church, **Cracow, 986 kc/s, 304.3 metres. 12.3 p.m.**, Weather. **12.5**, Press Review. **12.10**, Light Music by the Englard Orchestra, from **Ciechocinek. 1.0**, News. **1.5**, Light Music on Records. **2.0**, Announcements; Economic Notes. **2.15**, Interval. **4.0**, Orchestral Concert: March from Aida (Verdi); Overture, Der Paria (Moniuszko); Overture, Flis (Moniuszko); Czardas from 'Der Geist des Wojewoden (Grossman). **4.30**, Dance Records. **5.0**, Programme for Children. **5.15**, Recital by Mme. Al. Helfreich (Songs) and Tolkacz (Pianoforte). **6.0**, Talk: Professional and Domestic Work for Women. **6.15**, Quintet in G Minor (Mozart) on Records. **6.45**, Talk. **6.55**, Art Review. **7.0**, Announcements. **7.10**, Programme Announcements. **7.15**, With the Microphone through Poland — Programme from **Katowice, 758 kc/s, 395.8 metres. 7.40**, Records of the Dan Choir. **7.50**, Sports Notes. **8.0**, Great Thoughts. **8.2**, Talk: In the Tomb of Tutankhamen. **8.12**, Light Music by the Station Orchestra; Conductor, Gorzynski; Soloist, Zywolewski (Guitar). **8.50**, News. **9.0**, Fanfare from Gdynia. **9.2**, Talk for Farmers. **9.12**, Concert by the Station Orchestra; Conductor, Oziminski. **9.40**, Pianoforte Recital by Labunski: Allegro (Ph. Em. Bach); Sicilienne (W. Fr. Bach); Rondo in E Flat (Hummel); Two Pieces (Schumann): (a) Nachtlied, (b) Traubswirren; Two Pieces (Chopin): (a) Impromptu in F Sharp, (b) Etude in F, Op. 10, No. 8. **10.10**, Talk: The Declaration of War—Personal Souvenirs. **10.25**, Dance Music. **11.0**, Weather.

ZURICH.—Relays **Beromünster.**

AUG. 27th MONDAY *continued*



The Strandhotel at Bellevue, near Copenhagen, from which Andersen's string ensemble broadcasts a concert to-day.

TUESDAY

AUGUST THE TWENTY-EIGHTH

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.—1.30 to 2.30 p.m.,** Time Signal; Weather; Exchange; Records. **6.0,** Programme for Children. **6.45,** News. **7.0,** Irish Talk. **7.15,** Recitations by Nuala Gleeson. **7.30,** Time Signal; Concert of Light Music by the Station Orchestra. **8.0,** Variety by Maureen O'Mara. **8.15,** Station Orchestra. **8.30,** Pianoforte Recital by Lilian Conolly. **8.50,** Song Recital by C. O'Doherty (Tenor). **9.5,** Experiment—Play, presented by Gabriel Fallon and Company. **9.35,** Song Recital by Jean Nolan (Soprano). **9.50,** Irish Music by the Station Orchestra. **10.0,** Variety Programme. **10.30,** Time Signal; News; Weather. **10.40,** Records. **11.0** (approx.), Close Down.

BARCELONA

975 kc/s, 377.4 metres; 5 kW.—**8.15 a.m.,** News; Records. **9.0,** Chimes; Gym.; Records. **9.20,** News; Records. **10.0,** Obituary. **12 Noon,** Chimes; Weather. **1.0 p.m.,** Programme for Women. **2.0,** Records. **2.30,** Theatre Notes; Amusement Guide. **3.0,** Announcements; Talk: The Cinema; Sextet Concert. Extract from The Dollar Princess (Fall); Selection from Rosamunde (Schubert); Escena española (Cepeda); Oriental Dance (Moya); Song of the Rose, from El Pretendiente (Vives); Selection from Moros y cristianos (Serrano); Labour Exchange. **4.0,** Programme for Hospitals. **5.0,** News. **7.0,** Trio Concert. **7.30,** News; Concert (contd.); Request Programme. **8.15,** Talk: Sport. **8.30,** Exchange; Talk. **9.0,** Educational Talk. **9.10,** Talk. **9.20,** Records. **9.45,** Press Review. **10.0,** Chimes; Weather. **10.5,** Social Notes; Announcements; Exchange. **10.10,** Variety Programme. **10.40,** Recital on Two Guitars by Alfonso and Crespo. Etude (Sor); Turkish March (Mozart); Ave Maria (Schubert); Minuet (Mozart); Spanish Tango (Albeniz). **11.0,** Concert by the Heredia Ninon Trio. **11.30,** First Suite, Peer Gynt (Grieg), by the Station Orchestra. **12 Midnight,** Dance Music by the Melody Boys, relayed from the Shanghai Bar. **1.0 a.m. (Wednesday),** News; Close Down.

BASLE.—Relays **Beromünster.**

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.25,** See **Leipzig. 7.0,** News. **7.10,** See **Leipzig. 8.0,** Interval. **8.45,** Gym. for Women. **9.0,** Interval. **10.0,** News. **10.10,** Fire and Sword over East Prussia—Historical Sketch (Edith Heinrich-Brand) on Records. **10.50,** Programme for Children. **11.15,** Weather. **11.30,** Interval. **11.55,** Weather. **12.15 p.m.,** See **Hamburg.** In the interval at **12.55,** Time. **1.45,** News. **2.0,** Interval. **2.45,** Greetings; Announcements. **3.0,** Weather; Exchange. **3.15,** Die Müllerin—Sequence of Folk Songs and Legends (Meta Brix). **3.40,** Talk: Commercial Education. **4.0,** See **Munich. 5.30,** Sports Talk for Young People. **5.50,** Talk: India. **6.10,** Unfamiliar Humorous Goethe Lieder by Mia Neusitzer-Thönissen (Soprano) and Wilde (Tenor). **7.0,** Talk: Goethe. **7.10,** Political Press Review. **7.30,** Topical Talk. **8.0,** Motto; News. **8.10,** An Address by the Station Director. **9.15,** See **Rome. 10.0,** News. **10.30,** Report of the International Six-Days' Run. **10.45,** Weather. **11.0,** See **Munich. 12 Midnight** (approx.), Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Hymn; Gym. **6.15,** Weather; Prayers. **6.20,** Light Music by the Ferdy Kauffman Orchestra. **7.0,** News. **7.10,** Light Music (contd.). **8.0 to 8.20,** Gym. **8.30,** Announcements; Records. **9.30,** Hints for Housewives. **9.45,** Programme for Children. **10.0,** News. **10.10 to 10.25,** Market Prices. **11.25 to 11.30,** Exchange. **12 Noon,** Concert of Light Music by the Herbert Fröhlich Orchestra: Seid umschlungen, Millionen (Joh. Strauss); Minuet (Bolzoni); Extase (Ganne); Bagatelle (Lindner); Florentine Song (Raffaelli); Love Waltz (Carrera); Minuet (Hagemann); Die Romanze vom Glück (Milde-Meissner); La Folletta; Was dein Mund mir nicht sagt (Liebscher); Waltz, Verschmähte Liebe (Lincke). In the interval at **12.30 p.m.,** Weather. **1.0,** News. **1.15,** Records of Old and New Dances. **2.0,** News. **2.15,** Concert from **Stuttgart. 4.0,** Orchestral Concert relayed from the Berlin Radio Exhibition; Conductor, Homola: Overture, Alessandro Stradella (Flotow); Wedding Music Op. 45 (Jensen); Ballet égyptien (Luigini); Swedish Dances Op. 63 (Bruch); Triumph March from Aida (Verdi); Overture, Der Erlenhügel (Kuhlau); Polonaise Op. 12 (Svendsen); Two Slav Dances (Dvorák); Waltz, Wo die Zitronen blühn (Joh. Strauss); Polka-Mazurka (Jos. Strauss); Ballet Music from Ritter Pasman (Joh. Strauss). **6.0,** Wireless Notes. **6.5,** Programme for Young People. **6.30,** Baedeker without Stars—Sketch (Riemkasten). **6.45,** Adolf Schlemm Recital by Meier (Oboe) and Seiler (Viola). **7.20,** Agriculture for City Folks. **7.40,** Echoes of the Day. **7.50,** News. **8.10,** See **Stuttgart.** In the interval at **10.20,** News. **12 Midnight,** Light Music and Dance Music by the Small Station Orchestra; Conductor, Steiner. **1.0 a.m. (Wednesday),** Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**12.15 p.m.,** Programme to be announced. **1.0,** See **Sottens. 2.0,** Interval. **4.0,** See **Sottens. 7.30,** Report on the Cycle Tour of Switzerland. **8.0,** Vocal and Instrumental Concert. **8.55,** Kreuz und quer—Sequence (Meyer-Gutzwiller and Hausmann). **9.15,** Weather; News. **9.30,** Recital on Two Pianofortes. **10.15** (approx.), Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Talk; Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian. **11.0,** Water Level. **11.5,** See **Prague. 12.10 p.m.,** News in Slovak. **12.15,** Record. **12.20,** See **Prague. 1.40,** News and Weather in German and Hungarian. **1.50 to 2.0,** See **Prague. 3.15 to 4.20,** See **Prague. 5.40,** Records. **5.50,** See **Prague. 6.0,** Records. **6.15,** Hungarian Transmission: Literary Programme. **6.55,** See **Prague. 7.40,** Literary Talk relayed from **Kosice, 1,113 kc/s, 269.5 metres. 7.55,** See **Prague. 11.0,** News in Hungarian. **11.15** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.—5.0 a.m.,** Hymn; Motto. **5.10,** Records. In the interval at **5.40,** Notes for Farmers. **6.0,** Time; Weather; Gym. **6.25,** See **Leipzig. 7.0,** News. **7.15,** See **Leipzig. 8.0,** Cookery Hints. **8.10,** Records. **9.0,** News. **10.10 to 10.40,** Broadcast for Schools: French Folk Songs. **11.30,** News. **11.45,** Notes for Farmers. **12 Noon** (from **Gleiwitz**), Orchestral Concert of Light Music. Conductor: Peter. In the interval at **12.30 p.m.,** Notes for Farmers. **1.30,** News. **1.45** (from **Gleiwitz**), Orchestral Concert. Conductor: Peter. Overture, The Nuremberg Doll (Adam); Waltz, Dolores (Waldteufel); Elfentanz (Heykens); Intermezzo (Marks); Gallop (Armandola). **2.20,** Exchange. **2.25,** Announcements; Records. **2.50,** Market Prices. **3.10,** Goethe Lieder (Reichardt) by Cläre Frühling (Soprano) and Hanna Ehrhardt (Recitations to Music). **3.40,** Talk: Butterflies. **4.0,** Orchestral Concert. Conductor: Gielnik. Overture, Le Premier Jour de Bonheur (Auber); Scandinavian Suite (Juel Frederiksen); Waltz (Blon); Swabian Rhapsody No. 4 (Kaempfert); Fantasia on the Song, Santa Lucia (Löhr); Symphonic Dance Fantasy (Leuschner); Japanese Overture (Yoshitomo). **5.30,** Notes for Farmers. **5.35,** Talk for Women. **5.55,** The August Issue of The Oberschlesier. **6.20,** Humorous Vocal Quartets; Warnung (Mozart); Two Songs (Piber): (a) Zeitrechnung in der Schlafstube, (b) Maier-Hymne; Musikalische Speisekarte (Keldorfer); Pepita (Müller). **6.50,** Announcements; Notes for Farmers, **7.0,** Community Singing from the Eichendorff Open-Air Theatre, Scheitnig. **8.0,** To-day's News. **8.10,** Address by Dr. Ley (on Records). **9.0,** Music for Workers. **10.10,** Technical Talk. **10.20,** News. **10.45,** Records. **11.0,** See **Munich. 12 Midnight** (approx.), Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 10.25,** Records. **11.5,** See **Prague. 1.30 p.m.,** Talk on Economics. **1.40 to 2.0,** See **Prague. 3.15 to 4.20,** See **Prague. 5.40,** Announcements. **5.50,** Talk. **6.0,** Records. **6.20,** German Transmission: Review; Talk for Farmers. **6.55,** See **Prague. 7.40,** Literary Talk from **Kosice, 1,113 kc/s, 269.5 metres. 7.55,** See **Prague. 11.15** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Records. **12.45 p.m.,** Song Recital by Suzanne Braconnier; Arias from Athalie (Weber); Elisabeth's Prayer from Tannhäuser (Wagner); Puisque l'aube grandit (Fauré). **1.0,** News. **1.10,** Orchestra; Concert of Light Music: Potpourri (Salabert); Selection from Frederica (Lehár); Waltz, Toujours ou jamais (Waldteufel); Selection from Cocorico (Ganne); Divertissement for Two Trumpets (Wangermée); Neapolitan Dance (Desormes). **2.0,** Interval. **4.55,** Announcements. **5.0,** Belgian Concert by the Symphony Orchestra; Conductor, Meulemans: Ballet, La fête du vieux tilleul (Barbier); Tarantella (Mawet). **5.30,** Programme for Children. **6.5,** Talk by the Abbot of Maredsons: The Benedictine Order. **6.15,** Sacred Music by the Choir of Dijon Cathedral (on Records). **6.30,** Recital by René Costy (Violin) and Lydia Vanderlinden (Pianoforte). **7.15,** Wireless Notes. **7.30,** Art Review; Programme for Women. **8.0,** Operetta Music by the Radio Orchestra; Soloist, Piergyl (Songs): Overture, Fra Diavolo (Auber); Air from L'Irato (Méhul); Ständchen (Schubert); La dame du pesage (Hirckmann); Song from Die Teresine (O. Straus); Selection from The Desert Song (Romberg); Song from The Czarevitch (Lehár); Selection from Nina-Rosa (Romberg); Song from Paganini (Lehár). **8.50,** The Vicentius Choir. **9.0,** Address by the Bishop of Tournai: The Eucharistic Congress in Soignies. **9.15,** Concert of Classical Music by the Symphony Orchestra; Conductor, Meulemans; Soloist, Mény Merckx (Songs): Overture, Prometheus (Beethoven); Extracts from Orpheus (Gluck); Scherzo from A Midsummer Night's Dream (Mendelssohn); Ah, perfido (Beethoven); Overture, Iphigenia in Aulis (Gluck). **10.0,** News. **10.10,** Request Records. **10.55,** Christus vincit (Liszt). **11.0,** Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish. **11.57 a.m.,** Weather. **12 Noon,** Descriptive Music—Orchestral Concert; Waltz, Potpourri No. 3 (Robrecht); Overture, Frau Meisterin (Suppé); Gavotte Idylle (Lincke); Records; Selection from Véronique (Messager); Selection from The Last Waltz (O. Straus); Record: Romantic Suite (Armandola). **1.0 p.m.,** News. **1.10,** Records. **2.0,** Interval. **4.55,** Announcements. **5.0,** Offenbach Concert by the Radio Orchestra. **6.15,** Descriptive Music—Orchestral Concert. **7.15,** Talk: The Economic Position of the World. **7.30,** Programme for Women. **8.0** Russian Concert; Conductor, Meulemans; Soloists, Yurenev and Nancy Vellaz (Songs), and Boyarin (Songs to the Guitar); Overture, Russian and Ludmilla (Glinka); Songs (Mussorgsky): (a) Aria from Boris Godunov, (b) Trepak, Persian Dance from Khovanstchina (Mussorgsky); Songs: (a) Aria from Russlan and Ludmilla (Glinka), (b) Aria from Prince Igor (Borodin). **8.45,** Talk. **9.0,** Records: Dances from Prince Igor (Borodin). **9.15,** Russian Concert (contd.); Russian Dance No. 2 (Bullerian); Songs to the Guitar; Dance (Tchaikovsky); Four Songs (Mussorgsky); On the Volga (Van Dijck). **10.0,** News. **10.10,** Dance Records. **11.0,** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15,** Time; News. **1.40,** Records. **6.0,** Time; Weather. **6.5,** Concert of Light Music by the Motzoi Orchestra. **7.30,** Educational Programme. **7.45,** Records. **8.0,** Talk. **8.15,** Brahms Concert by the Station Orchestra; Conductor, Perlea: Tragic Overture; Variations on a Haydn Theme; Symphony No. 4 in E minor. In the interval at **9.0,** Anthology. **10.0,** News. **10.30,** Records.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym. **9.45,** News. **10.0,** Talk. **10.40,** Horticultural Talk. **11.10,** Water Level. **12 Noon,** Chimes. **12.5 p.m.,** Concert by an Orchestra of Unemployed Musicians. **1.30,** Concert by the University Choir. **2.40,** Notes for Housewives. **4.0,** Programme for Women. **5.0,** Talk. **6.0,** Humorous Talk. **6.30,** Concert of Light Music from the Margareteninsel. **7.30,** Talk. **8.0,** Concert by a Trumpet Quartet. **8.50,** News. **9.10,** Concert by the Rigo Cigány Band. **10.20,** Concert by the Budapest Concert Orchestra. Conductor: Nandor Zsolt. Overture, The Secret Marriage (Cimarosa); Selection from The Violinmaker of Cremona (Hubay); Melody (Rousseau); La Czarine (Ganne); Waltz (Kern); Rakoczy Overture (Kéler-Béla). **11.30,** Dance Music by the Pataky Jazz Band, from the Hotel Gellert.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Hymn; Records. **6.5,** Gym. **6.25,** See **Leipzig.** In the interval at **6.50,** Hymn; News. **8.0,** Announcements. **8.5 to 8.20,** Gym. for Women. **10.0,** News. **10.10,** Carl Loewe Ballads by Strienz (Bass). **10.40,** History Reading. **11.0,** Folk Songs. **11.30,** Announcements; Records. **12 Noon,** Records. **12.45 p.m.,** Announcements; Greetings. **1.0,** Concert of Light Music by the Small Station Orchestra; Conductor, Eysoldt: Overture, Turandot (Lachner); Waltz, Märchen aus dem Orient (Strauss); Suite (de Micheli); Berceuse (Godard); Waltz Serenade (Czibulka); Der lustige Postillon (Pesse). **1.45,** Announcements. **2.0 to 2.45,** Light Music by the Fröhliche Fünf. **3.10,** Talk: Safety Devices on Modern Ships. **3.30,** Exchange. **3.45,** Talk: The Marriage Subsidy. **4.0,** Concert by Fritz Schlenkermann's Orchestra, relayed from Dortmund. **5.0,** Talk: Goethe. **5.35,** Goethe Lieder (Schubert) by Kläre Hansen (Soprano) and Engels (Tenor): Gretchen am Spinnrad; Heideröslein; Der König in Thule; Schäfers Klagelied; Nähe des Geliebten; Geheimes; Ariette de Claudine; Der Musensohn. **6.0,** Report of a Holiday Tour. **6.20,** Talk: Electricity. **6.40,** Topical Talk. **6.50,** Time; Weather; Exchange; Sports Notes. **7.0,** Variety Programme with Liselotte Wilke (Songs). **8.0,** Announcements. **8.10,** German Folk Songs and Dances—A Lecture-Recital with Records. **8.45,** Don Carlos—Drama (Schiller), relayed from **Berlin. 10.20,** News. **10.40,** Chess Lesson. **10.50** (approx.), Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**10.30 a.m. to 12 Noon,** Programme in English arranged by the International Broadcasting Company of London: Dance Music. **12 Noon to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English arranged by the I.B.C. **4.30,** Torquay, Exeter, Plymouth, and Devonport Concert: Part I—Melodrama; Part II—Dance Music; Part III—Organ Recital. **5.45,** Dance Music. **6.0 to 11.0,** Programme in French. **11.0** till Close Down, Programme in English arranged by the I.B.C. **11.0,** Variety Programme on Gramophone Records. **11.30,** Concert of Light Music arranged by the I.B.C. (Ireland), Ltd. **12 Midnight,** Club Concert for Crewe Listeners: Dance Music. **12.30 a.m. (Wednesday),** I.B.C. Time Signal. **12.31,** Dance Music (contd.). **1.0,** I.B.C. Good-night Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.40,** Time; Announcements. **6.50,** Weather. **6.55,** Military Band Concert from **Donaueschingen. 8.10,** Weather. **8.15 to 8.35,** Gym. **10.0,** News. **10.45,** Hints for Housewives. **11.0,** Concert. **11.40,** Announcements; Exchange. **11.50,** Social Notes. **12 Noon,** See **Stuttgart. 1.0 p.m.,** Time; News. **1.20,** Orchestral Concert. **1.50,** News. **2.0,** Concert (contd.). **2.40,** Talk for Women: Three Women and Goethe—Sketch (Bassermann). **3.30,** Weather. **3.35,** Industrial Review. **3.50,** Time; Exchange. **4.0,** Concert by the Station Orchestra; Conductor, Merten; Soloist, Charlotte Boerner (Soprano): Suite from Euryanthe (Weber-Jokl); Aria from Maria di Rohan (Donizetti); Overture and Aria from Fierrabras (Schubert); Overture and Aria from Genoveva (Schumann); Overture, Riccio (Sandberger); Symphony in D (Mozart). **5.30,** Talk: The Winner of the Goethe Prize, 1934. **5.45,** Hugo Wolf Lieder by Jaroschek (Tenor). **6.0,** Dialogue: A Journey through Spain. **6.15,** Industrial Review. **6.25,** Italian Lesson. **6.45,** Weather; Exchange; Announcements; Time. **6.50,** Topical Talk. **7.0,** Concert by the Municipal Orchestra, relayed from **Giessen. 8.0,** Time; News. **8.10,** The Industrial Revival in South-West Germany—Sequence (Dr. Paul Laven). **8.50,** Variety Programme. **10.20,** Time; News. **10.35,** See **Stuttgart. 10.45,** Variety Interlude. **11.0,** Concert by the Municipal Orchestra, relayed from **Trier. 12 Midnight,** Records. **1.0 a.m. (Wednesday),** Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.** Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg,** and **Hanover, 1,330 kc/s, 225.6 metres.—5.45 a.m.,** Time; Weather; Notes for Farmers. **6.0,** Gym. **6.15,** Time; Weather. **6.20,** See **Berlin (Funkstunde). 7.0,** News. **7.10,** See **Berlin (Funkstunde). 8.0,** Weather; Notes for Women. **8.10,** Announcements; Records. **10.50,** News. **11.0,** Military Music for Schools, with Commentary. **11.45,** Records. **12 Noon,** Notes for Housewives. **12.5 p.m.,** Time; Weather; Shipping Notes. **12.15,** Concert for the Radio Exhibition. The Station Orchestra. Conductor: Eibenschütz. Liebeswalzer (Reger); Hungarian Rhapsody No. 2 (Liszt); Italian Caprice (Tchaikovsky); Overture, Die Fledermaus (Joh. Strauss); Flirtation (Steck). **1.0,** Exchange. **1.15,** Weather. **1.20,** Concert (contd.): Scènes napolitaines (Massenet); Extracts from Der Tenor der Herzogin (Künneke); Dynamiden-Walzer (Jos. Strauss); Norwegian Dances (Grieg). **2.15,** News. **2.30,** Folk Song Records. **3.0,** Exchange. **3.40,** Shipping and Aviation Notes. **4.0,** See **Berlin (Funkstunde). 5.30,** Sequence for Women: The Moors (Gerda Jörn). **6.10,** Topical Talk. **6.45,** Exchange. **6.55,** Weather. **7.0,** Dithmarschen—Play (Jan). **7.45,** Three Pieces from the Fantasie-Stücke, Op. 12 (Schumann) by Hattenbach (Pianoforte): (a) Fabel, (b) Traumeswirren, (c) Ende vom Lied. **8.0,** Announcements. **8.10,** Military Band Concert from **Magdeburg. 8.50,** The Speedy Engagement—One-Act Comedy (Paul Ernst). **9.30,** Concert by the Magdeburg Cathedral Choir from St. John's Church, **Magdeburg.** Conductor: Henking. Motet (Chemin-Petit); Three Songs from the Marienlieder, Op. 22 (Brahms): (a) Der englische Gruss, (b) Marias Kirchgang, (c) Der Jäger; Songs from Op. 138 (Reger): (a) Unserer Lieben Frauen Traum, (b) Nachtlied. **10.0,** News. **10.20,** Light Music. **11.0,** Orchestral Concert from **Magdeburg.** Conductor: Theil. Overture, Das Modell (Suppé); Selection from Der Obersteiger

(Zeller); Sérénade printannière (Lacombe); Italian Serenade (Czibulka); Glow-worm Idyll from Lysistrata (Lincke); Blumengeflüster (Blon); Waltz, Tales from the Vienna Woods (Joh. Strauss). **12 Midnight** (approx.), Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Kootwijk,** 50 kW. from **3.40 p.m.** Programme of the General Broadcasting Society (A.V.R.O.).—**7.40 a.m.,** Time; Records. **9.40,** Service. **9.55,** Records. **10.10,** Light Music by the Rentmeester Orchestra. **12.10 p.m.,** Recital by Pierre Palla (Organ), Boris Lensky (Violin), and J. Wolf (Tenor). **1.40,** Pianoforte Recital by Cor de Groot. Part I, Rachmaninov Music: Polichinelle; Elegy; Waltz; Humoresque. Part II, Cor de Groot Music: To Debussy; Toccatina from the Miniature Suite; Two Pieces from Portraits. **2.10,** Recitations. **2.40,** Records. **3.40,** Interval. **3.55,** Records. **4.10,** Songs by a Children's Choir. **4.40,** Programme for Children. **5.10,** Light Music by the Kovacs Lajos Orchestra. **6.10,** Talk. **6.40,** Light Music (contd.). **7.10,** Talk: Old Italian Works of Art. **7.40,** Time; News. **7.45,** Concert by the A.V.R.O. Orchestra. Conductor: Nico Gerharz. Soloists: Egbert Veen (Pianoforte) and Van der Woude (Violin). Overture, L'isola disabitata (Haydn); Eine kleine Nachtmusik (Mozart); Romance in F for Violin and Orchestra (Beethoven); Ballet Music from Rosamunde (Schubert); Capriccio brilliant for Pianoforte and Orchestra (Mendelssohn). **8.40,** News. **9.0,** Light Music by the A.V.R.O. Orchestra. Conductor: Nico Gerharz. March, Grillenbanner (Komzak); Overture, Poet and Peasant (Suppé); Waltz, Wienermädl (Ziehrer); Selection from The Bird Fancier (Zeller). **9.40,** Records. **9.55,** Concert by the A.V.R.O. Orchestra. Conductor: Gerharz. Overture, The Crown Diamonds (Auber); Selection from La Périchole (Offenbach); Entr'acte Gavotte (Gillet); Aubade printannière (Lacombe); Ballet Music from Faust (Gounod). **10.40,** News. **10.50,** Light Music and Dance Music relayed from the Pschorr Restaurant, **Rotterdam.** **11.40,** Time; Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW (until **6.40 p.m.**); 20 kW. from **6.40 p.m.**—Programme of the Catholic Radio Society (K.R.O.). **7.40 a.m.,** Records. **9.10,** Talk. **10.10,** Concert. **10.40,** Records. **11.10,** Religious Address. **11.40,** Police Messages. **11.55,** Records. **1.40 p.m.,** Programme for Women. **2.40,** Records. **2.55,** Recitations by Hartman. In the interval at **3.5,** Records. **4.10,** Records. **5.10,** Concert by the K.R.O. Boys. Conductor: Lustenhouwer. Souvenirs (Neumann); Im Walzerrausch (Lincke); Thanks (Johnston); Waltz Potpourri (Borchert); I was in the Mood (Pola); Records. Piece (Warren); Rubinstein Potpourri (Urbach); Potpourri (Schneider); Plaisir d'amour (Martini); Hold my hand (Henderson). **6.40,** Police Messages. **6.55,** Talk. **7.15,** Records. **7.40,** Concert by the K.R.O. Orchestra. Conductor: Ruygrok. Symphony No. 2 in F sharp minor, Op 20 (Ruygrok). **8.10,** News; Talk on Films. **8.30,** Concert (contd.). Soloist: Tiny Kaiser (Pianoforte); Overture, Raymond (Thomas); Pianoforte Concerto in A (Liszt). **9.10,** Choral Concert: Kyrie, Sanctus, and Benedictus, from the Missa Dies Sanctificatus (Palestrina); Song (arr. Gevaert); Sixteenth Century Rondo and Melody (arr. Gevaert); Eighteenth Century Military Song (arr. du Bois), **9.25,** Pianoforte Recital by Tiny Kaiser. **9.40,** Peer Gynt Suite (Grieg) by the K.R.O. Orchestra. Conductor: Ruygrok. **10.10,** News. **10.15,** Choral Concert (contd.): Les bergerettes (arr. du Bois); Noël Nantais (arr. du Bois); Two Songs for Soprano and Contralto (Abramzs); Die Nachtingall im Tannenwald (arr. Schumann); Schneiders Höllenfahrt (arr. Hausegger). **10.35,** Records. **10.40,** Concert by the K.R.O. Boys. Conductor: Lustenhouwer. Piece (de Leur); Potpourri (Borchert); Potpourri (Dostal); Same old Moon (Rose); Ilona (Tauber); Quadiano (Martini-de Leur). **11.25,** Records. **11.40** (approx.), Close Down.

INNSBRUCK.—Relays **Vienna.**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres;** and **Skamlebaek, 49.5 metres.**—**7.0 a.m.,** Gym. **7.27,** Weather. **8.30,** Service from Copenhagen Cathedral. **11.0,** Weather. **11.10,** Fish Prices. **12 Noon,** Chimes; Weather. **12.5 p.m.,** Concert by the Bendix String Ensemble, relayed from the Wivex. **2.0,** Interval. **3.0,** Concert by the Station Orchestra; Conductor, Launy Gröndahl; Soloist, Dagny Möller (Songs): Overture, King Stephen (Beethoven); Selection from William Tell (Rossini); Hungarian Dances in G minor and F (Brahms); La Cloche (Brusselmans); Four Eighteenth Century English Dances (arranged Gröndahl); L'année commence (Jacobsen); La Turque (Gluck); Le chant du coq (Grétry); La rafraichissante (Schall): Six Songs (Palmgren); Rhapsody on Folk Melodies (Gaubert): Selection from Samson and Delilah (Saint-Saëns); Suite, Jours de fête (Rhéne-Baton); Serenade (Gounod); March (Rosey). **5.0,** Talk for Girls. **5.30,** Exchange. **5.42,** A Poem. **5.45,** French Recitation: Le Pater (François Coppée), by Marthe Husson. **6.15,** German Lesson. **6.45,** Weather; Wireless Notes. **7.0,** News. **7.15,** Time. **7.30,** Talk. **8.0,** Time; Weather. **8.2,** The Maid of Orleans—Tragedy (Schiller); Translation by Johannes Magnussen. **10.0,** News. **10.15,** Concert of Light Music by the Station Orchestra; Conductor, Emil Reesen: Russian March (Ganne); Selection from Roses from Florida (Lehár); Waltz from The Dollar Princess (Fall); March from Sunny (Kern); Tarantella from the Gipsy Suite (German); Romanian Festival Overture (Kéler Béla). **11.0,** Dance Music relayed from the Lodberg. In the interval at **12 Midnight,** Chimes. **12.30 a.m. (Wednesday),** Close Down.

KIEL.—Relays **Hamburg.** **KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—**5.0 a.m.,** Records. **5.50,** Weather. **6.0,** Gym. **6.20,** See **Berlin (Funkstunde).** **7.0,** News. **7.10,** See **Berlin (Funkstunde).** **8.0,** Prayers. **8.30,** Gym. for Women. **9.0,** Interval. **9.5,** A Sketch for Schools. **10.40,** News. **10.55,** Weather. **11.5,** Talk for Farmers. **11.30,** Records. **12 Noon,** See **Berlin (Funkstunde).** In the interval at **12.30 p.m.,** News. **1.1,** Time; Weather. **1.5,** Records. In the intervals, News. **2.30,** Announcement; Records. **3.0,** Market Prices. **3.10,** Book Review. **3.30,** Reading. **4.0,** Concert of Light Music by the Small Station Orchestra; Conductor, Wilcken: Overture, Semiramis (Rossini); Extracts from Gaudeamus (Humperdinck); Traumideale (Fucik); Doubt (Glinka); Extracts from Lysistrata (Lincke); Rhapsody No. 2 (Liszt); Overture, Der Wolgazigeuner (Spialek); Barcarolle (Rust); Liebesserenade (Blön); Waltz (Blön); In the interval, at **5.0,** Holiday Hints. **5.50,** Advice on Careers. **6.15,** Market Prices. **6.25,** Talk: The Battle of Tannenberg. **6.55,** Weather. **7.0,** Violin and Pianoforte Recital by Edith von Voigtländer and Margrit Goetz; Two Pieces (Arensky): (a) Basso ostinato, (b) Caprice; Aria (Reger); Grave (Mayerhoff); Pieces (Tchaikovsky): (a) Russian Dance, (b) Troika; Four Pieces from the Italian Suite (Kaun): (a) Lake Garda, (b) Venice, (c) Genoa, (d) Naples. **7.45,** Two East Prussian Tales. **8.0,** News. **8.10,** Concert by the Opera House Orchestra; Conductor, Brückner; Soloist, Hedwig Jungkurth (Songs); Extracts from Jeux d'enfants (Bizet); Arias from Madame Butterfly and La Bohême (Puccini); Rhapsody on Swedish Folk Melodies (Lindberg); Song from Boccaccio (Suppé); Liebeswalzer (Joh. Strauss); Ballet égyptien (Luigini); Overture, The Gipsy Baron (Joh. Strauss). **9.35** (from **Danzig**), Der fliegende Geheimrat—Sketch (Goetz). **10.0,** News. **10.30,** Dance Music from the Casino Hotel (Zoppot). **12 Midnight** (approx.), Close Down.

KOSICE.—Relays **Prague.** **LAUSANNE.**—Relays **Sottens.**

LAHTI

166 kc/s, 1,807 metres; 40 kW. Relayed by **Helsinki, 895 kc/s, 335.2 metres.**—**7.5 to 7.20 a.m.,** Service in Swedish. **7.30 to 7.45,** Service. **11.0,** Exchange. **11.5,** Records. **11.30,** Exchange. **11.45,** News in Finnish and Swedish. **11.59,** Time; Weather. **5.0 p.m.,** Violin Recital by Rastenberger. **5.25,** Talk. **5.50,** News. **5.59,** Time; Weather. **6.10,** News. **6.15,** Song Recital by Elli Ranta. **6.40,** Talk. **7.5,** Recitations. **7.30,** Concert by the Station Orchestra. Conductor: Haapanen. Soloist: Marguerite Trombini-Kazuro (Pianoforte). Concerto (Corelli); Pianoforte Concerto in E flat (Mozart); Adagietto (Kajanus); Intermezzo (Sibelius); Les Préludes (Liszt). **8.45,** News. **9.0,** News in Swedish. **9.10,** Music relayed from the Kappeli Restaurant. **10.0** (approx.), Close Down.

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.**—**5.50 a.m.,** Notes for Farmers. **6.0,** Gym. **6.25,** Concert by the Station Orchestra. Conductor: Schröder. **7.0,** News. **7.15,** Concert (contd.). **8.0,** Gym. **8.20,** Records. **9.0 to 9.20,** Programme for Women. **9.40,** Exchange. **9.45,** Announcements. **10.10 to 10.50,** Broadcast for Schools: A Visit to the Zeppelin Works at Friedrichshafen (on Records). **11.0,** Announcements; Records. **11.30,** News. **11.40,** Weather. **11.50,** Notes for Farmers. **12 Noon,** Concert by the Station Orchestra. Conductor: Blumer. **1.0 p.m.,** News. **1.10,** Records. **2.0 to 2.15,** News; Exchange; Weather. **3.0** (from **Dresden**), Recital by Müller-Hayn (Baritone), Dietrich ('Cello), and Schaefer (Pianoforte). **3.35,** Exchange. **4.0** (from **Dresden**), Concert by the Dresden Philharmonic Orchestra, from Weisser Hirsch. Conductor: Schestak. Overture, Euryanthe (Weber); The Ride of the Valkyries, from The Valkyrie (Wagner); Suite No. 2 (de Micheli); Waltz (Joh. Strauss); Extracts from Cavalleria rusticana (Mascagni). **5.0,** Talk: Goethe and Eckermann. **5.20,** Talk: Humour in German Song. **5.50,** Exchange; Weather; Time. **6.0,** Military Talk. **6.20,** Wind Instrument Concert. **7.5,** Recital by Lahl (Violin), Schaaf ('Cello), and Sammler (Pianoforte). **7.40,** Talk: German Peasant Genealogy. **8.0,** News. **8.10** (from **Dresden**), Concert by the Dresden French Horn Quartet. **8.45,** Bavarian Folk Songs by Josef Voggenauer. **9.15,** See **Rome.** **10.0,** Topical Talk. **10.20,** News. **10.50** (from **Dresden**), Concert of Opera Music by the Philharmonic Orchestra. Conductor: Nerlich. **12.30 a.m. (Wednesday),** Close Down.

LINZ.—Relays **Vienna.**

LJUBLJANA

527 kc/s, 569.3 metres; 5 kW.—**12.15 p.m.,** Records. **12.45,** News. **1.0,** Weather; Records. **7.0,** Programme for Children. **7.30,** Talk. **8.0,** Station Orchestra. **9.0,** Floramye—Operetta (on Records). **10.10,** Weather; News. **10.30 to 11.0,** Programme in English arranged by the International Broadcasting Company of London. **10.30,** Concert. **11.0,** I.B.C. Goodnight Melody and Close Down.

LUXEMBOURG

230 kc/s, 1,300 metres; 150 kW.—**7.45 a.m.,** Records. **8.0,** News in French; Record; News in German; Record. **12 Noon,** Concert by the Station Orchestra; Conductor, Pensis: March (Westenberg); Dreaming (Joyce); Selection from Cavalleria rusticana (Mascagni); Aurore (Leemans); La Belle au Bois dormant (Debussy); Ballet Music from Faust (Gounod); Xantippchen (Königsberger); Amina (Lincke); Selection from Phi-phi (Christiné). In the interval at **12.30,** News in French and German; and at **1.0,** Exchange. **1.15,** Talk: Beekeeping in Luxembourg. **1.20,** Records. **1.30,** Exchange. **1.35,** Records (contd.). **2.0,** Exchange. **3.45,** Exchange. **6.30** till Close Down, Belgian Evening. **6.30,** Variety Programme. **7.30,** Racing Results in French. **7.35,** Tourist Talk. **7.40,** Violin Recital by Carlo Kaufhold: Tzigane (Ravel); Piece (Wieniawsky). **8.0,** News in French and German. **8.20,** Concert by the Station Orchestra; Conductor, Pensis: Overture, The Thieving Magpie (Rossini); Waltz, The Rose of Stamboul (Fall); Parlezmoi d'amour (Lenoir); Selection from Tales of Hoffmann (Offenbach); Baby plays Soldiers (de Micheli). In the interval at **8.30,** Exchange. **9.5,** Concert of Belgian Music by the Station Orchestra; Conductor, Pensis; Soloist, Simon (Songs): Ballad (de Greef); Tryptique (Vreuls); Le Chevalier maudit (La Gye); Suite in the Eighteenth Century (Goyens); Deuxieme Nocturne (d'Agrèaves); Dance Variations (Poot). **10.5,** Recital of Belgian Songs by Gustave Simon; Les Gars de chez nous (Daneau); Berceuse Rose (Daneau); Dans la Maison (d'Agrèaves); Faune (d'Agrèaves); La Prisonnier (Ryelandt); Clair de lune (Ryelandt); Adieu (Rasse); Le Cimetière au Bord de la Mer (Rasse). **10.30,** Dance Music by the Station Jazz Band; Conductor, Jusa.

LYONS

LA DOUA, 648 kc/s, 463 metres; 15 kW.—**8.0 a.m.,** News. **10.30,** concert from **Toulouse, PTT, 776 kc/s, 386.6 metres. 12 Noon,** Concert by the Station Orchestra. In the interval at **1.0 p.m.,** News, and at **1.15,** Music Notes. **2.30,** Concert by the Fusier Orchestra. Italian March (Rousseau); Military Waltz (Waldteufel); Moment musical (Schubert); Russian Song (Leoni); Selection from Les cloches de Corneville (Planquette); Ochsenmenuet (Haydn); Foxtrot (Bozi); Selection from La Tosca (Puccini); Nocturne for 'Cello (Chopin); Intermezzo (Scassola). **5.30,** News. **7.30,** Local News. **7.40,** Legal Notes. **8.0,** Variety. **8.10,** Medical Notes. **8.30** till Close Down, See **Paris (Ecole Supérieure).**

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**9.0 a.m.,** News. **10.0,** Announcements; Exchange. **10.30,** Interval. **2.0 p.m.,** Chimes; Time; Weather; Light Music. **2.30,** Sextet Concert. **3.0,** Amusement Guide; Exchange; Light Music. **3.30,** Sextet Concert (contd.). **4.0,** Light Music. **4.15,** Sextet Concert (contd.). **4.50,** News. **5.0,** Interval. **6.0,** Chimes; Light Music. **7.0,** Announcements; Hygiene Talk. **7.30,** Exchange. **7.35,** Orchestral Music; Songs. **8.15,** Hunting and Fishing Notes. **8.30,** News. **8.35,** Orchestral Concert. Overture, Mignon (Thomas); Dance (Granados); Waltz (Strauss); Selection from La Bohême (Puccini); Jota (Serrano); Chinese Street Serenade (Siede); Hungarian Rhapsody No. 2 (Liszt); Extracts from Spanish Musical Comedies (Serrano). **9.50,** Sports Notes. **10.0,** Chimes; Time; Talk. **10.30,** Recital by Jose Angerri (Baritone). **11.0,** News. **11.10** (approx.), Sextet Concert; Recitations; Songs. **12.45 a.m. (Wednesday),** News. **1.0,** Chimes. **2.0,** Dance Music arranged by the International Broadcasting Company, of London. **3.0,** I.B.C. Goodnight Melody; Close Down.

MADRID

EAQ, 10,000 kc/s, 30 metres; 20 kW.—**11.15 p.m.,** News. **11.30,** Spanish Music. **11.45,** News. **12 (Midnight),** Light Music. **1.0 to 1.30 a.m. (Wednesday),** Programme in English arranged by the International Broadcasting Company of London. **1.0,** Orchestral Music. **1.30,** I.B.C. Goodnight Melody and Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.**—**7.30 a.m.,** Gym. **7.45,** Time; News. **8.0,** Interval. **11.30,** Concert by the Malatesta Chamber Orchestra. **12.30 p.m.,** Records. **12.45,** News. **1.0,** Time; Announcements. **1.5,** Popular Music. **1.30,** Records; Exchange. **1.45,** Popular Music. **2.15,** Exchange. **2.25,** Interval. **4.20,** News. **4.30,** Balilla Programme. **5.0,** News. **5.10,** Concert by the Doreno Orchestra. **5.55,** Weather. **6.0 to 6.10,** Notes for Farmers; Wheat Market Report. **7.0,** Announcements. **7.15,** News in Foreign Languages. **8.0,** News; Records. **8.30,** Government Notes. **9.0,** Opera from **Rome.** **10.0,** Records. **11.0,** News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**12 Noon,** News. **12.5 p.m.,** Concert by the Station Orchestra: Overture, I Puritani (Bellini); Selection from The Merry Wives of Windsor (Nicolai); Movement from Symphony No. 4 (Schumann); Potpourri (Morena); Se tu vorresti (Tosti); Harlequin Serenade (Schütt). In the interval at **12.29,** Time; Weather. **12.55,** News. **1.5,** Records. **1.30,** Interval. **3.59,** Time from Neuchâtel Observatory. **4.0 to 6.0,** See **Sottens.** **7.45,** News. **8.0,** Concert of Opera Music by the Station Orchestra; Conductor, Casella; Soloist, Amilcare Pozzoli (Tenor); Overture, The Daughter of the Regiment (Donizetti); Arias from Il Duca d'Alba (Donizetti) and Martha (Flotow); Prelude to Act I of La Traviata (Verdi); Arias from L'elisir d'amore (Donizetti) and Mignon, (Thomas); Overture, Mirella (Gounod); Arias from The Pearl Fishers (Bizet) and Werther (Massenet); Overture, Phèdre (Massenet). **9.0,** Talk. **9.15,** Concert by the Station Orchestra; Rhapsody No. 14 (Liszt); Czardas (Monti); Rhapsody No. 2 (Brahms); Czardas (Michiels); Slav Rhapsody No. 1 (Dvorák); Czardas from Der Geist des Wojewoden (Grossmann).

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.0 to 7.15 a.m.,** See **Prague.** **10.0 to 10.25,** See **Prague.** **10.25,** Records. **11.5,** See **Prague.** **12.0 Noon,** Report for Farmers. **12.10 to 2.0 p.m.,** See **Prague.** **3.15 to 4.20,** See **Prague.** **5.40,** Record **5.45,** Talk. **5.55,** Local Report. **6.0,** Records. **6.10,** Talk. **6.20,** See **Brno.** **6.55,** See **Prague.** **7.10,** Trio in C minor (Beethoven). **7.40,** Literary Talk from **Kosice, 1,113 kc/s, 269.5 metres.** **7.55,** See **Prague.** **11.0** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.,** News. **5.30,** Fanfare. **5.45,** Gym. **6.15,** Programme Announcements. **7.30,** Records. **9.0,** Musical Programme. **9.55,** Time. **10.0,** News. **10.15,** Concert Version of The Barber of Seville—Opera (Rossini). **11.15,** Talk: Harvesting Methods. **2.45,** News. **3.55,** Time Signal. **4.0,** News. **5.30,** Symphony Orchestra; Records. **6.30,** Programme of Humour and Satire; Vocal Quartet and Violin Recital. **8.0,** Concert. **9.0,** German Visitors at the Microphone. **9.55,** Chimes. **10.5,** Literary Talk in French. **11.5,** Literary Talk in Dutch.

MOTALA.—Relays **Stockholm.** **MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nürnberg, 1,267 kc/s, 236.8 metres;** and **Kaiserslautern, 1,195 kc/s, 251 metres.**—**6.30 a.m.,** Gym. **6.45,** Motto; Records. **7.15,** News. **7.25,** Concert from **Stuttgart.** **10.0,** Concert by the Small Station Orchestra. **12 Noon,** News. **12.10 p.m.,** Records. **1.15,** News. **1.25,** Records. **2.0,** News; Exchange. **2.20,** Chamber Music: Suite for Flute and Pianoforte (Graener); Variations and Fugue for Two Pianofortes, Op. 18 (Wehrli). **2.50,** Programme for Women. **3.30,** Talk: Calico. **3.50,** News. **4.0,** Orchestral Concert; Conductor, Kloss: Overture, Raymond (Thomas); Serenade (R. Strauss); Extracts from The Valkyrie (Wagner); Intermezzo from I quattro Rusteghi (Wolf-Ferrari); Three Pieces (Schütt): (a) Liebesweise, (b) Canzonetta, (c) Langsamer Walzer; Extract from Little Ida's Flowers (Klenau); Waltz (Jos. Strauss); Extract from I Promessi sposi (Ponchielli); Gallop (Leuschner). **5.20,** Talk: East Africa. **5.50,** Song Recital by Paula Menari (Soprano): Three Songs (Schubert): (a) Der Neugierige, (b) Liebesbotschaft, (c) Die böse Farbe; Three Songs (Schumann): (a) Jasminstrauch, (b) Der Nussbaum, (c) Aufträge; Two Songs (Reger): (a) Waldeinsamkeit, (b) Wiegenlied. **6.10,** Programme for Young People: Tannenberg. **6.30,** Classical Records. **6.50,** Time; Weather; Notes for Farmers. **7.0,** Wind Instrument Orchestra. **8.0,** News. **8.15,** Recital of Ballads by Watzke (Baritone) and Staab (Pianoforte):

Belsazar (Schumann); Verrat (Brahms); Ballad in D minor for Pianoforte (Brahms); Odins Meeresritt (Loewe); Two Ballads (Plüddemann): (a) Jung Dietrich, (b) Siegfrieds Schwert. **8.45,** A Defenceless Woman—Play (Weichenmayr, after Tchekov). **9.15,** See **Rome.** **10.0,** News; Exchange. **10.20,** To be announced. **11.0,** Dance Music. **12 Midnight** (approx.), Close Down.

NAPLES.—Relays **Rome.** **NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jelöy, 6,990 kc/s, 42.92 metres.**—**11.15 a.m.,** Service. **11.50,** Exchange. **12.45 p.m.,** News. **12.55,** Nauen Time Signal. **1.0 to 2.0,** Records. In the interval at **1.15,** Weather for Farmers, and at **1.45,** Exchange. **5.15,** Records. **6.10,** Talk. **6.30,** Programme for Women. **7.0,** Announcements. **7.15,** Weather; News. **7.30,** Time. **7.31,** Lyric Suite (Grieg) by the Station Orchestra; Conductor, Kramm. **8.0,** Talk. **8.30,** Svendsen Concert by the Station Orchestra; Conductor, Kramm; Norwegian Rhapsody No. 4; Symphonic Poem, Zorohayda; Scherzo from the Symphony in D; Two Swedish Melodies; Festival March. **9.20,** Operetta Duets by Mikkelsen and Ericson, relayed from **Trondelag, 629 kc/s, 476.9 metres.** **9.40,** Weather; News. **10.0,** Topical Talk. **10.15,** Accordion Duets by Syvertsen and Gustavson. **10.45** (approx.), Close Down.

OSTERSUND.—Relays **Stockholm.**

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431 metres; 7 kW.—**8.0 to 8.30,** Press Review; News. **10.30,** Concert relayed from **Toulouse P.T.T., 776 kc/s, 386.6 metres.** **12 Noon,** Talk: Art in Austria. **12.15 p.m.,** Concert from **Toulouse.** **1.0,** News. **1.15,** Concert from **Toulouse** (contd.). **2.0,** Records. **4.0,** Concert from **Paris (Radio-Colonial) 25.25 metres;** Conductor, Clergue: La patrie (Bizet); Le tombeau de Couperin (Ravel); Forest Murmurs, from Siegfried (Wagner); Selection from La vivandière (Godard); Phaéton (Saint-Saëns); Künstlerleben (Strauss); Selection from Sunny (Kern). **6.0,** Talk: The Theatre of Porto-Rico. **6.30,** News. **7.45,** Popular Science Talk. **7.53,** Temperance Talk. **8.0,** Records. **8.30,** Denise—Comedy (Dumas). **10.30,** Dance Music by the Lucien Goldie Band. In the interval, News.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.5 a.m.,** Fanfare; Records. In the intervals at **7.30** and **8.20,** News. **8.45,** Cookery Talk. **12 Noon,** Exchange. **12.5 p.m.,** Records: Sound Film Music. **12.25,** News. **12.35,** Records. **1.5,** Interval. **1.15,** Records. In the interval at **1.30,** Exchange. **2.0,** Exchange. **3.15,** Exchange. **3.45,** Exchange. **4.50,** Exchange. **6.25,** Protestant Address. **6.45,** Exchange. **6.49,** Waltz Records: Valse des fleurs (Tchaikovsky); Waltz in C sharp minor (Chopin); Waltz (Brahms); Valse des sylphes (Berlioz); Valse triste (Sibelius). **7.10,** News. **7.30,** Records of Edith Lorand and Georges Thill. **8.0,** Interval. **8.10,** Concert of Viennese Music: Overture, Morning, Noon and Night (Suppé); Waltz Suite from Die Fledermaus (Joh. Strauss); Czardas (Monti); Selection from The Gipsy Princess (Kalman); Two Hungarian Dances (Brahms). **8.40,** Exchange. **8.55,** Concert of Brahms Music. **10.30** till Close Down, Programme in English arranged by the International Broadcasting Company of London. **10.30,** Tunes from the Talkies and Shows. **10.45,** Ould Ireland. **11.0,** I.B.C. Goodnight Melody and Close Down.

PARIS

RADIO PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.,** Gym. **7.0,** Records. **7.15,** News. **7.45,** Gym. **8.0,** Records. **12 Noon,** Symphony Concert; Conductor, Labie: Waltz, from The Arabian Nights (Joh. Strauss); Serenade (Erlanger); Suite from Philemon et Baucis (Gounod); L'anneau d'argent (Chaminade); Suite, La Feria (Lacôme); Selection from L'amour masqué (Messager); Chanson intime (de la Presle); Selection from Ariane (Massenet); Military Symphony (Haydn); Ballet Music from Hérodiade (Massenet); Spring Song (Mendelssohn): Prelude to Faust (Gounod); Selection from Samson and Delilah (Saint-Saëns); Marche funèbre d'une Marionette (Gounod); Elegy (Massenet); Overture, Fingal's Cave (Mendelssohn). In the interval at **1.20,** Exchange. **3.45,** Exchange. **6.20,** Weather; Programme for Farmers; Exchange; Racing Results. **6.45,** Records: An American in Paris (Gershwin). **7.0,** Talk: Modern Sculptors. **7.30,** Topical Talk. **8.0,** Song Programme arranged by Victor Vallier; Soloists, Marinier, Cluny, Maye, Tarquini d'Or, and Alice Furt. In the intervals at **8.30,** News, and at **9.15,** News and Sports Talk: Diving. **10.30,** Dance Music.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres** and **25.27 metres.**—**3.0 p.m.,** Edward MacHugh. **3.15,** Castles of Romance. **3.30,** To-day's Children. **3.45,** News; Cooking School. **4.0,** Honeymooners. **4.15,** Alice Joy. **4.30,** Melody Mixers. **5.0,** Piano Recital. **5.15,** Fields and Hall. **5.30,** Vic and Sade. **5.45,** Hotel William Penn Orchestra. **6.0,** Market Reports. **6.15,** Hon. Archie and Frank. **6.30,**

AUG. 28th TUESDAY *continued*

Farm and Home Hour. **7.30,** KDKA Home Forum. **8.0,** Sammy Fuller. **8.15,** Congress of Clubs. **8.30,** Music Magic. **9.0,** Betty and Bob. **9.15,** Singing Stranger. **9.30,** Market Reports. **9.45,** Chicago Symphony Orchestra. **10.15,** KDKA Kiddies' Klub. **10.30,** Jackie Heller. **10.45,** Orphan Annie. **11.0,** Dan and Sylvia. **11.14,** Baseball Resumé. **11.30,** Twenty Fingers of Harmony. **11.45,** Lowell Thomas. **12 Midnight,** Stanley Metcalfe; News. **12.15 a.m. (Wednesday),** Pittsburgh Varieties. **12.45,** Frank Buck. **1.0 to 6.0,** Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 to 7.15 a.m.,** Time; Gym.; Music and Songs; News. **10.0,** Record; News. **10.20,** News in German. **10.25,** Records. **11.5,** Orchestral Concert; Conductor, Benes. **11.55,** Report for Farmers; Weather. **12 Noon,** Time; Talk for Farmers. **12.10 p.m.,** Records. **12.20,** News. **12.30,** Concert by Muzik's Quartet. Waltz, Winterstürme (Fucik); Country Sketches (Malat); Selection from Faust (Gounod); Countess Maritza (Kálmán); Polka (Straub). **1.30,** Industrial Review. **1.40,** Records. **1.50,** Exchange. **1.55,** Exchange and Weather in German. **2.0,** Interval. **3.15,** Dance Music. **4.15,** Exchange; Weather. **5.40,** Record; Local Report. **5.50,** Report for Workers. **6.0,** Record; Market Prices. **6.15,** Record. **6.20,** German Transmission: Literary Talk: Goethe. **6.55,** News in German. **7.0,** Time; News. **7.10,** Concert by the Vienna Chamber Trio. Trio in D (Svoboda); Three Movements from the Suite (Hasenöhrl); Two Dances (Salmhofer). **7.40,** Literary Talk relayed from **Kosice, 1,113 kc/s, 269.5 metres.** **7.55,** Introductory Talk to the following Transmission. **8.0,** A Three Act Operetta (Benes), relayed from a Theatre. In the interval at **10.0,** Time; News. **11.0,** News in English. **11.15** (approx.), Close Down.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan (No. 2), 1,348 kc/s, 222.5 metres; Turin (No. 2), 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.**—**7.30 a.m.,** Gym. **7.45,** Time; News. **8.0,** Interval. **12.30 p.m.,** Records. **1.5,** See **Milan. 1.30 to 1.45,** Time; News; Exchange. **4.30,** Children's Radio Review. **4.55,** News; Exchange. **5.5,** Recitation. **5.10,** See Milan. **5.55,** Weather. **6.0,** Wheat Market Report. **6.10 to 6.15,** Atmospheric Signals. **7.0,** Announcements. **7.15,** News in Foreign Languages. **8.0,** Time; News. **8.10,** Records. **8.30,** Government Notes. **8.45,** A Play. **9.0,** L'Amico Fritz—Opera (Mascagni). After the Opera: Talk. **10.15** (approx.), Dance Music. **11.0,** News.

RUYSSELEDE

10,330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.,** News in French. **8.0,** Records. **9.0,** News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by **W2XAF** on **31.48 metres,** and by **W2XAD** on **19.56 metres.**—**7.0 p.m.,** Musical Programme. **7.15,** Mudcaves—Play. **7.30,** Woman's Radio Review; Talks; Orchestra. **11.30,** Exchange. **12 Midnight,** Leo Reisman's Orchestra. Soloist: Phil Duey (Baritone). **12.30 a.m. (Wednesday),** Wayne King and his Orchestra. **1.0 to 3.0 a.m.,** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW.; and **Geneva, 401 kc/s, 748 metres.**—**6.0 a.m. to 6.15,** Gym. **12.29 p.m.,** Time. **12.30,** News in French and German. **12.45** (from **Geneva**), Records. **2.0,** Interval. **3.59,** Time. **4.0,** Concert of French Music by the Small Radio Lausanne Orchestra: Overture, La Princesse Jaune (Saint-Saëns); La Nursery (Inghelbacht); Pavane pour une Infante défunte (Ravel); Carnaval. (Guiraud). **4.45,** Records. **5.10,** Concert by the Small Station Orchestra: Eine kleine Nachtmusik (Mozart); Selection from Passionnément (Messager); Le Bœuf sur le toit (Milhaud). **6.0** (from **Geneva**), Talk for Women. **6.30** (from **Geneva**), Talk: Amateur Photography. **7.0** (from **Geneva**), Talk: Mountaineering. **7.30,** Commentary on the Cycle Tour of Switzerland. **7.59,** Weather. **8.0 to 9.15,** See **Beromünster. 9.15,** News in French and German. **9.30,** See **Beromünster. 10.15** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.**—**7.45 a.m.,** Divine Service. **8.0,** Weather. **12.30 p.m.,** Weather. **12.45,** Exchange. **12.55,** Time. **1.0,** Concert of Light Music by the Gunnar Andersson Orchestra, relayed from **Malmo, 1,312 kc/s, 228.7 metres. 2.0,** Reading. **2.30 to 3.0,** Records of Spanish Music. **5.0,** Weather. **5.5,** Accordion Recital. **5.30,** Talk. **5.45,** Records. **6.45,** Talk. **7.15,** Weather; News. **7.30,** Recital of English Songs and Ballads by Harry Hopewell: A Barrel of Beer (arr. Johnston); The Oak and the Ash (arr. Hadow); The Keeper (arr. Sharp); Ground for the Floor. (arr. Maitland); The Tree in the Wood (arr. Sharp); Blow, blow, thou winter Wind (Sarjeant); The sweetest Flower that blows (Hawley); To Anthea (Hatton); Go from my Window, go (Somervell); Whilst I'm carousing (Newton); Sweet and low (Barnby). **8.0,** Reading. **8.30,** Acts II and III from Faust—Opera (Gounod), relayed from the Opera House; Conductor, Grevillius. **9.55,** Weather; News. **10.10,** Concert of Light Music by the Broström Orchestra: Overture, Fra Diavolo (Auber); Waltz (Heinecke); Andalusian Romance (Sarasate); Suite (Micheli); Piece (Sandeii). **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.30 a.m.,** Concert relayed from **Toulouse PTT (776 kc/s, 386.6 metres). 12 Noon,** Records. **12.45, p.m.,** News. **1.0,** Time; Exchange. **1.5,** Variety Concert; Conductor, Roskam. **4.0,** Concert relayed from **Paris (Radio Colonial), 11,880 kc/s, 25.25 metres;** Conductor, Clergue; Patrie (Bizet); Le tombeau de Couperin (Ravel); Forest Murmurs (Wagner); Selection from La Vivandière (Godard); Phaëton (Saint-Saëns); Waltz, Künstlerleben (Strauss); Selection from Sunny (Kern). **5.0,** Talk: The Colonies. **5.15,** Orchestral Concert; Conductor, Roskam: Prelude to Kunihild (Kistler); Selection from The Queen of Sheba (Gounod); Sous ta fenêtre (Lachaume); Aubade Japonaise (Lachaume); En relisant vos lettres (Masson-Kiek); Potpourri (Hruby). **6.0,** Legal Talk in German. **6.15,** Topical Talk. **6.30,** Concert; Conductor, Roskam: Part I—The Surprise Symphony (Haydn); Part II—Les Leçons Imprévues—Comic Opera in One Act (Raynal). **7.30,** Time; News. **7.45,** Announcements. **8.0,** Press Review in German, Lottery Results; Announcements. **8.30,** See **Paris (Ecole Supérieure). 10.30** (approx.), Press Review.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.35 a.m.,** Notes for Farmers. **5.45,** Hymn; Time; Weather. **5.50,** Gym. **6.15,** Records. **6.40,** Announcements. **6.55,** Concert of Light Music from **Mannheim** by the Philharmonic Orchestra; Conductor, Becker. **8.10,** Weather. **8.15 to 8.35,** Gym. **10.0,** News. **10.10,** Sound Film Music by Ries (Cinema Organ). **10.30,** Bass Recital by Tönges: Four Songs (Loewe): (a) Meeresleuchten, (b) Heimlichkeit, (c) Reiterlied, (d) Spirito sancto; Arias from The Merry Wives of Windsor (Nicolai), Der Waffenschmied (Lortzing) and The Magic Flute (Mozart). **11.0,** Records of Viennese Waltzes. **11.25,** Post Office Propaganda; Records. **11.55,** Weather. **12 Noon,** Records. **1.0 p.m.,** Time; News. **1.20,** Dreams—Records: A Dream (Grieg); Du bist Orplid, mein Land (Wolf); Liebestraum (Liszt); Es war ein König von Thule (Zelter); Träumerei (Schumann); Traum durch die Dämmerung (R. Strauss); Träume (Wagner); Sogno (d'Ambrosio). **1.50,** News. **2.0,** Swabian Musical Programme for the Berlin Radio Exhibition: The Kromer Sextet and Choir, an Accordion Band, a Zither Trio, the Station Orchestra and Soloists; Conductor, Görlich. **4.0,** See **Berlin (Funkstunde). 5.30,** Talk: Insects. **5.50,** Reading. **6.5,** Records. **6.15 to 6.45,** See **Frankfurt. 6.45,** Miltary Band Music. In the interval: The Honeymoon—Humorous Sketch (Dürr). **7.45,** Time; Weather; Notes for Farmers. **8.0,** News. **8.10,** Gala Swabian Folk Concert for the Berlin Radio Exhibition: The Kromer Sextet and Choir, The Hitler Youth Choir, Folk Singers and Dancers from Alsace, Siebenburgen, Egerland and the Tyrol, Village Bands and Dance Bands; Conductor, Görlich. In the interval at **10.20,** News. **12 Midnight,** See **Frankfurt. 1.0 a.m. (Wednesday),** Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.,** Dance Refrains. **8.30,** News. **8.35,** Songs; Light Music. **12 Noon,** Symphony Orchestra. **12.15 p.m.,** Operetta Songs. **12.30,** News; Exchange. **12.45,** Request Music. **1.0,** News; Market Prices. **1.5,** Military Music. **1.15,** Sound Film Music. **1.30,** Viennese Orchestra. **1.45,** Songs. **6.0,** News. **6.15,** Operetta Music. **6.30,** Opera Arias. **6.45,** Philharmonic Orchestra. **7.0,** Popular Songs. **7.15,** Bal Musette. **7.30,** News. **7.45,** Sound Film Music. **8.15,** Pianoforte Recital: Prelude in A minor (Bach); Danseuses de Delphe (Debussy); Etude (Doucet); Etude No. 3 (Chopin); Ondine (Debussy). **8.30,** Songs: La délaissée (Hahn); Der Nussbaum (Schumann); Le soir (Fauré); Tristesse (Chopin). **9.0,** Extracts from The Nothing-doing Bar (Milhaud). **9.30,** Military Music. **10.0,** Au caveau de dix heures—Fantasy. **10.15,** News. **10.30,** Soloist Programme. **11.0,** Argentine Orchestra. **11.15,** Operetta Songs. **11.30,** Hunting Horn Music. **11.50,** Soldiers' Songs. **12 Midnight,** News; Weather; Programme Announcements. **12.5,** Popular Songs. **12.15,** Potpourri (Ziehrer). **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo.** **TURIN.**—Relays **Milan.**

VATICAN CITY

15,120 kc/s, 19.48 metres; 10 kW **(Morning); 5,970 kc/s, 50.26 metres (Evening).**—**11.0 to 11.15 a.m.,** Religious Information in English. **8.0 to 8.15 p.m.,** Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz** and **Salzburg, 1,294 kc/s, 231.8 metres.**—**9.0 a.m.,** News. **9.20,** Market Prices. **9.30,** Weather. **10.50,** Water Level. **11.30,** Records. **11.55,** Weather. **12 Noon,** Concert of Light Music by the Vienna Symphony Orchestra; Conductor, Holzer; Soloist, Rosner (Violin): Overture, The Merry Wives of Windsor (Nicolai); Dances of the Nations (Mannfred); Waltz, Tales from the Vienna Woods (Joh. Strauss); Die Biene (Schubert); Serenade (Herbert); Potpourri (Komzák). **1.0 p.m.,** Time; Announcements. **1.10,** Concert (contd.): March (Dostal); Selection from Bruder Straubinger (Eysler); Song (Granichstaedten); Waltz (Fall); Song (Lehár); March Potpourri (Blankenburg). **2.0,** Interval. **3.30,** Time; Market Prices. **3.50,** Programme for Women. **4.10,** Records. **4.35,** News. **4.40,** Programme for Children: A Children's Choir. **5.10,** Talk: The Italian Exhibition at the Vienna Autumn Fair. **5.20,** Talk: The Ethnological Museum. **5.45,** Recital by Minna Krasa-Jank (Soprano) and Müller (Violin): Senta's Ballad from The Flying Dutchman (Wagner); Aria from The Dusk of the Gods (Wagner); Sonatina in G Minor, Op. 137, No. 3 (Schubert). **6.15,** Talk: Georges Sorel. **6.40,** Talk; Mountaineering. **7.5,** Talk: Austria. **7.25,** Time; Weather. **7.35,** Viennese Song Recital by Arnold (Tenor). **8.10,** Mass in C Minor (Mozart), from St. Peter's Church, Salzburg; The Mozart Orchestra and Mozarteum Choir; Conductor, Paumgartner; Soloists, Felice Hüni-Mihacsek (Soprano), Maria Kehldorfer (Soprano), Gallos (Tenor), and Mayr (Bass). **9.10,** A Radio Sequence. **10.10,** Concert of Light Music by the Vienna Symphony Orchestra and a Military Band; Conductors, Holzer and Wacek: Overture, Gipsy Love (Lehár); Florentine March (Fucik); Waltz, Myrtenblüten (Joh. Strauss); Spanish Waltz from The Pearl of Iberia (Hellmesberger); Gavotte (Czibulka); Song (Koller); Wiener Fresken-Walzer (Joh. Strauss); Zwanzinette (Lehár); Suppé Potpourri (Wacek); March (Schieder); Overture, Im Reiche des Indra (Lincke); Schönfeld March (Ziehrer); Two Pieces (Komzák): (a) Süsse Erinnerung, (b) Es war einmal; Overture, Prince Methuselah (Joh. Strauss); Nachtschwärmer-Walzer (Ziehrer); Wine Festival Potpourri (Kronegger). In the interval at **10.30,** News. **11.45** till Close Down, Records. **1.0 a.m. (Wednesday),** Close Down.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.,** Hymn. **6.35,** Records. **6.38,** Gym. **6.53,** Records. **7.5,** News. **7.10,** Records. **7.20,** Notes for Housewives. **7.25,** Programme Announcements. **7.30,** Announcements. **7.40,** Interval. **11.57,** Time. **12 Noon,** Fanfare from St. Mary's Church, **Cracow, 986 kc/s, 204.3 metres.** **12.3 p.m.,** Weather. **12.5,** Press Review. **12.10,** Concert by the Adamska-Grossman Orchestra: Waltz (Waldteufel); Rondino (Beethoven-Kreisler); Chanson triste (Conti); Intermezzo (Macmillan); Lyric Suite (d'Albert); Frottola italiana (Joteyko); Seville (Ranzato). **1.0,** News. **1.5,** Programme for Children. **1.20,** Pianoforte Concerto (Schumann) on Records. **1.55,** Exchange. **2.0,** Announcements; Economic Notes. **2.15,** Interval. **4.0,** Light Music by the Hollywood Orchestra; Conductor, Gorzynski: Lawinski (Humorous Monologues); Intermezzo (Noack); Boston (Facins); Slow Foxtrot (Facins); Monologues; Foxtrot (de Kers); Tango (Bleauw); Foxtrot (Packay); Monologues: Slow Foxtrot (Concina); Waltz (Rust); Foxtrot (Martinasso); Rumba (Marjanowsky). **5.0,** Letterbox. **5.15,** Recital by Mme. Czekotowska (Songs), and Roesner (Violin). **6.0,** Talk. **6.15,** Light Orchestral Music from Ciechocinek; Conductor, Szulc: March (Szulc); Selection from Morning, Noon, and Night (Suppé); Waltz (Millöcker); Pepetuum mobile (Strauss); Oberek (Szulc). **6.45,** Talk: Aviation. **6.55,** Anti-gas Drill. **7.0,** Announcements. **7.15,** Concert of Light Music by an Accordion Band; Soloist, Mme. Em. Zielinska (Zither), Zither Solos: Träumerei (Wagner); Berceuse (Godard); Waltz, Estudiantina (Waldteufel); Two Pieces (Namyslowski); (a) Mazurka, (b) Couiavienne; Zither Solos: Ländler (Larche); Gipsy Romance (Ratold-Liszt); Mazurka (Zielinska); Polka (Suchocki); Polka-Mazurka (Stec); Oberek (Szulc). **7.50,** Sports Notes. **8.0,** Great Thoughts. **8.2,** Poetry. **8.12,** Tzitzi—Operetta in Three Acts (Stolz) by the Station Symphony Orchestra; Conductor, Górzynski; Choir and Soloists. In the intervals, News; Notes for Farmers. **10.15,** Talk. **10.30,** Dance Music. **11.0,** Weather.

ZURICH.—Relays **Beromünster.**

WEDNESDAY
AUGUST THE TWENTY-NINTH

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.**—**1.30 to 2.30 p.m.,** Time Signal; Weather; Exchange; Records. **6.0,** Programme for Children. **6.45,** News. **7.0,** Irish Lesson. **7.15,** German Lesson. **7.30,** Time Signal; Concert by the Dublin Postal Band. **8.30,** Songs and Stories by Cathal O'Byrne. **8.45,** Dramatic Sketch, presented by Dorothy Day and Company. **9.15,** Song Recital by E. M. Davis (Baritone). **9.30,** Traditional Fiddle Solos by M. O'Duinn. **9.45,** Accordion Recital by Joe Carey. **10.0,** Variety Programme. **10.30,** Time Signal; News; Weather. **10.40,** Records. **11.0** (approx.), Close Down.

BARCELONA

795 kc/s, 377.4 metres; 5 kW.—**8.15 a.m.,** News; Records. **9.0,** Chimes; Gym; Records. **9.20,** News; Records. **10.0,** Obituary. **12 Noon,** Chimes; Weather. **1.0 p.m.,** Programme for Women. **2.0,** Records. **2.30,** Theatre Notes; Amusement Guide; Records. **3.0,** Concert by a Sextet; Labour Exchange. **4.0,** Programme for Hospitals. **5.0,** News. **7.0,** Trio Concert: Träume (Wagner); Selection from The Magic Flute (Mozart); Serenata (Gandolfo); Eighteenth Century Musette (Offenbach); Melody (Ackermans); Minuet No. 3, Op. 78 (Schubert); Selection from Le Cid (Massenet). **7.30,** News; Concert (contd.). **8.0,** Request Programme. **8.30,** Exchange. **9.0,** Educational Talk. **9.10,** Records. **9.45,** Press Review. **10.0,** Chimes; Weather. **10.5,** Social Notes; Exchange. **10.10,** Concert by the Station Orchestra. **11.0,** Two One-Act Comedies: (a) Les Admetilles d'Arenys (Arnau), (b) El Ret de la Sila (Soler). **1.0 a.m. (Thursday),** News. **2.0 to 3.0,** Programme in English arranged by the International Broadcasting Company of London. **2.0,** Orchestral Music. **2.30,** Popular Selections. **3.0,** I.B.C. Goodnight Melody and Close Down.

BASLE.—Relays **Beromünster.**

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.20,** See **Königsberg. 7.0,** News. **7.10,** See **Königsberg. 8.0,** Interval. **8.45,** Gym. for Women. **9.0,** Interval. **9.40,** Gym. for Children. **10.0,** News. **10.10,** Sequence of German Epic Poetry. **10.50,** Programme for Children. **11.15,** Weather. **11.30,** Interval. **11.55,** Weather. **12 Noon,** See **Leipzig.** In the interval at **12.55 p.m.,** Time. **1.45,** News. **2.0,** Interval. **2.45,** Greetings; Programme Announcements. **3.0,** Weather; Exchange. **3.15,** Stories for Children. **3.40,** Pianoforte Recital by Dorothea Klotz: French Suite in E (Bach); Soirée de Vienne (Schubert-Liszt). **4.0,** Military Band Concert from the Radio Exhibition; Conductor, Harmens; March (Otten); Festival Overture (Leutner); March, Zum Gipfel empor (Schattman); Fantasia, Das treue deutsche Herz (Schreiner); Overture, Der Erlenhügel (Kuhlau); Brautwerber-Marsch (Secker); Unser Führer (Schadewitz-Harmens); Dramatic Overture (Bion); Waltz, Vibrationen (Joh. Strauss); Selection from Sigurd Jorsalfar (Grieg); Jagdfantasie (Prager); March, Blinkfeuer (Schwittmann); March, Mein Regiment, mein Vaterland (Leuschner). In the interval at **4.50-5.5,** Announcements. **6.0,** Topical Talk. **6.15,** Report from the International Six-Day Automobile Trial. **6.30,** Theatre Review. **6.50,** Recital by Stross (Violin) and Brugger (Pianoforte): Duet Op. 162 (Schubert); L'Anglaise (Fiocco); Tambourin (Rameau); Minuet (Pugnani); Sonata in D (Beethoven). **7.30,** Italian Lesson on Records. **8.0,** News. **8.10,** See **Frankfurt. 8.30,** Variety Programme by Willi Glahé's Dance Band, a Banjo Ensemble, and Soloists. **9.35,** Records. **10.0,** Results of the Competition for Radio Announcers. **10.15,** News; Sports Notes. **10.25,** Talk on Records: The Radio Weather Service for Shipping. **10.45,** Weather for Shipping, **11.0,** Records. **12 Midnight** (approx.), Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Hymn; Gym. **6.15,** Prayers. **6.20,** See **Königsberg. 7.0,** News. **7.10,** See **Königsberg. 8.0,** Gym. **8.20,** Health Talk. **8.35,** Interval. **9.0-9.40,** Song Programme for Schools. **10.0,** News. **10.10,** Market Prices. **10.30,** Records; Announcements. **11.25,** Exchange. **11.30,** Interval. **12 Noon,** Light Music by the Nera Monti Band: Waltz, Aquarellen (Joh. Strauss); Liebeslied (Schmalstich); Russian Air (Schenk); Overture, The Nuremburg Doll (Adam); Amina (Lincke); Schmetterlingsliebe (Grit); Waltz, Orchideen (Schönian); Frühling und Liebe (Grothe); Jalousie (Gade); Ein kleines Nichts (Steindel); Serenade, La Plata (Plessow). In the interval at **12.30 p.m.,** Weather. **1.0,** News. **1.15,** Records. **2.0,** See **Stuttgart. 4.0,** See **Berlin (Deutschlandsender). 6.0,** Announcements. **6.30,** Pianoforte Recital by Susanne Fischer: Sonata in F (Mozart); Three Bagatelles, Op. 126 (Beethoven); Rondo in G, Op. 51 No. 2 (Beethoven). **7.0,** Schubert Song Recital by Bronsgeest (Baritone): Am Feierabend; Der Neugierige; Ungeduld; Morgengruss; Pause; Des Baches Wiegenlied. **7.20,** Folk Songs. **7.40,** Echoes of the Day. **7.50,** News. **8.0,** A Canticle of Labour—Gala Variety Programme; The Augmented Station Orchestra and Choir; Conductor, Rosband; and a Dance Troupe from the Berlin Opera House; Soloists, Drissen (Bass-Baritone), Fuchs (Bass), Marten (Tenor), and Störring (Tenor), and others. In the interval at **10.20,** News; Sports Notes. **12 Midnight,** Light Music and Dance Music by the Station Small Orchestra; Conductor, Steiner. **1.0 a.m.** (approx.), Close Down.

BERNE.—Relays **Beromünster.**

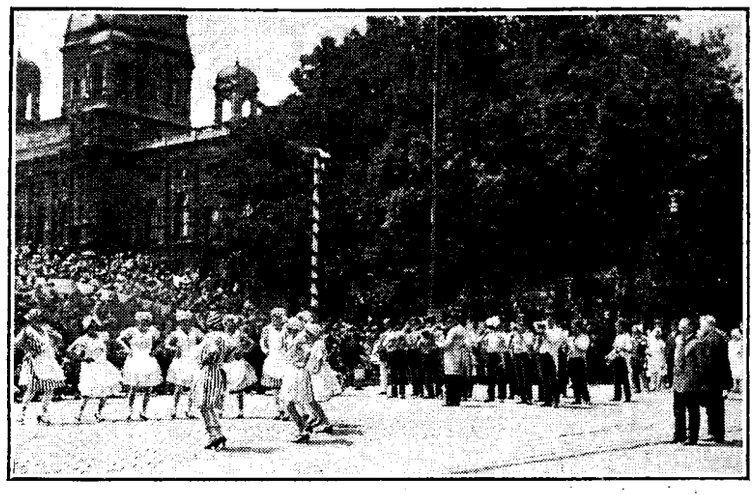
BEROMUNSTER

556 ck/s, 539.6 metres; 60 kW.—**10.45 a.m.,** Report on the Cycle Tour of Switzerland. **11.15,** Interval. **12.15 p.m.,** Programme to be announced. **1.0,** Programme from **Sottens. 2.0,** Interval. **4.0,** See **Sottens. 7.30,** Report on the Cycle Tour of Switzerland. **8.0,** See **Sottens.** In the interval, News. **10.15** (approx.), Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Talk; Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian. **10.30,** See **Moravská-Ostrava. 11.0,** Water Level. **11.5,** Records. **12.10 p.m.,** News in Slovak. **12.15,** Record. **12.20,** See **Prague. 12.30,** See **Moravská-Ostrava. 1.20,** Records. **1.30,** See **Prague. 1.40,** News and Weather in German and Hungarian. **1.50 to 2.0,** See **Prague. 3.15 to 4.20,** See **Prague. 5.40,** History Talk. **5.50,** Records. **6.0,** Talk: The Europe Swimming Championship. **6.10,** Talk for Housewives. **6.15,** Hungarian Transmission: Talk; Song Recital; Educational Talk. **6.55,** See **Prague. 8.10,** Violin Recital by Actardieff. **8.40,** Talk: Alcoholism and Ethics. **8.55,** Concert by an Orchestra of Unemployed Musicians; Conductor, Haiser. **9.40,** See **Prague. 10.45,** News in Hungarian. **11.0** (approx.), Close Down.



OLD VIENNA. "An evening in Old Vienna" is the description of tonight's concert by the Leipzig station symphony orchestra. The picture shows a typically Viennese scene: a festival in the streets.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.**—**5.0 a.m.,** Hymn; Motto. **5.10,** Records. **6.0,** Time; Weather; Gym. **6.25** (from **Gleiwitz**), Military Band Concert. **7.0,** Time; News. **7.15,** Concert (contd.). **8.0,** Cookery Hints. **8.10,** Concert (contd.). **8.40,** Gym. for Women. **9.0,** Time; News. **10.10 to 10.40,** Hugo Wolf Song Recital by Benkel. **11.30,** News. **11.45,** Programme for Farmers. **12 Noon,** Concert by the Bunzlau Municipal Orchestra; Conductor, Arndt. In the interval at **12.30, p.m.,** Time; Weather. **1.30,** News. **1.45,** Concert (contd.): Prince August Wilhelm March (Karras); Overture, Medea (Cherubini); Finale from Ariele (E. Bach); Chant du Rossignol, for Piccolo (Filipowski); Potpourri (Manfred). **2.20,** Exchange. **2.25,** Announcements; Records. **2.50,** Market Prices. **3.10,** Book Review. **3.30,** Handwork for Children. **4.0,** Concert by the Waldenburg Kurhaus Orchestra, relayed from **Bad Salzbrunn;** Conductor, Kaden: March, Einer für Viele (Blankenburg); Overture, The Caliph of Bagdad (Boieldieu); Wiegenlied (Schubert); Selection from Rigoletto (Verdi-Schreiner); Potpourri, Weiner Spezialitäten (Hruby); March, Aus grosser Zeit (Lehnhardt); Festival Overture on Thuringian Folk Songs (Lassen); Duologue for Oboe and Clarinet; Spanish Serenade (Welser); Waltz from Waldmeister (Joh. Strauss). In the Interval at **5.30,** Weather; Market Prices. **6.0,** Reading: A Fiddler's Chatter (Erdmann). **6.15,** Talk: Were-wolves. **6.30,** Talk: East German Libraries. **6.50,** Programme Announcements; Weather; Market Prices. **7.0,** Records. **8.0,** News. **8.30,** See **Berlin (Deutschlandsender). 9.0,** Concert by the Station Orchestra; Conductor, Prade; Soloist, Ruth Stelzer (Pianoforte); Pianoforte Concerto in C, Op. 15 (Beethoven); Symphony in B flat No. 12 (Haydn). **10.0,** See **Berlin (Deutschlandsender). 10.20,** Time; Weather; News; Sports Notes. **10.45,** Dance Music by the Station Band; Conductor, Ilgner. **12 Midnight,** Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 10.30,** See **Moravská-Ostrava. 11.0,** Records from **Prague. 12 Noon,** See **Prague. 12.30 p.m.,** See **Moravská-Ostrava. 1.20,** Records. **1.30,** Labour Exchange; Social Notes. **1.40,** Records. **1.50,** See **Prague. 2.0 to 2.5,** Exchange. **3.15 to 4.20,** See **Prague. 5.40,** Announcements. **5.45,** German Transmission: Medical Talk; The Client—Comedy in One Act (Ludwig Thomá). **6.20,** Harp Recital by Schröderová. **6.40,** Record. **6.45,** Talk for Workers. **6.55,** See **Prague. 8.10,** Talk. **8.25,** Debussy Pianoforte Recital by Králová. **8.40,** See **Prague. 11.0** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Orchestral Concert of Light Music; Soloist, Frans Wigy (Violin): March (Florendas); Waltz from Les moulins qui chantent (van Oost); Overture, The Siege of La Rochelle (Balfe); Piece (Leuchner); Violin Solo, Fantasia on Hullebroeck Songs (Wigy); Waltz (Farbach); Selection from Benvenuto Cellini (Diaz); Miniatures orientales (Fischer). **1.0 p.m.,** News. **1.10,** Records. **2.0,** Interval. **4.55,** Announcements. **5.0,** Light Music by the Radio Orchestra: March of the Tin Soldiers (Pierné); Dances from The Rebel Maid (Montague Phillips); Rhapsody No. 12 (Liszt); Nutcracker Suite (Tchaikovsky). **5.30,** Programme for Children. **6.0,** Talk. **6.15,** Orchestral Concert of Operetta Music: Extracts from Troublez-moi (Moretti), Yes (Yvain), François les bas bleus (Messager), Trois jeunes filles nues (Moretti), Phi-Phi (Christiné), The Student Prince (Romberg). **7.15,** Labour Report. **7.30,** Weekly Review; Medical Talk. **8.0,** Concert by the Symphony Orchestra; Conductor, Meulemans; Soloists, Renée Cosse (Pianoforte) and Villanova (Bass): Overture, Figaro (Mozart); Suite in B Minor (Bach); Le joli jeu du furet (Ducasse); Pianoforte Solos: (a) Harmonie du soir (Liszt), (b) Fantasia No. 4 (Benoit), (c) Etude in G Flat (Chopin); Ballet Suite No. 1 (Grétry-Mottl); Suite, Les heures (Goyens); Airs angevins (Leken); Extracts from Ariane (Massenet); Ballet Music (Sacchini); Songs: (a) Serenade (Splingaire), (b) Les vieilles de chez nous (Levadé), (c) Elegy (Massenet); Extracts from Conte d'avril (Widor). In the interval at **8.45,** Talk: Trade and the Crisis. **10.0,** News. **10.10,** Request Records. **11.0,** Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish.—**11.57,** Weather. **12 Noon,** Records. **1.0 p.m.,** News. **1.10,** Orchestral Concert; Soloist, Van Roey (Songs): March (Blankenburg); Waltz (Joh. Strauss); Overture, The Drum Major's Daughter (Offenbach); Silver Clouds (Ketelbey); Selection from Loute (Szule); Aria from Figaro (Mozart); De wereld is van hem (Lemaire); Fête au Trianon (Popy). **2.0,** Interval. **4.55,** Announcements. **5.0,** Concert by Lionel's Club Orchestra, relayed from the Continental Hotel, **Blankenberghe. 6.0,** Records. **6.15,** Talk: The Belgian Freethought Congress. **6.30,** Sonata Recital by Mme. Husson-Michaux (Pianoforte) and M. Adolphe Frezin ('Cello): Sonata in G minor (Eccles-Salmon); Suite (De Caix D'Hervelois); Sonata in G (Sammartini). **7.0,** Book Review. **7.15,** Ballet Music from Mârouf (Rabaud), on Records. **7.30,** News; Sports Talk. **8.0,** Quartets Nos. 3 and 4 (Beethoven), by the Pro Arte Quartet. **8.45,** Recitations. **9.0,** Records. **10.0,** News. **10.10,** Concert by the Lionel's Club Orchestra, relayed from the Continental Hotel, **Blankenberghe. 11.0** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15 p.m.,** Time; News. **1.40,** Records. **6.0,** Time; Weather. **6.5,** Concert of Waltzes by the Station Orchestra. **7.0,** Educational Programme. **7.15,** Concert of Romanian Music by the Station Orchestra. **8.0,** Talk. **8.15,** Viola Recital by L. Mendelssohn. **8.45,** Anthology. **9.0,** Song Recital by Ledeanu. **9.30,** Dance Music on Two Pianofortes. **10.0,** News. **10.30,** Light Music from the Cina Restaurant.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym. **9.45,** News. **10.0,** Talk. **10.40,** Horticultural Talk. **11.10,** Water Level. **12 Noon,** Chimes. **12.5 p.m.,** Concert. **1.30,** Concert by the Horváth Cigány Band. **2.40,** Hints for Housewives. **4.0,** Programme for Schools. **5.0,** Talk. **5.40,** Pianoforte Recital by Pál Kiss. **6.15,** Janus Pannonius Commemoration Programme. **6.55,** Orchestral Concert. **8.0,** A Comedy (Sándor Török). **8.50,** Concert by the Mandits Jazz Band. **9.40,** News. **10.0,** Concert by the Kolompár Cigány Band. **10.45,** Concert by the Opera Orchestra; Conductor, Tibor Polgár: Rêverie (Buttykay); Hofballtänze (Lanner); Selection from Carmen (Bizet); Liebesliederwalzer (Strauss); Potpourri (Szabados).

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Hymn; Records. **6.5,** Gym. **6.25,** See **Breslau. 6.50,** Hymn; Time; News. **7.15,** Concert from **Breslau. 8.0,** Announcements. **8.5,** Gym. for Women. **8.20 to 8.35,** Talk. **10.0,** Time; News. **10.10,** Talk: The Lower Rhine. **11.10,** Post Office Propaganda. **11.35,** Talk on Records: Rural Savings Banks. **12 Noon,** Military Band Concert; Conductor, Stark. **12.45 p.m.,** News; Greetings. **1.0,** Orchestral Concert; Conductor, Eysoldt: Prelude to Prince Igor (Borodin); Serenade for Strings (Tchaikovsky); Slav Rhapsody (Dvorák); March, In treue Fest (Teike); Prelude to Martha (Flotow); Suite, Jeux d'enfants (Bizet); Liebeslederwalzer (Strauss); Viennese Melodies Potpourri (Komzak). In the interval at **1.45,** Announcements. **3.0,** Gym. for Children. **3.30,** Time; Exchange. **3.50,** Topical Talk. **4.0,** Concert by the Chamber Quintet and the Six Merry Singers: Die kleinen Soldaten (Marks); Italian Duet (Suppé); Two Songs; Salon-Ländler (Emerschitz); Tango (Albéniz); Two Songs; Salut d'amour (Elgar); Waltz, A toi (Waldteufel); Two Songs; Amors Siegeszug (Blon); Ich sende diese Blume dir (Wagner); Czardas (Michiels); **5.0,** Book Review. **5.15,** Finnish and Russian Song Recital by Strienz (Baritone). **5.45,** Talk: Denmark. **6.5;** Industrial Review. **6.25,** Recitation of Ruth Schaumann Poems by Eva Maria Kurig. **6.40,** Topical Talk. **6.50,** Time; Weather; Exchange; Sports Notes. **7.0,** Orchestral Concert; Conductor, Kühn: Entry March of the Boyards; Prelude to Donna Diana (Recznicek); Hungarian Rhapsody No. 6 (Liszt); Piedmontese Dance (Sinigaglia); Perpetuum mobile (Ries). **8.0,** Announcements. **8.30,** See **Berlin (Deutschlandsender). 9.0,** Programme of Light Music by the Station Chamber Orchestra and Soloist: Conductor, Hartmann. **10.0,** See **Berlin (Deutschlandsender). 10.15,** Time; News. **10.30,** Light Music (contd.). **12 Midnight** (approx.), Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**11.30 a.m. to 12 Noon,** Programme in English, arranged by the International Broadcasting Company of London. **11.30,** Request Programme. **12 Noon to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English, arranged by the I.B.C. **4.30,** Isle of Wight, Portsmouth, and Southsea Concert. Part I: Half-

an-Hour with George Gershwin. **5.0**, Part II: Dance Music. **5.30**, Part III: Military Band Music. **6.0 to 11.0 p.m.**, Programme in French. **11.0** to Close Down, Programme in English, arranged by the I.B.C. **11.0**, Talkie Time. Tunes from the Talkies and Shows. **11.30**, Club Concert for Knutsford Listeners. Part I: Light Orchestral Music. **12 Midnight**, Part II: Dance Music. In the interval at **12.30 a.m. (Thursday)**, Dance Music. **1.0**, I.B.C. Good-night Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.**, Hymn; Time; Weather. **5.50**, Gym. **6.40**, Time; News. **6.50**, Weather. **6.55**, Orchestral Concert from Badenweiler. **8.10**, Water Level; Weather. **8.15 to 8.35**, Gym. **10.0**, News. **10.10**, Programme for Boys. **10.45**, Hints for Housewives. **11.0**, Concert. **11.40**, Programme Announcements; Exchange; Weather. **11.50**, Social Notes. **12 Noon**, See **Leipzig. 1.0**, News. **1.20**, See **Stuttgart. 1.50**, Time; News. **2.0**, Records. **2.30**, Kaiserslautern-Cassel-Trier Inter-Relay Programme: Chamber Music from Kaiserslautern; History Talk from Cassel; Wind Quintet from Trier. **3.30**, Weather. **4.0**, Concert relayed from **Bad Nauheim. 5.30**, Book Review. **5.45**, Palatinate Folk Songs by a Girls' Choir. **6.20**, Talk for Mothers. **6.35**, Reading (Hans Schwarz). **6.45**, Weather; Exchange; Programme Announcements; Time. **6.50**, Topical Talk. **7.0**, Concert by the Station Orchestra, conducted by Caspur. **7.45**, Improvisations by Laven. **8.0**, Time; News. **8.10**, Local News. **8.30**, See **Berlin (Deutschlandsender). 9.0**, Beethoven Pianoforte Recital by Hoehn. **10.0**, See **Berlin (Deutschlandsender). 10.20**, Time; News. **10.35**, See **Stuttgart. 10.45**, News; Sports Notes. **11.0**, Folk Music by Helma Kolbe (Soprano); Henny Schmitt (Contralto); the Station Choir and a Mandoline Orchestra. **12 Midnight**, See **Stuttgart. 1.0 a.m. (Thursday)**, Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg,** and **Hanover, 1,330 kc/s, 225.6 metres.**—**5.45 a.m.**, Time; Weather; Notes for Farmers. **6.0**, Gym. **6.15**, Time; Weather. **6.20**, See **Königsberg. 7.0**, Time; News. **7.10**, See **Königsberg. 8.0**, Legal Talk for Mothers. **8.10**, Announcements; Records. **10.50**, News. **11.0**, Operetta Records. **12 Noon**, Cookery Hints. **12.5 p.m.**, Time; News. **12.15**, Concert from **Berlin (Funkstunde). 1.0**, Exchange; Market Prices. **1.15**, Weather. **1.20**, Musical Interlude. **2.15**, News. **2.30**, Records. **3.0**, Exchange. **3.40**, Shipping and Aviation Notes. **4.0**, Concert by the Station Orchestra; Conductor, Secker; Soloist: Eva Schlee (Soprano): Overture, The Ace of Hearts (Künneke); Polichinelle (Rachmaninov); Two Songs (Jos. Marx): (a) Windräder, (b) Und gestern hat er mir Rosen gebracht; Fest der Infantin (Gebhardt); Miniature Suite (Coates); Madrigalette (Bullerian); Czardas from Der Geist des Wojewoden (Grossmann); Romanzetta (Cui); Caucasian Suite (Ippolitov-Ivanov); Two Songs (Tchaikovsky): (a) None but the Weary Heart, (b) Gipsy Song; Cuban Serenade (Mausz); Waltz, Künstlerleben (Joh. Strauss). **5.30** (from **Bremen**), Talk: The Haunts of the Sea Falcon. **5.50**, Folk Song Programme. **6.30**, Talk for Farmers. **6.45**, Exchange. **6.55**, Weather. **7.0** (from **Hanover**), Concert by the Hanover Symphony Orchestra; Conductor, Sosen: Triumphal March from Tarpeia (Beethoven); Fest-Klänge (Sommer); Festival March in E flat, Op. 37 (Kleinmichel); Festival Overture (Hartung); Festival Polonaise (Larsen). **7.40**, August Sports Review. **8.0**, News. **8.30**, See **Berlin (Deutschlandsender). 9.0**, Records with Commentary. **10.0**, See **Berlin (Deutschlandsender). 10.15**, News. **10.35**, Musical Interlude. **11.0**, Concert of Norwegian Folk Music; Soloist, Brodal (Tenor): Part I, Folk Songs; Part II, Sylvelin (Sinding); Red Roses (Haarklou); By the Blue Fjord (Paulsen); Norönafolket det vil fare (Grieg); Melody (Sinding). **11.30**, String Quartet in D, Op. 20, No. 2 (Haydn) by the Station String Quartet. **12 Midnight** (approx.), Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Kootwijk,** 50 kW. from **3.40 p.m.**—**7.40 to 9.40 a.m.**, Programme of the Workers' Radio Society (V.A.R.A.). **7.40**, Records. **9.10** Dietetics. **9.40**, Religious Programme of the Liberal Protestant Radio Society (V.P.R.O.). **9.55** till Close Down, V.A.R.A. Programme. **9.55**, Concert for Night Workers. **11.40**, Concert by the V.A.R.A. Ensemble; Conductor, Bakels: March (Rosey); Waltz, Soirée d'été (Waldteufel); Serenade (Braga); Was Blumen träumen (Translateur); March (Jessel); You are my Heart's Delight, from The Land of Smiles (Lehár); Records; Dutch Mills (Heykens); Austrian Folk

AUG. 29th WEDNESDAY *continued*

Dances (Pachernegg); Waltz from Polenblut (Nedbal); Selection from Der Bummelbaron (Kollo). **12.40 p.m.**, Light Music. **1.25**, Interval. **1.40**, Programme for Women. **2.0**, Light Music (contd.). **2.40**, Programme for Children. **5.10**, Concert of Light Music; Conductor, v. d. Horst; Soloist, De Booy (Songs). **6.0**, Recitations. **6.15**, Records. **6.35**, News. **6.40**, Organ Recital by Steyn: Overture, Orpheus in the Underworld (Offenbach); Madonna mine (Raffaelli); Piece (Vacek); Melody (Medinger); Parla mi d'amore (Bixio); Russian and Hungarian Song Potpourri (Steyn). **7.10**, Talk. **7.30**, Records. **7.37**, Announcements. **7.40**, Recitations. **8.0**, Symphony Concert by the V.A.R.A. Orchestra; Conductor, de Groot: Overture, Egmont (Beethoven); Second Symphony (Beethoven). **8.40**, Talk. **9.0**, Symphony Concert (contd.): Overture in Italian Style (Schubert); Selection from Rosamunde (Schubert); Danse macabre (Saint-Saëns); March from Sigurd Jorsalfar (Grieg). **9.40**, News. **9.55**, Light Music by the V.A.R.A. Orchestra: March (Hilberto); Jubilee Waltz (Eysler); So schön wie es einmal war (Dauber); Birthday Greetings (Ketelbey); Geburtstagständchen (Lincke); Red Roses (Lehár); March (Sousa). **10.40**, Records. **11.40**, Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. (until **6.40 p.m.**), 20 kW. from **6.40 p.m.**—Programme of the Christian Radio Society (N.C.R.V.). **7.40 a.m.**, Bible Reading and Prayer. **7.55**, Records. **9.10**, Interval. **10.10**, Religious Programme. **10.40**, Recital by Snijders (Organ). **11.40**, Police Messages. **11.55**, Records. **12.10 p.m.**, Concert by the Van der Hurk-Van der Horst Ensemble: Bella vista (Morena); Moonlight on the Alster (Fetras); Serenade (Fanchesi); Chants russes (Lalo); Song (F. Wagner); Potpourri (Rubach); Records; Selection from Il Trovatore (Verdi); Mattinata (d'Ambrosio); Suite (Worch). **1.40**, Records. **2.30**, Concert by the Excelsior Women's Choir; Conductor, Fransina Boer, with Records. **3.25**, Interval. **3.40**, Recital by Andries de Swarte ('Cello) and Marianne de Swarte de Leeuwe (Pianoforte): Toccata (Frescobaldi-Cassado); Sonata (Breval); Records; Scherzo Op. 4 (Brahms); Records; Allegro appassionato (Saint-Saëns); Mazurka (Popper); Vito (Popper); Air (Huré); Piece No. 3 (Boulanger). **4.40**, Programme for Children. **5.40**, Records. **6.10**, Programme to be announced. **6.40**, Police Messages; Religious Notes. **6.55**, Records. **7.40**, Recital by Jan Zwart (Organ): Toccata, Romance and Scherzo (Reger); Paraphrase (Zwart); Fugue and Choral from the Symphonic Choral (Karg-Elert), Song (Karg-Elert); Prologus tragicus (Karg-Elert): Paraphrases (Zwart). In the interval at **8.5**, Talk. **8.40**, Talk. **9.10**, Recital by Hélène Ludolph (Songs) and Caroline Lankhout (Pianoforte). Piet Lenz ('Cello), Jehan van Hell (Clarinet): Trio (Beethoven); Der Hirt auf dem Felsen (Schubert): Rhapsody (Debussy): Piece and Berceuse (Diepenbrook); Trio (Zemlinsky).

INNSBRUCK.—Relays **Vienna.**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres**; and **Skamlebaek, 49.5 metres.**—**7.0 a.m.**, Gym. **7.27**, Weather. **8.30**, Service from Copenhagen Cathedral. **11.0**, Weather. **11.10**, Fish Prices. **12 Noon**, Chimes; Weather. **12.5 p.m.**, Concert by Nielsen's String Ensemble, relayed from the Ritz. **2.0**, Interval. **3.0**, Records. **3.30**, Concert by the Station Orchestra; Conductor, Emil Reesen: Hungarian March (Schubert-Liszt); Overture, Zampa (Hérold); Waltz, Dreams on the Ocean (Gungl); Selection from Romeo and Juliet (Gounod); Slav Rhapsody (Friedemann); March (Fucik); Prelude to Le Déluge (Saint-Saëns); Hungarian Dances in G Minor and D (Brahms); Selection from Coppélia (Delibes); Hungarian March from Der Teufelsreiter (Kálmán). In the interval at **4.15** (approx.), Talk for Women. **5.30**, Exchange. **5.45**, Medical Talk. **6.15**, French Lesson. **6.45**, Weather; Wireless Notes. **7.0**, News. **7.15**, Time. **7.30**, Talk: Cooperation in the Crisis. **8.0**, Chimes. **8.2**, Schubert and Johann Strauss Concert by the Station Orchestra. Conductor: Mahler. Part I, Schubert Music: Overture in D, No. 2; German Dances with Coda; Ballet Suite No. 1 from Rosamunde. Part II., Strauss Music: Overture, Carnival in Rome; Waltz, Wiener Frauen; Mazurka; March from Der lustige Krieg; Overture, The Gipsy Baron. **9.0**, Talk. **9.30**, Concert of Danish Music by the St. Matthew's Church Choir; Conductor, Debois. **10.0**, News. **10.15**, Recital of Scottish Folk Songs by Per Knudsen: Jessie the Flower o' Dunblane; Annie Laurie; The Blue Bells of Scotland; The Winter is past; Auld Lang Syne; Afton Water; Mary of Argyll. **10.35**, Violin Duets (Béla Bartók) by Else Bruun and Julius Koppel. **10.50**, Dance Music, relayed from the Lorry. In the interval at **12 Midnight**, Chimes. **12.30 a.m. (Thursday)**, Close Down.

KIEL.—Relays **Hamburg. KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—**5.0 a.m.**, Records. **5.50**, Weather. **6.0**, Gym. **6.20** (from **Danzig**), Police Band Concert. **7.0**, News. **7.10**, Police Band Concert. **8.0**, Service. **8.30 to 9.0**, Gym. for Women. **10.40**, News. **10.55**, Weather. **11.30**, Records. **12 Noon**, See **Berlin (Funkstunde). 1.1 p.m.**, Time; Weather. **1.5 to 2.30**, Records. In the intervals, News. **2.30** (from **Danzig**), Exchange. **3.0**, Market Prices; Exchange. **3.20**, Hints for Housewives. **3.30**, Programme for Children. **4.0**, Concert by the Station Small Orchestra; Conductor, Wilcken. In the interval, Wireless Hints. **5.50**, Talks for Parents and Children. **6.15**, Market Prices. **6.25**, Handwork for Boys. **6.50**, Weather. **7.0** (from **Danzig**), Reading. **7.25**, Lieder by Hedwig Jungkurth (Soprano). **8.0**, News. **8.30**, See **Berlin (Deutschlandsender). 9.0** (from **Danzig**), Concert by the State Theatre Orchestra; Conductor, Kallipke: Symphonic Poem, Les Préludes (Liszt); Pianoforte Concerto in E minor (Chopin). **10.0**, See **Berlin (Deutschlandsender). 10.15**, Weather; News; Sports Notes. **10.45**, See **Breslau.**

KOSICE.—Relays **Prague. LAUSANNE.**—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.**—**5.50 a.m.**, Notes for Farmers. **6.0**, Gym. **6.25**, See **Breslau.** In the interval at **7.0**, News. **7.15**, See **Breslau. 8.0**, Gym. **8.20 to 9.0**, Records. **9.40**, Exchange. **9.45**, Announcements; Water Level. **11.0**, Announcements; Records. **11.30**, Time. **11.40**, Weather. **11.50**, Notes for Farmers. **12 Noon** (from **Dresden**), Concert for the Radio Exhibition, The Dresden Philharmonic Orchestra; Conductor, Schestak: Overture, Die Opernprobe (Lortzing); German Dances (Mozart); Suite, The Taming of the Shrew (Zilcher); Russian Scenes (Bantock); Waltz, Mariana (Jos. Strauss); Entry March of the Gladiators (Fucik); Ballet Music, Sylvia (Delibes); Waltz, Doctrinen (Ed. Strauss); Selection from Der Wildschütz (Lortzing); March (Schubert). In the interval, at **1.0 p.m.**, News. **2.0**, News; Exchange. **2.15**, Records. **3.20**, Talk: Helmholtz, the Scientist. **3.40**, Exchange. **4.0**, Stories and Songs for Young People. **5.20** (from **Dresden**) Recital on Two Pianofortes by Kronke and Margrit Grube: Fantasia and Fugue in G minor (Bach); Variation on an Original Theme (Kirchner); Paraphrase on the Blue Danube Waltz (Strauss-Kronke). **5.50**, Exchange; Weather; Time. **6.0**, Reading (Euringer). **6.20**, Concert of Mandoline and Guitar Music. **7.0**, Brahms' Folk Songs by the Station Chamber Choir. **7.35**, Talk: Military Attire throughout the Ages. **8.0**, News. **8.30**, See **Berlin (Deutschlandsender). 9.0**, Concert of Viennese Music by the Leipzig Symphony Orchestra; Conductor, Blumer; Soloists, Johanna Barklin (Soprano) and Wirl (Tenor). **10.0**, See **Berlin (Deutschlandsender). 10.20**, News; Sports Notes. **10.50**, Dance Music by the EmDe Orchestra. **12 Midnight**, Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 120 kW.—**7.45 a.m.**, Records. **8.0**, News in French; Record; News in German; Record. **12 Noon**, Concert by the Station Orchestra; Conductor, Pensis: Overture, Don Pasquale (Donizetti); Roses of Picardy (Wood); Schumann Potpourri (Urbach); Serenade (Nanno); Piazza del Popolo (Freseriksen); The Rosary (Nevin); Piece (Noiret); Toboggan (Frémeaux); March (Mayer). In the interval at **12.20 p.m.**, News in French and German, and at **1.0**, Exchange. **1.15**, Records. **1.30**, Exchange. **1.35**, Accordion Recital by Silistrini: March (Marceau); Waltz, Sogno d'Amore (Silistrini); Ninon (Salabert); March (Vantepitte); Waltz Variations (Van Herck); March (Gardoni). **2.0**, Exchange. **3.45**, Exchange. **6.30** till Close Down, Austrian Evening. **6.30**, Variety Programme. **7.30**, Racing Results. **7.35**, Concert by the Station Orchestra; Conductor, Pensis: Overture, Ruy Blas (Mendelssohn); La Pendula armoniosa (Pick-Mangiagalli); Rendezvous (Alletter); Suite, Goliardica (Amadei); Overture, Morning, Noon and Night (Suppé); Waltz, Wiener Bürger (Ziehrer); Liebesfreud und Liebesleid (Kreisler); Viennese Potpourri (Dostal). In the interval at **8.0**, News in French and German, at **8.35**, Exchange. **9.5**, 1900 Potpourri (arr. Salabert); Record. **9.30**, Sonata in B flat minor (Chopin) by René Delporte (Pianoforte). **9.50**, Song Recital by Alice Peffer: Songs (Grieg): (a) Eros, (b) Solvieg's Song, (c) The Water Lily; Songs (Brahms): (a) Sapphische Ode, (b) Vergebliches Ständchen, (c) Der Tod, das ist die Kühle Nacht, (d) Sonntag, (e) Mädchenlied, (f) O liebliche Wangen. **10.20**, Dance Records.

MADRID

EAJ7, 1,085 kc/s, 274 metres; 7 kW.—**9.0 a.m.**, News. **10.0 to 10.30**, Announcements. **2.0 p.m.**, Chimes; Weather; Variety Music. **2.30**, Concert by the Station Sextet. **3.0**, Announcements; Exchange; Variety Music. **3.30**, Sextet Concert (contd.). **4.0**, Variety Music. **4.15**, Sextet Concert (contd.). **4.40**, News. **5.0**, Interval. **6.0**, Chimes; Light Music. **7.0**, Announcements; Songs. **7.30**, Exchange. **7.35** (approx.), Orchestral Concert: Prelude (Barbieri); Caprice viennois (Kreisler); Suite, Le carnaval des animaux (Saint-Saëns); El puerto (Albéniz); Waltz, Gold and Silver (Lehár); Spanish Dance (Moszkovsky); Spanish Songs. **8.30**, News. **8.40** (approx.), Concert—Part I: Old Spanish Songs. Part II: 'Cello Solos, (a) Gavotte (Popper), (b) Arlequin (Popper), (c) Spanish Dance (Granados), (d) Après un rêve (Fauré), (e) Elegy (Fauré), (f) Papillon (Fauré), (g) Spanish Serenade (Glazunov). Part III: Opera Music; Aria from La Traviata (Verdi), Gianni Schicchi (Puccini), La Bohème (Puccini), Lakmé (Delibes), Cavalleria rusticana (Mascagni), La Gioconda (Ponchielli). **9.50**, Announcements. **10.0**, Chimes. **10.5**, Lecture Recital: Chile. **11.0**, News. **11.10** (approx.), Concert by the Station Sextet; Soloist, Roberto Díaz (Argentine Songs to the Guitar). In the interval, Programme by Ramón Gómez de la Serna. **12.45 a.m. (Thursday)**, News. **1.0**, Chimes; Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres**; and **Florence, 610 kc/s, 491.8 metres.**—**7.30 a.m.**, Gym. **7.45**, Time; News. **11.30**, Light Music. **12.30 p.m.**, Records. **12.45**, News. **1.0**, Time; Announcements. **1.5**, Concert by the Malatesta Chamber Orchestra. In the interval, at **1.30**, Records; Exchange. **2.15**, Exchange. **2.25**, Interval. **4.35**, News. **4.45**, Programme for Children. **5.10**, Chamber Music. **5.55**, Weather. **6.0 to 6.10**, Report for Farmers; Wheat Market Prices. **7.0**, Tourist Report; Announcements. **7.15**, News in Foreign Languages. **8.0**, Time; News; Records. **8.45**, Lakané—Opera in Three Acts (Delibes). After the Opera, News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**12 Noon**, Announcements. **12.10 p.m.** (approx.), Orchestral Concert: March, San Lorenzo (Silva); Overture, Alessandro Stradella (Flotow); Selection, Robert le Diable (Meyerbeer). **12.29**, Time. **12.33**, Concert (contd.): Ballet Music, The Demon (Rubinstein); Schumann Potpourri (Schreiner). **12.55**, News. **1.5**, Records. **1.15**, Fashion Notes. **1.30**, Interval. **3.59**, Time. **4.0**, See **Sottens. 6.0**, Interval. **7.45**, News. **8.0**, Notes for Farmers; Market Prices. **8.15**, First Act of La Traviata—Opera in Four Acts (Verdi), on Records. **8.50**, Topical Talk. **9.5**, Acts II and III of La Traviata—Opera (Verdi), on Records. **10.0**, Report: The Cycle Tour of Switzerland. **10.15** (approx.), Act IV or La Traviata—Opera (Verdi), on Records. **10.50** (approx.), Close Down.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.0 to 7.15 a.m.**, See **Prague. 10.0**, See **Prague. 10.30**, Military Band Concert. **11.0**, Records. **12 Noon**, See **Prague. 12.30 p.m.**, Concert by the Station Orchestra; Conductor, Divis: Selection from The Devil and Kate (Dvorák); Selection from The Girl from the Golden West (Puccini); Mattinata (Leoncavallo); Piece (Tichy); March (Micanik). **1.20**, Records. **1.30**, See **Prague. 1.40**, Records. **1.50 to 2.0**, See **Prague. 3.15 to 4.20**, See **Prague. 5.40**, See **Prague. 5.55**, Local Report. **6.0**, Programme for Women. **6.10**, Talk for Workers. **6.20**, Band Concert of Light Music; Conductor, Jurina. **6.55**, See **Prague. 9.40**, Suite for Pianoforte (Turina). **10.0**, See **Prague. 10.45**, Records. **11.0** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.**, News. **5.30**, Fanfare. **5.45**, Gym. **6.15**, Programme Announcements. **7.30**, Records. **9.0**, Musical Programme. **9.55**, Time. **10.0**, News. **10.15**, Pianoforte Recital. In the intervals, Records. **11.15**, Technical Talk for Farmers. **2.45 p.m.**, News. **3.15**, Educational Programme for Children. **4.15**, Book Review. **4.30**, Communist Party Programme. **5.30**, Concert. **9.0**, Literary Talk in Czech. **9.55**, Chimes. **10.5**, Talk in English: Reminiscences of an Old Bolshevist. **11.5**, Literary Programme in German.

MOTALA.—Relays **Stockholm. MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nürnberg, 1,267 kc/s, 236.8 metres**; and **Kaiserslautern, 1,195 kc/s, 251 metres.**—**6.30 a.m.**, Gym. **6.45**, Motto. **6.50**, Italian Lesson. **7.15**, Time; News. **7.25**, Orchestral Concert; Conductor, Freytag. **9.50**, Gym. for Women. **10.55**, Market Prices;

Notes for Farmers; News. **11.30**, Post Office Propaganda; Records. **12 Noon**, Records. **1.15 p.m.**, Time; News. **1.25**, Orchestral Concert; Conductor, Kloss: Overture, Ceuerentola (Rossini); Russian Dances (Bortkiewicz); Alt-China (Niemann); Three Pieces in Dance Form (Mrazek); Barcarolle (Scharwenka); Polish Dance (Scharwenka). **2.0**, News; Programme Announcements; Exchange. **2.20** (from **Nürnberg**), Vocal and Instrumental Concert; Else Marr (Soprano); Trio for Flute, Clarinet and Bassoon, Op. 12 (Lang); Four Goethe Lieder for Soprano, String Quartet and Pianoforte (Lang). **2.50**, Talk: The Peasants' Revolt, 1234. **3.10**, Songs to the Lute. **3.30**, Talk: The Psychological Effects of Colour. **3.50**, Weather; Notes for Farmers. **4.0**, Light Music by Schneider's Orchestra and Soloists: March (Dostal); Poème (Drdla); Overture, Poet and Peasant (Suppé); Hungarian Dances Nos. 5 and 6 (Brahms); Yodels with Zither Accompaniment; Waltz, Herbststimmung (Lincke); Popular Songs; Zauberlied (Meyer-Helmund); Selection from Das Pensionat (Suppé); Accordion Solos; Heinzelmännchens Wachtparade (Noack); March (Mühlberger). **5.30**, Play for Children. **6.10**, Programme for Young People. **6.50**, Time; Weather; Notes for Farmers. **7.0**, Records. **8.0**, See **Frankfurt**. **8.35**, Variety from **Berlin (Funkstunde)**. **9.0**, Variety Programme by the Rodina Balalaika Orchestra, the Station Schrammel Quartet and Soloists. **10.0**, See **Berlin (Deutschlandsender)**. **10.15** (approx.), Time; News; Exchange; Sports Notes. **10.20**, Programme to be announced. **11.0**, Concert by the Station Small Orchestra; Conductor, Kloss. **12 Midnight** (approx.), Close Down.

NAPLES.—Relays **Rome.** **NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres**; and **Jelöy, 6,990 kc/s, 42.92 metres.**—**11.15 a.m.**, Service. **11.50**, Exchange. **12.45 p.m.**, News. **12.55**, Nauen Time Signal. **1.0 to 2.0**, Records. In the interval at **1.15**, Weather; Programme for Farmers; and at **1.45**, Exchange. **5.10**, 'Cello Solos by Aksel Wold, relayed from **Tröndelag, 629 kc/s, 476.9 metres**: Allegro appassionato (Saint-Saëns); Après un rêve (Fauré); Polonaise (Popper). **5.30**, Recital by Mildred Selmer (Pianoforte) and Solveig Melody (Cleve); Papillons (Schumann). **6.10**, Recitations. **6.30**, Programme for Young People. **7.0**, Announcements. **7.15**, Weather; Ruud Kjölö (Songs); Folk Song (Grieg); News. **7.30**, Time. **7.31**, Programme for Farmers. **7.40**, Song Recital by Conrad Arnesen, from **Bergen, 850 kc/s, 352.9 metres. 8.10**, Talk. **8.40**, Concert by the Station Orchestra; Conductor, Kramm: Kleine Kammermusik (Hermann); Capriccio catalan (Albéniz); Andante cantabile (Tchaikowsky); Aria (Wagner); La nuit nordique (Vecsey); Two Pieces (Berlioz): (a) Danse des lutins, (b) Danse hongroise; Russian Rhapsody from Prince Igor (Borodin); Overture, Semiramis (Rossini). **9.40**, Weather; News. **10.0**, Topical Talk. **10.15**, Variety Programme. **10.45**, Dance Records. **11.30** (approx.), Close Down.

OSTERSUND.—Relays **Stockholm.**

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 to 8.30 a.m.**, News. **10.30**, See **Lyons (La Doua). 12 Noon**, Tourist Report. **12.15 p.m.**, Concert by the National Orchestra; Conductor, Désomière; Soloists, Prigent (Songs): In the interval at **1.0**, News. **2.0**, Records. **2.30**, Songs. **6.0**, Programme for Young People. **6.30**, News. **7.45**, Tourist Report. **8.0**, Records. **8.30**, Variety Programme. In the interval at **9.30**, Songs. After the Programme, News. **10.30**, Dance Music.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.10 a.m.**, Fanfare; Records. **8.0**, Concert. **8.30**, News. **8.45**, Cookery Talk. **12 Noon**, Exchange. **12.5 p.m.**, March Records. **12.25**, News. **12.35**, Dance Records. **1.5**, Exchange. **1.15**, Records. **2.0**, Exchange. **3.15**, Exchange. **3.45**, Exchange. **4.50**, Exchange. **6.5**, Exchange. **6.45**, Exchange. **6.49**, Records: Beethoven Music. **7.10**, News. **7.30**, Records. **8.0**, Interval. **8.10**, La Traviata—Opera (Verdi) (on Records). In the interval at **8.40**, Exchange; Talk. **10.20**, Exchange; News. **10.30** till Close Down Programme in English arranged by the International Broadcasting Company of London. Music from Opera. **11.0**, I.B.C. Goodnight Melody and Close Down.

PARIS

RADIO-PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.**, Gym. **7.0**, Records. **7.15**, News. **7.45**, Gym. **8.0**, Records. **10.15**, Concert, relayed from **Vichy**: Hungarian March (Selim); Le Paradis de Mahomet (Planquette); Fleur de Belgique (Bertin); Idylle villageoise (Bertin); Selection from Coups de roulis (Messager); Souvenir (Danjaume); Suite Bucoliques (Dulourens); Waltz, L'immensité (Gregh) **12 Noon**, Talk: Racine. **12.15 p.m.**, Dance Music by the Lucien Goldy Orchestra; Sorbier (Songs). In the interval, at **1.20**, Exchange. **3.45**, Exchange. **6.20**, Weather; Programme for Farmers; Exchange; Racing Results. **6.45**, Medical Talk. **7.0**, Records. **7.15**, News. **7.30**, Topical Talk. **8.0**, Reading (Maupassant). **8.30**, News. **8.45**, Symphony Concert of French Music by the National Orchestra; Conductor, Desormière; Soloists, Germaine Féraldy (Songs) and Pauline Aubert (Harpsichord): March (Lulli); Orchestral Suite (Lalande); Songs; Selection from L'europe galante (Campra); Selection from Les Paladins (Rameau); Overture, Zaïs (Rameau); Piece for Harpsichord (Couperin); Extracts from Namouna (Lalo); Le tombeau de Couperin (Ravel). In the interval, at **9.15**, News and Fashion Review. **10.30**, Dance Music.

AUG. 29th WEDNESDAY *continued*

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres** and **25.27 metres.**—**3.0 p.m.**, Harvest of Song. **3.15**, Sammy Fuller. **3.30**, To-day's Children: **3.45**, News; Cookery Hints. **4.0**, Uncle Tom and Betty. **4.15**, Merry Macs. **4.30**, United States Army Band. **5.0**, Al and Lee Reiser. **5.15**, Fields and Hall. **5.30**, Vic and Sade. **5.45**, Concert by the Hotel William Penn Orchestra. **6.0**, News; Exchange. **6.15**, Hon. Archie and Frank. **6.30**, Farm and Home Hour. **7.30**, KDKA Home Forum. **8.0**, Joe White (Tenor). **8.15**, Happy Days in Dixie. **8.45**, Human Values. **9.0**, Betty and Bob. **9.15**, Programme to be announced. **9.30**, Exchange. **9.45**, Concert by the Chicago Symphony Orchestra. **10.15**, KDKA Kiddies' Klub. **10.30**, Jackie Heller. **10.45**, Little Orphan Annie. **11.0**, Dan and Sylvia. **11.14**, Goodrich Baseball Résumé. **11.30**, Comedy Stars of Hollywood. **11.45**, Lowell Thomas. **12 Midnight**, Music; News; Dramatic Programme. **12.15 a.m. (Thursday)**, Programme to be announced. **12.30**, Irene Rich. **12.45**, Frank Buck. **1.0 to 6.0 a.m.**, Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 to 7.15 a.m.**, Time; Gym.; Music and Songs; News. **10.0**, Records; News. **10.20**, News in German. **10.25**, Record. **10.30**, See **Moravská-Ostrava. 11.0**, Records. **12 Noon**, Time; Market Prices; Weather. **12.10 p.m.**, Records. **12.20**, News. **12.30**, See **Moravská-Ostrava. 1.20**, Talk. **1.30**, Labour Exchange. **1.40**, Labour Exchange in German. **1.50**, Exchange. **1.55**, Exchange and Weather in German. **2.0**, Interval. **3.15**, Dance Music. **4.15 to 4.20**, Exchange; Weather. **5.40**, Records. **5.45**, Book Review. **5.55**, Records. **6.5**, Local Report. **6.10**, Market Prices. **6.15**, Record. **6.20**, German Transmission: Topical Talk; Report for Workers; Announcements. **6.55**, News in German. **7.0**, Time News. **7.10**, Concert of Czech Opera Music: The Station Orchestra; Conductor, Jeremias; Soloists, Budikova (Soprano) and Toms (Tenor); Overture, The Bartered Bride (Smetana); Duet (Bendl); Ballet Music from Hedy (Fibich); Duet from Jacobin (Dvorák); Ballet Music from Eva (Foerster); Duet from The Secret (Smetana). **8.10**, Talk. **8.25**, Concert by the Prague Mandoline Quartet. **8.40**, Daily News—Play (Spitzer). **9.40**, Trio for Clarinet, Horn and Pianoforte (Reinecke). **10.0**, Time; News. **10.15**, Records. **10.45**, News in French. **11.0** (approx.), Close Down.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres**; **Milan (No. 2), 1,348 kc/s 222.6 metres**; **Turin (No. 2), 1,357 kc/s, 221.1 metres**; **and 2RO, 11810 kcs 25.4 metres.**—**7.30 a.m.**, Gym. **7.45**, Time; News. **12.30 p.m.**, Records. **1.5 to 2.15**, See **Milan.** In the interval, at **1.30**, Time; News; Exchange. **4.30**, Children's Radio Review. **4.55**, News; Exchange. **5.10**, See **Milan. 5.55**, Weather. **6.0 to 6.10**, Wheat Market Prices. **7.0**, Tourist Report; Dopolavoro Notes; Report of the Royal Geographical Society. **7.15**, News in Foreign Languages. **8.0**, Time; News. **8.10**, Records. **8.30**, Government Notes. **8.45**, See **Milan.** In the intervals, Music Talk and Theatre Notes. **11.0**, News.

RUYSSELEDE

10,330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.**, News in French. **8.0**, See **Brussels (No. 2). 9.0**, News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by **W2XAF** on **31.48 metres** and by **W2XAD** on **19.56 metres.**—**7.0 p.m.**, Dreams Come True. **7.15**, The Wise Man—Sketch. **7.30**, Woman's Radio Review; Talks; Orchestra. **11.30**, Exchange. **12 Midnight**, Guest Artists; Instrumental Quartet. **1.0 to 3.0 a.m. (Thursday)**, Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW; and **Geneva, 401 kc/s, 748 metres.**—**6.0 to 6.15 a.m.**, Gym. **10.45**, Report of the Cycle Tour of Switzerland. **11.15**, Interval. **12.29 p.m.**, Time. **12.30**, News in French and German. **12.45**, Records. **2.0**, Interval. **3.59**, Time. **4.0**, Concert by the Station Orchestra: Part I—Classical Music: Airs and Dances (Purcell); Symphony in D (Joh. Christian Bach); Musette (Rameau); Tambourin (Rameau); Extracts from Les petits reins (Mozart). **4.45**, Records. **5.16**, Concert (contd.): Part II—Operetta Music. **6.0**, Programme for Children. **7.0**, Accordion Solos by Thöni. **7.30**, Commentary on the Cycle Tour of Switzerland. **8.0**, Concert by the Station Orchestra; Soloist, Mlle Graf (Soprano); Suite (Lully); Aria from Idoménéo (Mozart); Five contredanses (Mozart); Two Songs (Schubert): (a) Du bist die Ruh, (b) Gretchen am Spinnrad; Bauerntänze (Beethoven); Waltz, Frühlingstraum (Joh Strauss); Overture, Die Fledermaus (Joh. Strauss). **8.45**, La Rente viagère—One-Act Play (Hervilliez). **9.15**, News in French and German. **9.30**, Jazz Music **10.15**, (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres**; **Göteborg, 941 kc/s, 318.8 metres**; **Hörby, 1,131 kc/s, 265.3 metres**; **Motala, 216 kc/s, 1,389 metres**; and **Sundsvall, 601 kc/s, 499.2 metres.**—**7.45 a.m.**, Service. **8.0**, Weather. **12.30 p.m.**, Weather. **12.45**, Exchange. **12.55**, Time. **1.0**, Talk. **1.30** (from **Göteborg**), Light Music. **2.30**, Song Recital by Vilhelm Hamnstedt. **3.0**, Interval. **5.0**, Weather. **5.5**, Programme for Children. **5.30**, Reading. **6.0**, Records. **7.0**, Talk. **7.15**, Weather; News. **7.30**, Talk. **7.45**, Recital by Set Svanholm (Songs) and Witowsky (Pianoforte); Songs (Wolf): (a) Uber Nacht, (b) Anakreons Grab, (c) Er ist's; Sonatina in F sharp (Ravel); Four Songs (Schubert): (a) An die Leier, (b) Liebesbotschaft, (c) Der Neugierige, (d) Ungeduld. **8.15**, Play (Erik Asklund). **8.45**, Concert of Light Music. **9.45**, Weather; News. **10.0**, Dance Music. **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.30 a.m.**, Orchestral Concert from **Lyons (La Doua). 12 Noon**, Records. **12.45 p.m.**, News. **1.0**, Time; Exchange. **1.5**, Records. **1.15**, Concert relayed from **Marseilles, 749 kc/s, 400.5 metres. 3.30**, Concert relayed from **Vichy. 4.45**, Talk on Electricity in German. **5.0**, Orchestral Concert; Conductor, Roskam; Soloist, Roskam ('Cello): March (Miline); Two Spanish Danses (Moszkowsky); Selection from Lilac Time (Schubert-Berté); Serenade from Les Millions d'Arlequin (Drigo); 'Cello Solo; Prelude, Waltz, Serenade and Melody (Rachmaninov); Czardas (Michiels); Potpourri (Scule); Waltz (Ganne). **6.0**, Talk: Tunis. **6.15**, Talk: Jewish Literature in the Aramic Language. **6.30**, Song and Pianoforte Recital from **Paris (Radio-Colonial), 11,880 kc/s, 25.25 metres. 7.30**, Time; News. **7.45**, Records. **8.0**, Press Review in German; Lottery Results; Announcements. **8.30**, Variety Programme by the Station Orchestra and Soloists; Coco-Bel Oeil—Operetta in One Act (Colin). In the interval at **9.30** (approx.), Press Review. **10.30**, Dance Music relayed from the Caveau de l'Aubette. **12 Midnight** (approx.), Close Down.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.35 a.m.**, Notes for Farmers. **5.45**, Hymn; Time; Weather. **5.50**, Gym. **6.15**, Records. **6.40**, Time; Announcements; Weather. **6.55**, Records. **7.25**, See **Munich. 8.10**, Weather. **8.15**, Gym. **8.35**, Interval. **10.0**, News. **10.10**, Lieder Recital by Brünhild Möckesch (Soprano). Three Lieder (Rothweiler); Four Songs (Hilde Kocher-Klein). **10.35**, Talk for Women: A Voyage to India. **11.0**, Bortkiewitz Pianoforte Recital by Albert Braun. Selection from (a) Andersen's Fairy Tales, (b) Childhood, Op. 39, (c) Impressions, (d) Lyric Thoughts. **11.25**, Post Office Concert. **11.55**, Weather. **12.0 Noon**, See **Leipzig. 1.0 p.m.**, Time; News. **1.20**, Records. **1.50**, Time; News. **2.0**, Concert of Swabian Folk Music for Radio Exhibition. Egerland, Transylvanian and Tyrolese Musicians, Village Bands and Choirs; Conductor, Görlich. **4.0**, See **Berlin (Deutschlandsender). 5.30**, Legal Talk. **5.45**, Records. **6.0**, Programme for Boys. **6.25**, Dance Records. **7.0**, Talk: A Visit to a Forestry School. **7.30**, Recital of Rhine Songs by Hermann Lingor. **7.45**, Time; Notes for Farmers. **8.0**, News. **8.10**, See **Frankfurt. 8.35**, For Young People. **9.0**, A Homeless Man—Radio Play (after H. Stilling). **10.0**, See **Berlin (Deutschlandsender). 10.20**, Time; News. **10.35**, Announcements. **10.45**, Local News; Weather; Sports Notes. **11.0**, Dance Music by the Waldmann-Gietmann Band, relayed from **Baden-Baden. 12.0 Midnight**, Serenade. **1.0 a.m.** (approx.), Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.**, Dance Refrains. **8.30**, News. **8.35**, Sound Film Music. **8.45**, Light Orchestral Music. **12 Noon**, Songs. **12.15 p.m.**, Light Orchestral Music. **12.30**, News; Exchange. **12.45**, Request Music. **1.0**, Market Prices. **1.5**, Opera Music. **1.30**, Military Band Music. **1.45**, Popular Songs. **2.0**, Amusement Guide. **6.0**, News. **6.15**, Operetta Music. **6.30**, Light Orchestral Music. **6.45**, Popular Songs. **7.0**, Cinema Organ Recital. **7.15**, Songs. **7.30**, News; Racing Results; Wheat Market Prices; Exchange. **7.45**, Light Orchestral Music. **7.50**, Talk. **8.15**, Operetta Music: Quadrille from La Mascotte (Audran); Selection from Les dragons de Villars (Maillart). **8.30**, Duets. **9.0**, Holidays—Fantasy. **9.30**, Light Orchestral Music. **10.0**, Operetta Music. **10.15**, News. **10.30**, Balalaika Music and Russian Songs. **11.0**, Request Music. **11.15**, Military Band Music. **11.30**, Opera Music: Arias from Manon (Massenet), Rigoletto (Verdi), Don Quixote (Massenet), Carmen (Bizet). **11.50**, Light Orchestral Music: The Butterfly (Bendix); Waltz, Tales from the Vienna Woods (Joh. Strauss); Liebesfreud (Kreisler); Troika (Schishkin). **12 Midnight**, News. **12.5 a.m. (Thursday)**, Au Caveau de Minuit—Fantasy. **12.15**, Opera Music: Selection from Tosca (Puccini); Ballet Music from Rosamunde (Schubert). **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo.** **TURIN.**—Relays **Milan.**

VATICAN CITY

15,120 kcs, 19.84 metres; 10 kW **(Morning)**; **5,970 kc/s, 50.26 metres (Evening).**—**11.0 to 11.15 a.m.**, Religious Information in Spanish. **8.0 to 8.15 p.m.**, Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres**; **Innsbruck, 519 kc/s, 578 metres**; **Klagenfurt, Linz and Salzburg, 1,294 kc/s, 231.8 metres.**—**9.0 a.m.**, News. **9.20**, Market Prices. **9.30**, Weather. **10.50**, Water Level. **11.30**, Programme for Women. **11.55**, Weather. **12 Noon**, Records. **1.0 p.m.**, Time; News; Programme Announcements. **1.10**, Records. **2.0**, Announcements. **2.10**, Records. **3.30**, Time; Weather; Exchange. **3.50**, Gym. for Children. **4.10**, Talk by an Engineer: The Problem of Friction. **4.35**, News. **4.40**, Song and Pianoforte Recital by Edith van Aust (Soprano) and Hauser (Pianoforte); Sommerlied (Wetchy); Chant d'Hiver (Dalcroze); Two Brahms Songs: (a) Feldeinsamkeit, (b) O komme, holde Sommernacht; Arabesque (Jos. Marx); Les collines d'Anacapri (Debussy); Toccata (Ravel). **5.10**, Talk: The Textile Trade and the Vienna Autumn Fair. **5.25**, Hints for Poultry-Breeders. **5.35**, Records. **5.55**, Talk: Wood for Domestic Architecture. **6.5**, Talk: Ingratitude. **6.30**, Talk: Ear Troubles caused by Outdoor Life and Sport. **6.55**, Time; News; Programme Announcements. **7.15**, Der Rosenkavalier—Opera (Richard Strauss), by the Vienna Philharmonic Orchestra and the Opera House Choir, relayed from the Festspielhaus, Salzburg; Conductor, Krauss. In the interval at **8.20** (approx.), Topical Talk; and at **9.35** (approx.), Poetry Reading (Hugo von Hoffmansthal). **11.0**, News; Announcements. **11.20**, Orchestral Concert; Conductor, Pauscher: Wedding March from A Midsummer Night's Dream (Mendelssohn); Selection from Tosca (Puccini); Overture, Die Zauberharfe (Schubert); Selection from A Kiss in Spring (Kálmán); Overture, The Land of Smiles (Lehár); Ziehrer Potpourri (Dauber); Overture, The Bird-Fancier (Zeller); Strauss Potpourri (Morena).

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.**, Hymn. **6.35**, Records. **6.38**, Gym. **6.53**, Records. **7.5**, News. **7.10**, Records. **7.20**, For Housewives. **7.25**, Announcements. **7.40**, Interval. **11.57**, Time. **12 Noon**, Fanfare from St. Mary's Church, Cracow. **12.3 p.m.**, Weather. **12.5**, Press Review. **12.10**, Records. **1.0**, News. **1.5**, Orchestral Concert of Light Music from **Lwów, 795 kc/s, 377.4 metres. 2.0**, News. **2.5**, Talk: Economics. **2.15**, Interval. **4.0**, Records of Viennese Music. **5.0**, Talk for Children. **5.15**, Trio Concert from **Lwów. 6.0**, Talk. **6.15**, Song Recital by Dolnicki (Baritone): Serenade (Tosti); The Rose (Tosti); Serenade (Mascagni); Aria from Chatterton (Leoncavallo); Two Songs (Gall); Neapolitan Songs. **6.45**, Talk. **6.55**, Art Notes. **7.0**, Announcements. **7.15**, Orchestral Concert of Light Music. **7.50**, Sports Notes. **8.0**, Great Thoughts. **8.2**, Topical Talk. **8.13**, Vocal and Instrumental Concert by the Station Orchestra; Conductor, Górzynski; Soloists, Anda Kitschmann (Songs), Zynski (Pianoforte): Quadrille (Joh. Strauss); Polka-Mazurka (Joh. Strauss); Three Songs (Kitschmann); Polka (Joh. Strauss); French Polka (Joh. Strauss); Pianoforte Solos: Waltz, Quand l'amour meurt (Crémieux); Waltz, La Crainte; Waltz (Mattei); March from Der lustige Krieg (Joh. Strauss); Gallop (Joh. Strauss). **8.50**, News. **9.0**, Fanfare from **Gdynia. 9.2**, Farmers' Letter Box. **9.12**, Vocal and Instrumental Concert (contd.): Foxtrot (Gynlaj); Three Songs (Kitschmann); Potpourri (Katscher); Pianoforte Solos: Foxtrot (Mayerl), Tango (Jaworski), Foxtrot (Rolin-Rainer); Intermezzo (Kroma); Two Step (Sygietynski). **10.0**, Reading: Tolstoi. **10.15**, Dance Music from **Ciechocinek. 11.0**, Weather.

ZURICH.—Relays **Beromünster.**

THURSDAY

AUGUST THE THIRTIETH

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.**—**1.30 to 2.30 p.m.,** Time Signal; Weather; Exchange; Records. **6.0,** Programme for Children. **6.45,** News. **7.0,** French Lesson. **7.15,** Variety by Val Vousden. **7.30,** Time Signal; Pipes and Fiddle Selections by S. Ennis and F. O'Higgins. **8.0,** Irish Music by the Station Orchestra. **8.20,** Song Recital by M. C. Ryan (Baritone). **8.35,** Violin Solos by Sydney Rosehill. **8.50,** Song Recital by Mai Corkeran (Soprano). **9.5,** Pianoforte Recital by Gerard Shanahah. **9.20,** Revue—presented by Eva Brennan and Company, with Orchestra. **10.0,** Variety Programme. **10.30,** Time Signal; News; Weather. **10.40,** Records. **11.0** (approx.), Close Down.

BARCELONA

795 kc/s, 377.4 metres; 5 kW.—**8.15 a.m.,** News; Records. **9.0,** Chimes; Gym.; Records. **9.20,** News; Records. **10.0,** Obituary. **12 Noon,** Chimes; Weather. **1.0 p.m.,** Programme for Women. **1.45,** Records. **2.0,** Records. **2.30,** Theatre Notes; Records. **3.0,** Announcements; Talk: The Cinema; Music by the Station Sextet. After the Programme, Labour Exchange. **4.0,** Programme for Hospitals. **5.0,** News. **7.0,** Concert by the Station Trio. In the interval at **7.30,** News. **8.0,** Talk. **8.30,** Exchange; Talk: Modern Discoveries. **9.0,** Educational Talk. **9.10,** Talk in Catalan. **9.20,** Records. **9.45,** Press Review. **10.0,** Chimes; Weather; Announcements; Exchange. **10.10,** Concert of Light Music by the Station Orchestra: March (Smetana); Waltz, Volga, Volga (Noack); Selection from Las zapatillas (Chueca); Silver Clouds (Ketelbey); Song (Mascheroni); Her First Dance (Heykens). **11.0,** Vicente Diez de Tejada reads from his own Works. **11.10,** Song Recital by Josefina Paulet. **11.40,** Concert of Light Music by the Station Orchestra: Andante from the Moonlight Sonata (Beethoven); Minuet No. 2 in G (Beethoven). **12 Midnight,** Dance Music by the Melody Boys Orchestra; Conductor, Udina. **1.0 a.m. (Friday),** News; Close Down.

BASLE.—Relays **Beromünster.**

BELGRADE

686 kc/s, 437.3 metres; 2.5 kW.—**10.45 a.m.,** Programme Announcements. **10.50,** Water Level. **11.0,** Records. **11.30,** Concert by the Station Orchestra. **11.59,** Time; Chimes. **12.5 p.m.,** Concert by the Station Orchestra. In the interval at **12.45,** Exchange Announcements. **1.30,** News; Time. **5.55,** Time; Programme Announcements. **6.0,** Programme for Women. **6.30,** Folk Songs with Orchestra. **7.0,** Announcements. **7.10,** Records. **7.15,** Opera Arias by Heumann. **7.45,** Talk. **8.15,** See **Vienna. 10.5,** Time; News; Dance Records. **10.50,** Light Music from the Dva Jelana Restaurant. **11.30** (approx.), Close Down.

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.20,** See **Berlin (Funkstunde). 7.0,** News. **7.10,** See **Berlin (Funkstunde). 8.0,** Interval. **8.45,** Gym. for Women. **9.0,** English History in Poems and Folk Songs—Sequence in English (Sotke). **9.40,** Programme for Housewives. **10.0,** News. **10.10,** Talk on Records: Language. **10.50,** Physical Training. **11.15,** Weather. **11.30,** Legal Talk for Peasants. **11.55,** Weather. **12 Noon,** See **Breslau. 12.55 p.m.,** Time, **1.0,** Records. **1.45,** News. **2.0,** Interval. **2.45,** Greetings; Programme Notes. **3.0,** Weather; Exchange. **3.15,** Animal Talk for Children. **3.40,** March and Waltz Records. **4.0,** See Stuttgart. **5.45,** Naval Talk. **6.0,** Classical and Modern Pianoforte Music—Recital by Else Blatt. **6.40,** Talk, for Count Arca's Sixty-fifth Birthday. **6.55,** Poem; Weather. **7.0,** Recordss. **7.30,** The Warthe—Historical Sketch. **8.0,** Motto; News. **8.10,** Joyous Notes—Variety Programme, with the Station Orchestra and Soloists; Conductor, Dobrinar. **10.0,** News; Sports Notes. **10.30,** Report: The International Six Days Motor Run. **10.45,** Weather. **11.0,** Concert by the Argentine Police Band, relayed from Buenos Aires. **12. Midnight** (approx.), Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Gym. **6.15,** Weather; Meditation. **6.20,** Concert by the Willy Schönfeldt Orchestra. **7.0,** News. **7.10,** Concert (contd.). **8.0-8.20,** Gym. **9.0-9.40,** See **Berlin (Deutschlandsender). 9.45,** Programme for Children. **10.0,** News. **10.10,** Market Prices. **10.30,** Records; Announcements. **11.25 to 11.30,** Exchange. **12 Noon,** Concert from **Königsberg.** In the interval at **12.30 p.m.,** Weather. **1.0,** News. **1.15,** Records; Sound Film and Operetta Music. **2.0,** News. **2.15,** Records; Light Music. **3.0,** Exchange. **3.20,** Interval. **4.0,** Concert by the Small Station Orchestra; Conductor, Willy Steiner; March (Krukfeldt); Spanish Comedy Overture (Keler-Béla); Piece from Divertimento (Graener); Waltz, Pensée d'automne (Waldteufel); Hymne an die Sonne (Kick-Schmidt); Serenade (Leoncavallo); Selection from Das Dorf ohne Glocke (Künneke); Meditation (Glazunov); Album Leaves (de Micheli); Waltz, Soiré d'été (Waldteufel); Malerische Suite (Fourdrain); Colombine (Kark); Novellette (Henselt); Mondnacht in Venedig (Lautenschläger); Elfentanz (Heykens); Arabian March (Gauwin). In the interval: Experiences of an African Explorer. **6.0,** Announcements. **6.5,** Travel Impressions (on Records). **6.30,** Relay of Foreign Stations. **7.10,** Sonata in D minor for Pianoforte and Violin Op. 121 (Schumann), by Helmut Hidegheti and Käte Grandt. **7.40,** Echoes of the Day. **8.0,** News. **8.15,** The Magic Carpet—Futuristic Fairy Tale (Lange), after the Poem by Kayssler, with Music by Kauler. **9.0,** Beethoven Recital by the Steiner Quartet; Soloists, Heinrich Steiner (Pianoforte) and Adolf Steiner ('Cello): Sonata in C for Pianoforte and 'Cello Op. 102 No. 1; String Quartet in C sharp minor Op. 131, **9.50,** Under the Lime Tree: Down in the Village—Scene with old Folk Songs (Walendy), with Bruno Hähnel (Zither), and Paul Dietrich (Accordion). **10.20,** News. **10.50,** Humorous and Dance Records. **1.0 a.m. (Friday),** Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**12.15 p.m.,** Report on the Cycle Tour of Switzerland. **12.45,** See **Sottens. 2.0,** Interval. **4.0,** Pianoforte Recital by Helene Lipp. **4.30,** Records. **4.55,** Concert of Modern Chamber Music. **5.40,** Barrel-Organ Music. **6.0,** Records. **6.20,** Talk: Swans. **6.45,** Records. **7.0,** Time; Weather; Traffic Report. **7.5,** Records. **7.30,** Report on the Cycle Tour of Switzerland. **8.0,** See **Sottens.** In the interval at **9.0,** Weather; News. **10.15,** Talk for Swiss Abroad. **10.35** (approx.), Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian. **10.30,** Records. **11.0,** Water Level. **11.5,** See **Brno. 12 Noon,** See **Prague. 12.5 p.m.,** Record. **12.10,** Local News. **12.15,** Record. **12.20,** See **Prague. 12.30,** See **Moravská-Ostrava. 1.30,** See **Prague. 1.40,** News; Weather in German and Hungarian. **1.50,** See **Prague. 2.0 to 2.5,** Market Prices. **3.15 to 4.20,** See **Prague. 5.40,** Records. **5.50,** Talk. **6.5,** Records. **6.10,** Notes for Housewives. **6.15,** Hungarian Transmission; Medical Talk; Reading; Programme for Farmers. **6.55,** See **Prague. 7.10,** Music for Children. **7.35,** Reading. **7.50,** Song Recital by Greta Filipková; Ten Songs (Wolf); Japanese Song (Marx). Love Songs (Novák); Song (Debussy.) **8.10,** Introductory Talk to the following Transmission. **8.15,** See **Vienna. 10.0,** See **Prague. 10.45,** News in Hungarian. **11.0** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.**—**5.0 a.m.,** Hymn; Motto. **5.10,** Records. **6.0,** Time; Weather; Gym. **6.25,** Orchestral Concert relayed from the Hotel Voss, Witten. **7.0,** Time; News. **7.15,** Concert (continued). **8.0,** Cookery Hints. **8.10,** Records. **9.0,** Time; News. **10.10 to 10.40,** Broadcast for Schools. **11.30,** Time; News. **11.45,** Programme for Farmers. **12 Noon,** Concert by the Station Orchestra; Conductor Topitz. In the interval at **12.30 p.m.,** Time; Weather. **1.30,** Time; News. **1.45,** Concert (contd.). March, Frühlingseinzug (v. Blon); Overture, Tantalusqualen (Suppé); Elfenserenade (Rayners); Waltz, Blumen der Liebe (Rust); Slav Rhapsody (Friedemann); March (Blankenburg). **2.20,** Exchange. **2.25,** Post Office Programme; Records. **2.50,** Market Prices. **3.10,** Talk: German Colonists in Bessarabia. **3.30,** A Trip to China, for Children. **4.0,** Orchestral Concert relayed from Bad Altheide; Conductor, Eschrich: March (Kluge); Overture, Hunyady Laszlo (Erkel-Ferencz); Symphonic Poem, Die Moldau (Smetana); Waltz, Dreams on the Ocean (Gungl); Landsknechte auf dem Marsch (Schmeling); Slav Rhapsody No. 2 (Friedemann); Selection from Tom der Reimer (Homann-Webau); Hungarian Melodies (Krüger); March (Loske). **5.30,** Programme for Farmers. **5.35,** Talk for Mothers. **5.55** (from **Gleiwitz**), 'Cello Recital by Gola; Sonata in G (Sammartini); Twelve Variations on the Theme, Ein Mädchen oder Weibchen, from Mozart's Magic Flute (Beethoven). **6.25,** Reading (Brockmeier). **6.50,** Announcements; Weather. **7.0,** Mount Zobten—Sequence (Schenke and Wenzel), with Music by Sczuka. **8.0,** Announcements. **8.10,** See **Berlin (Deutschlandsender). 10.0,** Records. **10.20,** Time; News. **10.45,** Dance Music by the Station Band; Conductor, Ilgner. **12 Midnight** (approx.), Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 10.25,** Records. **11.5,** Orchestral Concert; Conductor, Hanousek: March (Pelikán); Waltz (Vackár); Overture, Poet and Peasant (Suppé); Polka (Tichy); Selection from Where the Lark Sings (Lehár). **12 Noon,** See **Prague. 12.30 p.m.,** See **Moravská-Ostrava. 1.38,** See **Prague. 2.0,** Labour Exchange in German. **3.15 to 4.20,** See **Prague. 5.40,** Announcements. **5.45,** Programme for Boy Scouts. **5.55,** Records. **6.20,** German Transmission: Talk for Workers: Ferdinand Lasalle, with Extracts from his works. **6.55,** See **Prague. 7.10,** See **Bratislava. 7.35,** Topical Talk. **7.50,** Reading (Karel Capek). **8.5,** Record. **8.10,** See **Prague. 8.15,** See Vienna. **10.9,** See **Prague. 11.0** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Orchestral Concert of Light Music; Soloist, Germaine Marville (Songs): Overture, Paragraph III (Suppé); Valse des blondes (Ganne); Spring Suite (Wesly); Four Songs; Piece (Florendas); Serenade (Sykes); Ballet Music from Les deux pigeons (Messager). **1.0 p.m.,** News. **1.10,** Records: Mignon—Opera (Thomas). **2.0,** Interval. **4.55,** Announcements. **5.0,** Dance Music relayed from the Casino, Blankenberghe. **6.0,** Talk: Evolution. **6.15,** Light Music. **6.30,** Astronomy. **6.45,** Orchestral Concert of Light Music; Soloists, Frans Wigy (Violin) and Jane Délia (Songs): Theme and Variations on Carnival in Venice (Paganini-Wigy); Songs; Algerian Melody (Ketelbey); Selection from The Grand Duchess of Gerolstein (Offenbach); Wine, Woman and Song (Strauss). **7.30,** Sports and Colonial Reviews. **8.0,** Records: The Lark Quartet (Haydn). **8.15,** See **Vienna. 8.55,** Brahms Records. **9.10,** Concert from **Vienna. 9.30,** Records. **10.0,** News. **10.10,** Dance Music relayed from the Casino, Blankenberghe. **11.0,** Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish. **11.57 a.m.,** Weather. **12 Noon,** Records. **1.0 p.m.,** News. **1.10,** Orchestral Concert: Tournoi (Boëllmann); Piece (Earl); Chanson grecque (Moret); Gipsy Romance (Boldi); Habanera (Guittet); Old Czech Polka (Helman); Baby plays Soldiers (de Micheli); Crepuscule (Fredericksen); Schottische (Rivière); March (Helmburg); Chaplinade (Sarly); Pepita (Staub); Bolero (Staub); Tambourin (Rameau); La ronde de nuit (Saint-Saëns). **2.0,** Interval. **4.55,** Announcements. **5.0,** Concert by the Symphony Orchestra; Conductor, Meulemans; Introduction to Philémon et Baucis (Gounod); Eine kleine Nachtmusik (Mozart); La forêt enchantée (d'Indy); Marche du moyen-âge (Maxweiler). **5.45,** De schoone slaapster—Play for Children (Jeanne Claes). **6.30,** Programme for Women. **7.15,** Talk. **7.30,** Tourist Report. **8.0,** Concert by the Radio Orchestra: Rakoczy March (Liszt); Overture, Czar and Carpenter (Lortzing); Records; Selection from the Barber of Seville (Rossini); Suite campestre (Amadei); Act 11 of Cydalise et le chèvre-pied (Pierné); Adieu New York (Auric); Records; Suite romantique (Bullerian). In the Interval at **8.45,** Roman Catholic Address. **9.50,** Evening Prayer. **10.0,** News. **10.10,** Records: Selection from Siegfried (Wagner). **11.0** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15,** Time; News. **6.0,** Time; Weather. **6.5,** Dance Music by the Blue Star Jazz Band. **7.30,** Educational Talk. **7.45,** Talk. **8.15,** See **Vienna.**

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym. **9.45,** News. **10.0,** Talk. **10.40,** Horticultural Talk. **11.10,** Water Level. **12 Noon,** Chimes. **12.5 p.m.,** Balalaika Concert. **1.30,** Orchestral Concert. **2.40,** Hints for Housewives. **4.0,** Stories for Children. **5.0,** Sports Talk. **5.30,** Concert by the Bachmann Orchestra. **6.25** (approx.), Talk. **6.45,** Concert by the Vidák Cigány Band. **7.50,** Review of Foreign Affairs. **8.15,** See **Vienna. 10.10,** News. **10.30,** Concert by the Veres Cigány Band. **11.10,** Dance Music.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Motto; Records. **6.5** Gym. **6.25,** Orchestral Concert relayed from the Hotel Voss-Witten. In the interval at **6.50,** Motto; Time; News. **8.0,** Time; Weather; Water Level. **8.5 to 8.20,** Gym. for Women. **10.0,** Time; News. **10.10,** Instrumental Music. **11.0,** A Visit to the Friedenssaal, Osnabrück. **11.30,** Post Office Programme; Records. **12 Noon,** Light Music by Schrammel Quartet, Male Voice Choir and Soloists. **12.45 p.m.,** News; Greeting. **1.0** (approx.), Light Music (contd.). **1.45,** News. **2.0 to 2.45,** Humorous Records. **3.15,** Talk: The Rhenish-Westphalian Iron and Steel Skilled Worker and Post-War Rationalisation. **3.30,** Time; Exchange. **3.50,** Announcements. **4.0,** Concert by the Small Station Orchestra; Conductor, Eysoldt: Prelude, Rübezahl (Weber); Friedemann Bach Potpourri (Geisler); Liebeslied (Elman); Russian Song (Lalo); Rhapsody (Hartung); Rococo Gavotte (Pataky); Czardas, Rosza (Hubay). **5.0,** Talk: The Modern Attitude towards the old German Deities. **5.15,** Konrad Ramrath Recital by Elly Tillmanns (Soprano), Eugen Engels (Tenor), August Schwarz (Clarinet) and Karl Delseit (Pianoforte). **5.45,** Talk: Holidays in a Collapsible Boat. **6.0,** Reading (Löns). **6.20,** Technical Talk. **6.40,** Topical Talk. **6.50,** Time; Weather; Exchange; Sports Notes. **7.0,** Report from a Young People's Camp (on Records). **8.0,** News. **8.10,** The Peep Show, Variety Programme. **10.0,** Time; News. **10.20,** Topical Report. **10.30,** Wit and Humour in Classical Songs—Recital by Strienz (Bass). **11.0,** Chamber Music by Grace Castagnetta (Pianoforte) and Wilhelm Stross (Violin). **12 Midnight,** Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**11.0 to 11.30 a.m.,** Programme in English, arranged by the International Broadcasting Company of London. **11.0,** Military Band Music. **11.30 a.m., to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English by the I.B.C. **4.30,** Worthing, Littlehampton, Brighton and Hove Concert: Part 1—Debussy Programme. **4.45,** Part 2—Songs by Gertrude Lawrence (on Records). **5.0,** Part 3—Dance Music. **5.30,** Part 4—Accordeon Band Music. **5.45 to 6.0,** Dance Music. **6.0 to 11.0,** Programme in French. **11.0,** Close Down Programme in English, arranged by the I.B.C. **11.0,** Dance Music relayed from the Etretat Casino. **11.30,** Concert arranged by the I.B.C. (Ireland), Ltd. **12 Midnight,** Dance Music (contd.); in the interval at **12.30 a.m. (Friday),** I.B.C. Time Signal. **1.0 a.m.,** I.B.C. Goodnight Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.40,** Time; News. **6.50,** Weather. **6.55,** Concert relayed from **Bad Kreuznach. 8.10,** Water Level. **8.15 to 8.35,** Gym. **10.0,** News. **10.45,** Programme for Housewives. **11.0,** Announcements; Records. **11.40,** Announcements; Exchange; Weather. **11.50,** Social Report. **12 Noon,** See **Munich. 1.0 p.m.,** Time; Local Review. **1.10,** News. **1.20,** Orchestral Concert; Conductor: Eberhard: March (Blankenburg); Waltz, Samt und Seide (Ziehrer); Waltz, Swanilda (Fetras); March (Blankenburg). **1.50,** Time; News. **2.0,** Concert (contd.): Intermezzo, Bleisoldaten (Kockert); Serenade, Anina (Lincke); Sie kommen (Lincke); Phantom Melody (Ketelbey); March (Rupprecht). **2.40,** Programme for Children. **3.30,** Weather. **3.35,** Economic Report. **3.50,** Time; Exchange. **4.0,** See **Stuttgart. 5.30,** Talk: The New State. **5.45,** Topical Talk. **6.15,** See **Stuttgart. 6.45,** Weather; Exchange; Announcements; Time. **6.50,** Social Report. **7.0** (from **Freiburg**), Chamber Music. **7.30,** Local Review. **7.40,** Programme for Farmers. **8.0,** Time; News. **8.15,** Goodbye, Summer!—Literary and Musical Sequence. **9.0,** Extracts from Carmen—Opera (Bizet), by the Station Orchestra, Choir and Soloists; Conductor, Rosbaud. **10.20,** Time; News. **10.35,** Announcements. **10.45,** News. **11.0,** Dance Music from **Breslau. 12 Midnight,** Debussy Records. **1.0 a.m. (Friday),** Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg** and **Hanover, 1,330 kc/s, 225.6 metres.**—**5.45 a.m.,** Time; Weather; Programme for Farmers. **6.0,** Gym. **6.15,** Time; Weather. **6.20,** See **Berlin (Funkstunde). 7.0,** Time; News. **7.10,** See **Berlin (Funkstunde). 8.0,** Weather; Health Talk: Prevention is better than Cure. **8.10,** Announcements; Records. **10.50,** News. **11.0,** The Shepherd—Sketch (Garber). **11.30,** See **Königsberg. 12 Noon,** Programme for Housewives. **12.5 p.m.,** Time; Shipping Notes. **12.15,** Concert from **Königsberg. 1.0,** Exchange. **1.15,** Weather. **1.20,** Musical Programme. **2.15,** News. **2.30,** Records; Waltzes. **3.0,** Exchange. **3.40,** Shipping and Aviation Notes. **4.0,** See **Stuttgart. 5.30,** Talk: Language. **5.45,** Discussion for Young People. **6.0,** Talks: (a) Why we laugh at

old Films, (b) Topicalities. **6.25** (from **Bremen**), Das Reminiscences, by Adolf Neumann. **6.45**, Exchange. **6.55**, Weather. **7.0**, To-morrow we'll be married—Sequence (Deiters), by a Children's Choir; Conductor, Schütt. **8.0**, News. **8.10**, Dance Music by the Station Dance Band and Soloists; Conductor, Bolt. **10.0**, News. **10.20**, Dance Music (contd.). **11.0**, Light Music from the Railway Station Restaurant. **11.30** (on **Zeesen**), Extracts from Boccaccio—Operetta (Suppé), by the Station Orchestra and Soloists; Conductor, Eibenschütz. **12.30 a.m. (Friday)** (approx.), Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Kootwijk** (50 kW. from **3.40 p.m.**).—**7.40 a.m.**, Programme of the Workers' Radio Society (V.A.R.A.): Records. **9.40**, Religious Programme of the Liberal Protestant Radio Society (V.P.R.O.). **9.55 to 11.40**, V.A.R.A. Programme. **9.55**, Recitation. **10.15**, Organ Recital by Jong. **10.40**, Recitation. **11.0**, Records. **11.40 to 3.40 p.m.**, Programme of the General Broadcasting Society (A.V.R.O.). **11.40**, Time; Orchestral Concert; Conductor, Susan. In the intervals, Records. **1.40 p.m.**, Reading. **2.10**, Records. **2.40**, Programme for Children from the Kurhaus, Scheveningen. **3.40**, Interval. **3.55 to 7.40**, V.A.R.A. Programme. **3.55**, Records. **4.10**, Programme for Children. **4.40**, Concert of Light Music by the V.A.R.A. Orchestra; Conductor, de Groot: King Cotton (Sousa); Overture, Morning, Noon and Night (Suppé); Espana (Waldteufel); Extract from Der Geist des Wojewoden (Grossman); A Piece (Grossmann); The Phantom Brigade (Myddleton); Selection from La Bohême (Puccini). **5.25**, Recitation. **5.40**, Concert (contd.): Chinese Soldiers' March (Rettich); Overture, Sakuntala (Goldmark); Norwegian Rhapsody (Svendsen); Strauss Potpourri (Korngold); March (Schubert). **6.20**, Talk. **6.40**, Concert (contd.): Overture, Rienzi (Wagner); Melodious Memories (Finck). **7.10**, Talk. **7.30**, Records. **7.37**, Announcements. **7.40 to 10.40**, A.V.R.O. Programme. **7.40**, Time; News. **7.45**, Concert of Light Music by Kovacs Lajos and his Orchestra; Soloists, Helfricht (Songs to the Lute), Mrs. Henkemeyer (Harp), Bons Lensky (Violin). In the interval, Reading. **10.40** till Close Down, V.A.R.A. Programme: Records. **11.40**, Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. (until **6.40 p.m.**); 20 kW. from **6.40 p.m.**).—**7.40 a.m.**, Programme of the Catholic Radio Society (K.R.O.): Records. **8.55**, Interval. **9.40 to 10.40**, Programme of the Christian Radio Society (N.C.R.V.). **9.40**, Records. **9.55**, Religious Programme. **10.25**, Records. **10.40 to 1.40 p.m.**, K.R.O. Programme. **10.40**, Relay of the Opening of the Almenito Exhibition at Amsterdam. **11.40**, Police Notes. **11.55**, Concert by the K.R.O. Orchestra; Conductor, van 't Woud: Kling, Klang, goldner Wein (Zimmer); Overture, Erlenhügel (Kühlau); Ballet Suite (Armandola); Two Spanish Dances; Un peu d'amour (Silésu); Künstlerleben (Strauss); March, The Washington Post (Sousa); Records; San Lorenzo (da Silva); Ein Melodientraum (Urbach); Sphinx (Popy); Potpourri (Armandola). **1.40 p.m.** till Close Down, N.C.R.V. Programme. **1.40**, Violin Duets by Beths and de Graaff: Adagio and Gigue (Corelli); Trio in D (Krebs); Records; Sonata, Op. 8, No. 3 (Haydn); Etude (Hofmann); Sonata (de Graaff); Records; Suite (Moszkovsky). **3.25**, Interval. **3.40**, Bible Reading. **4.0** (approx.), Baritone and Organ Recital by J. H. and H. Smit Duyzenkunst. **4.40**, Handwork Lesson. **5.10**, Organ Recital by Kloek: Prelude, Op. 3, No. 2 (Rachmaninov); Au couvent (Borodin); Theme and Variations, Op. 72 (Glazunov); Chanson triste (Tchaikovsky); Idylle, Op. 16, No. 2 (Akimenko); Four Preludes (Pogojev). **5.55**, Soprano Song Recital by Mme. Houtstra van Dam: Recitative and Air (Mozart); Das Veilchen (Mozart); Wiegenlied (Flies); Records; Wohin (Schubert); Ihr Bild (Schubert); Des Müllers Blumen (Schubert); Records; Jezus Bloemhof (Pijper); Song (Spoel). **6.40**, Police Messages. **6.55**, Records. **7.10**, Press Review. **7.40**, Concert by the Arnhem Orchestral Society; Conductor, Mank: Polonaise in A (Chopin); Overture, The Merry Wives of Windsor (Nicolai); Melody (Rubinstein); The Forge in the Forest (Michaelis); Wienerbonbons (Strauss); Selection from Eugen Onegin (Tchaikovsky-Fétras); Suite, Roma (Bizet); Pavane pour une Infante défunte (Ravel); Overture, Le Roi d'Ys (Lalo). In the interval at **8.40**, Talk. **10.10**, Records. **11.10** (approx.), Close Down.

INNSBRUCK.—Relays **Vienna.**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres;** and **Skamlebaek, 49.5 metres.**—**7.0 a.m.**, Gym. **7.27**, Weather. **8.30**, Service from Copenhagen Cathedral. **11.0**, Weather; Fish Market Prices. **12 Noon**, Chimes from the Town Hall; Weather. **12.5 p.m.**, Concert by the Bendix String Ensemble, relayed from the Wivex Restaurant. **2.0**, Interval. **2.45**, Dance Music by Vilfret Kjaer's Dance Band. In the interval at **3.35**, Reading. **4.45**, Programme for Boys. **5.30**, Exchange; Fish Market Prices. **5.42**, Poem. **5.45**, Travelogue: Latvia. **6.15**, Elementary English Lesson. **6.45**, Weather; Announcements. **7.0**, News. **7.15**, Time. **7.30**, Talk. **8.0**, Chimes from the Town Hall. **8.5**, Records of Helge Rosvaenge: Walther's Aria from The Mastersingers (Wagner); Aria from Manon (Massenet). **8.9**, Weather. **8.15**, See **Vienna.** **9.5**, Reading. **9.25**, English Harpsichord Music by Folmer Jensen: Variations on the Folk Melody, Bonny Sweet Robin (Farnaby); Suite No. 2 in B flat (Purcell). **9.45**, News. **10.0**, Light Russian Music by the Balalaika Quintet and Hilmar Biehe (Songs): Potpourri of Soldier Songs; Capriccio (Ostroumov); Russian Waltz; Six Gipsy Songs; Fantasia on Russian Melodies (Demidov); Lullaby (Gretchaninov); March (Dabrahotov). **10.50**, Dance Music from the Arena. **12 Midnight**, Time and Chimes from the Town Hall. **12.5 a.m. (Friday)**, Dance Music (contd.). **12.30** (approx.), Close Down.

KIEL.—Relays **Hamburg.** **KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.**—**5.0 a.m.**, Records. **5.50**, Weather. **6.0**, Gym. **6.20**, See **Berlin (Funkstunde).** **7.0**, News. **7.10**, See **Berlin (Funkstunde).** **8.0**, Service. **8.30 to 9.0**, Gym. for Women. **9.5**, Broadcast for Schools. **9.35**, Programme for Housewives. **9.50**, Gym. for Children. **10.40**, News. **10.55**, Weather. **11.30**, Concert by the Small Station Orchestra; Conductor, Wilcken: March (Blankenburg); Overture, William Tell (Rossini); Slav Rhapsody (Volpatti); Selection from Faust (Gounod); Gipsy Festival (Heykens); Der keine Pfiffikus (Kockert); Waltz, Deutscher Grüsse (Joh. Strauss); Selection from Der lustige Krieg (Joh. Strauss). In the interval at **12 Noon**, Weather. **1.0 p.m.**, Time; News. **1.5**, Records of Light Music. **2.0 to 2.30**, News; Records. **3.0**, Programme for Farmers. **3.15**, Book Review. **3.30**, Eurhythmics. **4.0**, Concert by the Small Station Orchestra; Conductor, Wilcken: Overture, Médée (Cherubini); Humoresque (Dvorák); Legend No. 4 (Dvorák); Waltz, Donausagen (Fucik); Hochzeitsmusik (Jensen); Overture, Le Maçon (Auber); Selection from Die drei Wünsche (Ziehrer); Minuet (Boccherini); Serenade (Heykens); Waltz, Mon rêve (Waldteufel); March, Per aspera ad astra (Urbach). In the interval at **5.0**, Guessing Competition. **6.0**, Talk for Amateur Photographers. **6.15**, Market Prices. **6.25**, Talk: Between Town and Country. **6.55**, Weather. **7.0**, At the Court Masquerade—Organ Recital by Schütz. **7.30**, Folk Songs for Young People; Conductor, Scholz. **8.0**, News. **8.10**, The Ghost in the Gramophone Shop—Sequence (Steinbach). **9.15** (from **Danzig**), String Quartet in G Op. 161 (Schubert), by the Görlach Quartet. **10.0**, News; Sports Notes. **10.30** (from **Danzig**), Dance Music by the Vincent Douglas Orchestra. **12 Midnight** (approx.), Close Down.

KOSICE.—Relays **Prague.** **LAUSANNE.**—Relays **Sottens.**

LAHTI

166 kc/s, 1,807 metres; 40 kW. Relayed by **Helsinki, 895 kc/s, 335.2 metres.**—**7.5 to 7.20 a.m.**, Service in Swedish. **7.30 to 7.45**, Service in Finnish. **11.0**, Exchange. **11.5**, Records. **11.30**, Exchange. **11.45**, News in Finnish and Swedish. **12.59 p.m.**, Time; Weather. **5.0**, Concert from **Viipuri.** Conductor, Selin. Overture, The Bohemian Girl (Balfe); Air from The Tales of Hoffmann (Offenbach); Song (Kauppi); Slav Dance No. 2 (Dvorák); Tales from the Vienna Woods (Strauss). **5.50**, News in Finnish. **5.59**, Time; Weather. **6.10**, News in Finnish. **6.15**, Talk. **6.35**, Violin Recital by Toivo Oras. Serenade, Op. 37 (Kaski); Elegy, Op. 10 (Ernst); Old Vienna (Godowsky); Andalusian Romance (Sarasate). **7.0**, Talk. **7.5**, Concert by the Station Orchestra. Conductor, Linko. Air from Don Carlos (Verdi); Romance (Mascagni); Mattinata (Leoncavallo); O sole mio (Capua). **8.0**, Recitation (Kipling). **8.20**, Concert (contd.). Waltz, Czardas and Polka from Ritter Pasman (Joh. Strauss); Radetzky-March (Strauss). **8.45**, News in Finnish. **9.0**, News in Swedish. **9.10**, Concert. **10.0** (approx.), Close Down.

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.** **5.50 a.m.**, Programme for Farmers. **6.0**, Gym. **6.20**, Gym. for Children. **6.30**, Concert from **Cologne.** In the interval at **7.0**, News. **8.0**, Gym. **8.20 to 9.0**, Records. **9.40**, Exchange. **9.45**, Announcements. **9.55**, Weather; Water Level. **10.10**, Play for Schools. **10.50**, Interval. **11.0**, Post Office Programme; Records. **11.30**, News. **11.40**, Weather. **11.45**, Programme for Farmers. **12 Noon**, Concert from **Königsberg.** **1.0 p.m.**, News. **1.10**, Records; Selection from Der Wildschütz (Lortzing); Song from Don Giovanni (Mozart); Duet from The Merry Wives of Windsor (Nicolai); Song from The Gipsy Baron (Joh. Strauss); Wine, Women and Song (Joh. Strauss): The Blue Danube (Joh. Strauss); Das war der Graf von Rüdesheim (Krome); Bremer Stadtmusikanten (Krome); Beim Sonnenwirt ist a Hochzeit heut' (Stauch); Freut euch des Lebens (Joh. Strauss); Dörfhochzeit (Reltas). **2.0 to 2.15**, News. **2.40**, Reading: A Gliding Camp. **3.0**, Talk: The Leipzig Autumn Fair. **3.20**, Reading. **3.45**, Exchange. **4.0**, See **Stuttgart.** **5.30**, Book Review. **5.50**, Exchange; Weather; Time. **6.0**, Talk: Lt. Knüppel. **6.20**, Vogtland—Thüringen—Erzgebirge—Variety Programme. **7.35**, Art Talk: Matthias Pöppelmann. **8.0**, News. **8.10**, The Devil in the Bottle—Play after R. L. Stevenson (Wanninger); Incidental Music by Müller. **9.20** (from **Dresden**), Recital by Fritzsche (Violin) and Schneider-Marfels (Pianoforte); Sonata in E (Bach); Sonata No. 377 in F (Mozart); Sonata in C minor (Beethoven). **10.20**, News: Sports Notes. **10.50** (approx.), Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 120 kW.—**7.45 a.m.**, Records. **8.0**, News in French; Record; News in German; Record. **11.0**, Organ Recital from the St. Maurice Abbey. **12 Noon**, Concert by the Station Orchestra; Conductor, Pensis: Overture, Eros (Caludi); Hiawatha (Moret); Mendelssohn Potpourri (Urbach); Czardas (Kempner). **12.30 p.m.**, News in French and German. **12.40**, Concert (contd.): Slav Rhapsody (Friedemann); Dance (Gye); Selection from Le Chemin du Paradis (Heymann). **1.0**, Exchange. **1.5**, Concert (contd.): Mattinata (Leoncavallo); Russian Dance (Taeye); March (Albrecht). **1.15**, Records. **1.30**, Exchange. **1.35**, Records. **2.0**, Exchange. **3.45**, Exchange. **6.30** till Close Down, German Evening. **6.30**, Variety Programme. **7.30**, Racing Results. **7.35**, Records. **8.0**, News in French and German. **8.20**, Concert by the Station Orchestra; Conductor, Pensis: Overture, La belle Hélène (Offenbach); The Wedding of the Winds (Hall). **8.35**, Exchange. **8.40**, Concert (contd.): Selection from Le Cid (Massenet); Les Fileuses (Gillet); Two German Dances (Unger). **9.15**, Concert by the Station Orchestra; Conductor, Pensis; Soloist, Horner: Suite from Prometheus (Beethoven); Arias from The Mastersingers (Wagner) and Tannhäuser (Wagner); Overture, Manfred (Schumann); Arias from Gotterdämmerung (Wagner) and The Flying Dutchman (Wagner); Invitation to the Waltz (Weber). **10.25**, Dance Records.

LYONS

LA DOUA, 648 kc/s, 463 metres; 15 kW.—**8.0 a.m.**, News. **10.15**, See **Strasbourg.** **11.30**, Variety Concert by the Fusier Orchestra. Soloist, Yvonne Marsay (Songs). In the Interval at **1.0 p.m.**, News. **1.30**, Programme for Children. **2.30**, Concert by the Station Orchestra. **3.15**, Programme for Invalids. **3.30**, See **Strasbourg.** **6.30**, News. **7.30**, Local News. **7.50**, Travelogue. **8.0**, Talk: Oysters. **8.10**, Talk. **8.20**, Art Notes. **8.30**, Vocal and Instrumental Concert. Soloist, Henry Dangès (Baritone). After the Concert: News.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**9.0 a.m.**, News. **10.0**, Announcements. **10.30**, Interval. **2.0 p.m.**, Chimes; Weather; Light Music. **2.30**, Concert by the Station Sextet. **3.0**, Announcements; Exchange; Variety Music. **3.30**, Sextet Concert (contd.). **4.0**, Variety Music. **4.15**, Sextet Concert (contd.). **4.50**, News. **5.0**, Interval. **6.0**, Chimes; Light Music. **7.0**, Announcements; Song Recital. **7.30**, Exchange. **7.40** (approx.), Flamenco Songs, followed by Concert by the Station Orchestra: Overture, Il Seraglio (Mozart); Liebesträume (Liszt); Suite No. 1 from L'Arlesienne (Bizet); Intermezzo (Vives); The Phantom Brigade (Myddleton); Triana (Albéniz). **8.30**, News; Programme for Children. **9.50**, Announcements. **10.0**, Chimes. **10.5**, Sextet Concert; Dramatic Programme. **11.0**, News; Sextet Concert (contd.). **11.30**, Concert by the Municipal Band, relayed from the Rosales; Conductor, Ricardo Villa; in the interval at **11.45**, News. **1.0 a.m. (Friday)**, Interval. **2.0 till Close Down**, Programme in English, arranged by the International Broadcasting Company of London. **2.0**, Dance Music. **3.0**, I.B.C. Goodnight Melody and Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.**—**7.30 a.m.**, Gym. **7.45 to 8.0**, Time; Market Prices. **11.30**, Trio Concert. **12.30 p.m.**, Records. **12.45**, News. **1.0**, Time; News. **1.5**, Fashion Review. **1.10**, Music by the Doreno Orchestra. **1.30**, Records; Exchange. **1.45**, Music by the Doreno Orchestra. **2.15 to 2.25**, Exchange. **4.35**, News. **4.45**, Programme for Children. **5.10**, Musical Programme. **5.55**, Weather. **6.0 to 6.10**, Programme for Farmers. **7.0**, Tourist Talk; Dopolavoro Notes. **7.15**, News in Foreign Languages. **8.0**, Time; News; Records. **8.45**, Comedy. **10.15**, Chamber Music. In the Intervals, Talk: Art Notes. After the Programme, News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**12 Noon**, Announcements. **12.10 p.m.** (approx.), Orchestral Concert: Overture, The Siege of Corinth (Rossini); Waltz, Pomona (Waldteufel); Dance of the Waves from Loreley (Catalani). **12.29**, Time; Weather. **12.33**, Concert (contd.): Selection from Fedora (Giordano); Paraphrase, La paloma (Weninger). **12.55**, News. **1.5**, Sports Notes. **1.15**, Records. **1.30**, Interval. **3.59**, Time. **4.0**, See **Beromünster.** **6.0**, Interval. **7.45**, News. **8.0**, Programme to be announced. **10.0**, Report of the Cycle Tour of Switzerland.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.0 to 7.15 a.m.**, See **Prague.** **10.0**, See **Prague.** **10.25**, Records of Light Music. **12 Noon**, See **Prague.** **12.30 p.m.**, Concert by the Station Orchestra; Conductor, Musil: Overture, The Vintager's Bride (Nedbal); Symphonic Scherzo (Pecke); Spanish Caprice (Malvezzi); Waltz (Weis); Slovak Song Potpourri (Piskacek); Selection from Mignonette (Friml); Polka (Kovarovic). **1.30**, See **Prague.** **2.0 to 2.10**, See **Brno.** **3.15 to 4.20**, See **Prague.** **5.40**, Talk. **5.50**, Records. **6.0**, Book Review. **6.10**, Records. **6.20**, German Transmission: Programme for Children. **6.55**, See **Prague.** **7.10**, See **Bratislava.** **7.35**, Topical Talk. **7.50**, See **Prague.** **8.15**, See **Vienna.** **10.0**, See **Prague.** **11.0** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.**, News. **5.30**, Fanfare. **5.45**, Gym. **6.15**, Programme Announcements. **7.30**, Records. **9.0**, Musical Programme. **9.55**, Time. **10.0**, News. **10.15**, Sketch with Music. **11.15**, Recital of American, English, Spanish, and German Songs. **12.30 p.m.**, Talks; Records. **1.30**, Report; Talks. **2.45**, News. **3.15**, Sketch and Concert for Children. **4.30**, Concert by the Station Trio, Vocal Ensemble and Soloists. **5.30**, Dramatic Programme; Songs. **6.30**, Talk: The Harvest; Music and Records. **8.0**, Dance Music. In the Intervals, Records. **9.0**, German Programme; Letterbox; Humour and Satire. **9.55**, Chimes. **10.5**, Talk in French: Socialism and Individuality. **11.5**, Talk in Spanish: The Soviet States and Aristocracy.

MOTALA.—Relays **Stockholm.** **MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg and Nürnberg, 1,267 kc/s, 236.8 metres;** and **Kaiserslautern, 1,195 kc/s, 251 metres.**—**6.30 a.m.**, Gym. **6.45**, Motto; Records. **7.15**, Time; News. **7.25**, Concert from **Stuttgart.** **9.50**, Programme for Housewives. **10.40**, Programme for Farmers. **10.50**, Market Prices. **11.0**, Programme for Farmers. **11.20**, Time; News. **11.30**, Post Office Programme; Records. **12 Noon**, Concert by the Small Station Orchestra; Conductor, Kloss: Overture, Frau Meisterin (Suppé); Four Pieces (Dvorák): (a) Indian Piece, (b) Waltz, (c) Humoresque, (d) Mazurka; Kreisler Music; Neapolitan Serenade (d'Ambrosio); Manchurian Sketches (Glan); Folk Song Potpourri (Robrecht) Notti di Stelle (Micheli); Waltz (Steiner). **1.15**, Time; News. **1.25**, Records. **2.0**, Time; News. **2.20**, Pianoforte Quartet in F, Op. 8 (Beer-Walbrunn). **3.0**, Reading. **3.30**, Programme for Women. **3.50**, Weather; Programme for Farmers. **4.0**, Orchestral Concert; Conductor, Kloss; Overture, Idomeneo (Mozart); Ballet Music from Paris and Helene (Gluck); Brahms Suite (Fritz); Waltz (Lanner); Suite (Amadei) Prelude and Dance from The Pearl Fishers (Bizet); The Vision of Fuji San (Ketelbey); Japanese Carnival (de Basque). **5.30**, Lecture-Recital: Folk Songs and the Nation. **5.50**, Bellman's Songs and Compositions—Swedish Rococo Period Sequence (Senta). **6.30**, Talk: Superstitions. **6.50**, Time; Weather; Notes for Farmers. **7.0**, To Oberammergau by Stage Coach, Rail and Motor Car—Sequence (Althaus). **8.0**, News. **8.10**, Concert of German Folk Music: Part I: Old and New Wind Instrument Orchestra Music; Wind Instrument and Trombone Quartet; Conductor, Lange; Part II: Fritz Mühlhölzl (Zither); Part III: Music of the Mountains; The Styrian Choral Society; Conductor: Weber, and the Munich Schrammel Band. **9.40**, Talk for Farmers. **10.0**, Time; News. **10.20**, Programme to be announced. **11.0** (from **Nürnberg**), Light Music by the Josef Schwarz'sche Orchestra. **12 Midnight** (approx.), Close Down.

NAPLES.—Relays **Rome.** **NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jeloy, 6,990 kc/s, 42.92 metres.**—**10.0 a.m.**, Egg Prices. **11.15**, Service. **11.50**, Exchange. **12.45 p.m.**, News. **12.55**, Time. **1.0 to 2.0**, Records. In the interval at **1.15**, Weather; Talk for Farmers, and at **1.45**, Exchange. **5.30**, Concert by the Station Orchestra; Conductor, Kramm: Potpourri (Waldteufel); Suite, Svein Uraed (Olsen); Operetta Potpourri (Robrecht); Wedding Day on Troldd-

haugen (Grieg). **6.30,** Talk. **7.0,** Announcements. **7.15,** Weather; News. **7.30,** Time. **7.31,** Records of Spanish Dances. **7.45,** Harp Recital by Elsa Lindemann: Sonatina in B flat (Nadermann); First Arabesque (Debussy); Serenade and Waltz (Hasselmans); Piece (Tournier); Lolita (Tournier). **8.35,** Recitation from **Tröndelag, 629 kc/s, 476.9 metres.** **8.55,** Flute and Clarinet Recital. **9.20,** Pianoforte Recital by Franz Wolf, relayed from **Bergen, 850 kc/s, 352.9 metres:** Four Pieces (Bossi); Mephisto-walzer (Liszt). **9.40,** Weather; News. **10.0,** Topical Talk. **10.15,** Variety Programme. **11.0** (approx.), Close Down.

OSTERSUND.—Relays **Stockholm.**

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 to 8.30 a.m.,** News. **10.15,** Concert relayed from **Vichy;** Conductor, Jean Dorstène: Two-Step (Filipucci); Overture, Le puits d'amour (Balfe); Sur l'aile des vents (Pesse); Danse païenne (Pesse); Selection from Le mariage de Pierrot (Porret); Les feuilles tombent (Delmas); Aux carresses du printemps (Delmas); Xavière (Dubois); Suite brève (Dubois); Waltz (Waldteufel). **12 Noon,** Tourist Report. **12.15 p.m.,** Records. **1.0,** News. **1.15,** Concert, relayed from **Lille, 1,213 kc/s, 247.3 metres.** **4.0,** Records. **6.0,** Art Review; Readings. **6.30,** News. **7.45,** Medical Talk. **7.53,** Wireless Notes. **8.0,** Records. **8.30,** Chamber Music by Mme. Saiman-Gretti (Songs), Alice Merckel (Viola), Dufrêne (Flute), and Grandjany (Harp): Suite brêve (Rohozinski); Two Songs (Schubert); Andante and Finale for Viola (Handel); Andante from the Flute Concerto in D (Mozart); Sonatina for Flute (Reid); Songs: (a) The Dreary Steppe (Gretchaninov), (b) Why? (Tchaikovsky); Viola Solo: Georgian Rhapsody (Tcherepnin); Two Harp Solos; Flute Solos: (a) Melody (Noblet), (b) Serenade (Huë); Two Songs (Erlanger); Sonata for Flute, Viola, and Harp (Debussy). After the Concert, News. **10.30,** Dance Music by the Dervaux Jazz Band.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.10 a.m.,** Fanfare; Records. In the intervals at **7.30** and **8.30,** News. **8.45,** Cookery Talk. **12 Noon,** Exchange. **12.5 p.m.,** Records. **12.15,** Interlude by Kito the Clown. **12.25,** News. **12.35,** Records. **1.5,** Exchange. **1.15,** Records. **2.0,** Exchange. **3.15,** Exchange. **3.45,** Exchange. **6.45,** Exchange. **6.49,** Records: French Music. **7.10,** News. **7.30,** Tango and Waltz Records. **8.0,** Talk. **8.5,** Interval. **8.15,** Pianoforte Recital by Maurice Béché: Romance (Marais); Les Fifes, le Timpanon (Dandrieu); Toccata on the Song of the Cuckoo (Pasquini); Variations on Lison dormait (Mozart). **8.40,** Exchange. **8.50,** Concert by the Georges Léoni Orchestra. **9.35,** Interval. **9.45,** Children in Music—Concert. **10.30** till Close Down, Programme in English arranged by the International Broadcasting Company of London. **10.30,** Variety Concert. (Gramophone Records.) **10.45,** Songs from some Shows. **11.0,** I.B.C. Good-night Melody and Close Down.

PARIS

RADIO PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.,** Gym. **7.0,** Records. **7.15,** News. **7.45,** Gym. **8.0,** Records. **10.15,** Concert, relayed from **Vichy:** Zaragona (Filipucci); Overture Le puits d'amour (Balfe); Sur l'aile des vents (Pesse); Danse païenne (Pesse); Le mariage de Pierrot (Porret); Les feuilles tombent (Delmas); Aux caresses du printemps (Delmas); Xaviere (Dubois); Suite brève (Dubois); Waltz, Joie envolée (Waldteufel). **12 Noon,** Religious Address. **12.30 p.m.,** Concert by the Victor Pascal Orchestra: Dream of Love after the Ball (Czibulka); Gracia de Dios (Gallini); Melody (Rubinstein); Hungarian Poem (Lederer); 'Cello Solo; March (Lehnardt); Selection from Les Erynnies (Massenet); Lagarteranas (Guerrero); Foxtrot (Kern); Violin Solo; Bruyères (Debussy); Czardas (Grossmann); Piece (Snyder); One Step (Oberfeld); Pianoforte Solo; Après un rêve (Fauré); Foxtrot (Lieurance); Orientale (Albéniz); Selection from Ascanio in Alba (Mozart); A Night in Monte Carlo (Heymann); Selection from Paganini (Lehár); Waltz, Hoffballtänze (Joh. Strauss). In the intervals, Exchange. **3.45,** Exchange. **5.0,** Le menteur—Comedy (Corneille). **7.0,** Programme for Farmers; Exchange. **7.15,** German Press Review. **7.30,** Topical Talk. **8.0,** See **Vienna.** In the intervals, News; Review. **10.30** (approx.), Dance Music.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK on 48.86 metres,** and **25.27 metres.**—**3.0 p.m.,** Edward MacHugh. **3.15,** Castles of Romance. **3.30,** To-day's Children. **3.45,** News; Cookery Hints. **4.0,** United States Navy Band. **4.30,** Hazel Arth (Contralto). **4.45,** Al and Lee Reiser. **5.0,** Soloist. **5.15,** Fields and Hall. **5.30,** Vic and Sade. **5.45,** Concert by the Hotel William Penn Orchestra. **6.0,** Exchange. **6.15,** Hon. Archie and Frank. **6.30,** Farm and Home Hour. **7.30, KDKA** Home Forum. **8.0,** Musical Keys. **8.30,** Roy Shield's Orchestra. **8.45,** State Federation Pa. Women. **9.0,** Betty and Bob. **9.15,** Alice Joy. **9.30,** News; Exchange. **9.45,** "Concert by the Chicago Symphony Orchestra. **10.15,** KDKA Kiddies' Klub. **10.30,** Jackie Heller. **10.45,** Orphan Annie. **11.0,** Dun and Sylvia. **11.14,** Baseball Resumé. **11.30,** Kings and Queens of Sport. **11.45,** Lowell Thomas. **12 Midnight,** Stanley Metcalfe; News. **12.15 a.m. (Friday),** Lois Miller (Organist). **12.45,** Frank Buck. **1.0 to 6.0 a.m.,** Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 to 7.15 a.m.,** Time; Gym.; Music and Songs; News. **10.0,** Record; News. **10.20,** News in German. **10.25,** Records of Light Music. **12 Noon,** Time; Report for Farmers; Weather. **12.5 p.m.,** Records. **12.20,** News. **12.30,** See **Moravská-Ostrava.** **1.30,** Industrial Review. **1.40,** Records. **1.50,** Exchange. **1.55,** Exchange and Weather in German. **3.15,** Concert by the Station Orchestra; Conductor, Ancerl. **4.15,** Exchange; Weather. **5.40,** Local Report. **5.45,** Market Prices. **5.55,** Record. **6.0,** Talk for Workers. **6.10,** German Transmission: Book Review; Talk for Farmers. **6.55,** News and Weather in German. **7.0,** Time; News. **7.10,** See **Bratislava.** **7.35,** Talk on Philosophy. **7.50,** Saxophone Solos by Fleischlans. **8.10,** Introductory Talk to the following Transmission. **8.15,** See **Vienna.** **10.0,** Time; News. **10.20,** Concert of Schrammel Music. **11.0** (approx.), Close Down.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan (No. 2), 1,348 kc/s, 222.6 metres; Turin (No. 2), 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.**—**7.30 a.m.,** Gym. **7.45 to 8.0,** Time; News. **12.30 p.m.,** Records. **1.5,** Trio Concert. **1.30,** Time; News. **1.45 to 2.15,** Trio Concert. **4.30,** Children's Radio Review. **4.50,** News. **5.0 to 5.55,** Vocal and Instrumental Concert; Soloists, Bruno Sbalchiero (Bass), Uccia Cattaneao (Soprano) and Ada Fulloni (Mezzo-Soprano); Trio in G minor (Smetana); Bass Solos; Arias from (a) La Juive (Halévy) and (b) Nebuchadnezzar (Verdi); Soprano and Mezzo-Soprano Duets: (a) Wiegenlied (Schumann), (b) Guitar (Widor), (c) La fioraria (Montanaro), (d) in mezzo all'aja (Montanaro). **5.55,** Weather. **6.0,** Wheat Market. **7.0,** Tourist Talk: Dopolavoro Notes. **7.15,** News in Foreign Languages. **8.0,** Time; News. **8.10,** Records. **8.30,** Government Notes. **8.45,** Ponchielli Concert for the Centenary of his Birth; Conductor, Tansini. In the Interval, Talk: Literature and Art. **10.30** (approx.), Dance Music. **11.0,** News.

RUYSSELEDE

10,330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.,** News in French. **8.0,** See **Brussels No. 1.** **8.55,** Ewige Liebe (Brahms), on Records. **9.0,** News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by **W2XAF** on **31.48 metres** and by **19.56 metres.**—**7.0 p.m.,** Dreams Come True. **7.15,** Musical Programme. **7.30,** Woman's Radio Review; Talks; Orchestra. **11.30,** Exchange. **12 Midnight,** Fleischmann Hour with Rudy Vallee and his Orchestra. **1.0 to 3.0 a.m. (Friday),** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW.; and **Geneva, 401 kc/s, 748 metres.**—**6.0 a.m. to 6.15,** Gym. **12.15 p.m.,** Report on the Cycle Tour of Switzerland. **12.45,** News. **12.52,** News in German. **1.0 to 2.0** (from **Geneva**), Records. **3.59,** Time Signal from Neuchâtel Observatory. **4.0 to 7.0,** See **Beromünster.** **7.0,** News. **7.5 to 7.57,** See **Beromünster.** **7.57,** Interlude. **7.59,** Weather. **8.0** (from **Geneva**), Duets from Pelléas et Mélisande (Debussy) by Maria Ranèze and Hugues Cuénod. **8.30** (from **Geneva**), Talk: Eighteenth Century Actresses—Mme. Favart. **8.50,** Concert by the Station Orchestra; Conductor, Echenard: Symphony in C (Schubert); Nocturne and Scherzo (Mendelssohn). **9.15,** News. **9.27,** News in German. **9.35,** Concert (contd.): Slav March (Tchaikovsky); Entr'acte from Raymonda (Glazunov); The Flight of the Bumble Bee (Rimsky-Korsakov); Dance of the Tumblers (Rimsky-Korsakov); Caucasian Sketches (Ippolitov-Ivanov). **10.15** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden,** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.**—**7.45 a.m.,** Service. **8.0,** Weather. **12.30 p.m.,** Weather. **12.45,** Exchange. **12.55,** Time Signal. **1.0,** Dance Music for Two Pianofortes. **1.20,** Reading. **1.45,** Programme for Children. **2.0,** Concert of Light Music relayed from **Malmö, 1,312 kc/s, 228.7 metres.** **3.0,** Interval. **5.0,** Weather. **5.5,** Service relayed from **Malmö.** **5.30,** Records: Sacred Songs. **5.45,** Radio Report. **6.15,** Records. **7.0,** Reading. **7.15,** Weather; News. **7.30,** Variety Programme. **8.15,** Talk. **8.45,** Concert: Tornqvist (Violin), Märta af Klintberg (Pianoforte), and a Vocal Quartet. Quartet: Five Songs (Bellman); Sonata in G minor for Violin and Pianoforte (Schubert); Quartet: (a) Two Songs (Peterson-Berger), (b) Tröst (Merikanto), (c) Maansken (Stenhammar), (d) De lyckliga (Järnefelt), (e) Song (Widéon). **9.45,** Weather; News. **10.0,** Recital by Olsson (Organ); Ebba Högfeldt-Larka (Songs) and Gröndahl ('Cello); Prelude and Triple Fugue in E flat (Bach); 'Cello Solos: (a) Prelude (Corelli), (b) Largo (Vivaldi); Songs: (a) Caro mio ben (Giordano), (b) Confutatio maledictis from the Requiem (Verdi); 'Cello Solos: (a) Air (Ronchini), (b) Sicilienne (Fauré); Two Songs (Melartin); Organ Solos: (a) Andante from Faramondo (Handel), (b) March (Bossi). **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.15 a.m.,** Concert relayed from **Vichy.** **11.30,** Records. **12.45 p.m.,** News. **1.0,** Time; Exchange. **1.5,** Orchestral Concert; Conductor, Roskam; Soloist, M. Grégoire (Violin): Overture, Pique Dame (Suppé); Waltz-Intermezzo (Translateur); Selection from Les Saltimbanques (Ganne); Meditation from Thaïs (Massenet); Violin Solo; Serenade, Il baçio (de Micheli); Melody (Koechlin); Idéale (Tosti); Selection from Pas sur la bouche (Yvain). **2.0 to 3.0,** Programme for Children. **3.30,** Concert relayed from **Vichy.** **5.0,** Records. **6.0,** Talk in German: French-speaking Canada under British Rule. **6.15,** Talk: Jouffroy, the Inventor. **6.30,** Variety Concert; Conductor, Roskam. **7.15,** Lottery Results; Announcements. **7.30,** Time; News. **7.45,** Press Review in German. **8.15,** See **Vienna.** **10.0** (approx.), Press Review.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.35 a.m.,** Notes for Farmers. **5.45,** Hymn; Time; Weather. **5.50,** Gym. **6.15,** Records. **6.40,** Time; Announcements; Weather. **6.55,** Concert by the Philharmonic Orchestra, relayed from **Karlsruhe;** Conductor, Zehn. **8.10,** Weather. **8.15,** Gym. **8.35,** Interval. **9.0 to 9.15,** Gym. for Women. **10.0,** News. **10.10,** Recital of Old Italian Music by Eucken (Pianoforte); Gavotte from the Sonata in F (Sacchini); Sonata in D (Paradisi); Allegro (Sarti). **10.40,** Lieder Recital by Margarete Wetter (Soprano); Four Songs (Liszt): (a) Wieder möcht 'ich dir begegnen, (b) Wo weilt er, (c) O komm im Traum, (d) In Liebeslust; Four Songs (R. Strauss): (a) Sie wissen's nicht, (b) Freundliche Vision, (c) Waldseligkeit, (d) Blauer Sommer. **11.0,** Records: Yodelling. **11.25,** Post Office Propaganda; Records. **11.40,** Autumn Sowing. **11.55,** Weather. **12.0 Noon,** See **Munich.** **1.0,** Time; News. **1.20,** Records: Whistling and Yodelling. **1.50,** Time; News. **2.0 to 2.30,** Records. **3.0,** Song Recital by Elisabeth Jentsch (Soprano), Jautz (Tenor), Jentsch (Baritone). **3.30,** Kasperle looks for Work—Sequence (Willner) for Chidren. **4.0,** Concert by the Philharmonic Orchestra; Conductor, Walter. March of the Boyards (Halvorsen); Two Legends (Dvorák); Selection from Tosca (Puccini); Norwegian Dances (Grieg); Glockenspiel Gavotte (Eilenberg); Rhapsody No. 1 (Liszt); Waltz, Lysistrata (Lincke); Humorous Variations on Was kommt dort von der Höh? (Suppé); In a Chinese Temple Garden (Ketelbey); Waltz, Mein Lebenslauf ist Lieb und Lust (Joh. Strauss); March, Germanentreue (Blankenburg). **5.30,** Harpsichord Recital by Paul Schwob; Suite in D minor (Handel); Harpsichord Music (Couperin). **6.0,** Talk: Swabian Landscape in Literature. **6.15,** Talk: Ethnology. **6.25,** Military Band Concert, relayed from **Ulm;** Conductor, Schilling: March, In treue Fest (Teike); Overture, Der Erlenhügel (Kuhlau); Dream Waltz from Der Feldprediger (Millöcker); Spanish Fantasia, Ein Fest in Aranjuez (Demerssemann); Swabian Rhapsody (Kämpfert); Selection from Der Obersteiger (Zeller). **7.30,** See **Frankfurt.** **7.40,** Time; Weather; Notes for Farmers. **8.0,** News. **8.15,** The Black Hand—One-Act Detective Play (Struve). **9.0,** Concert by the Station Orchestra; Conductor, Seyfert. Soloists: Yella Hochreiter (Contralto), Wistinghausen (Baritone); Overture (Lortzing); Aria from Hans Heiling (Marschner); Overture, Die Matrosen (Flotow); Prayer from Höllisch Gold (Bittner); Selection from The Queen of Spades (Tchaikovsky); Aria from Prince Igor (Borodin); Prelude to Act III of Carmen (Bizet); Song from Carmen (Bizet); Selection from Madame Butterfly (Puccini); Credo from Othello (Verdi). **10.20,** Time; News. **10.35,** Announcements. **10.45,** Local News; Weather; Sports Notes. **11.0,** Dance Music from **Breslau.** **12.0 Midnight,** See **Frankfurt.** **1.0 a.m.** (approx.), Close Down.

SUNDSVALL.—Relays **Stockholm.**

AUG. 30th THURSDAY *continued*

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0,** Dance Refrains. **8.30,** News. **8.35,** Sound Film Music. **8.45,** Popular Songs. **12 Noon,** Opera Music. **12.15 p.m.,** Light Orchestral Music. **12.30,** News; Exchange. **12.45,** Request Music. **1.0,** Market Prices. **1.5** Au Cabaret Toulousain—Fantasy. **1.15,** Classical Orchestral Music. **1.30,** Songs. **1.45,** Military Band Music. **6.0,** News. **6.15,** Sound Film Music. **6.30,** Light Orchestral Music. **6.45,** Opera Music; Extracts from Le roi d'Ys (Lalo), Martha (Flotow), Grisélidis (Massenet), La Vivandière (Godard). **7.0,** Hawaiian Guitar Music. **7.15,** Tyrolese Music. **7.30,** News; Racing Results; Wheat Market Prices; Exchange. **7.45,** Operetta Music. **8.15,** 'Cello Recital: Spring Song (Mendelssohn); Larghetto (Handel); Oh, Star of Eve, from Tannhäuser (Wagner); Interlude (Chausson); Spanish Serenade. **8.30,** Songs. **9.0,** Concert Version of L'Heure espagnole—Lyric Play (Ravel). **10.0,** Le Caveau de Dix Heures—A Radio Fantasy. **10.15,** News. **10.30,** Operetta Songs. **11.0,** Military Band Concert. **11.15,** Vocal Tangos. **11.30,** Light Orchestral Music. **11.50,** Humorous Scenes. **12 Midnight,** News. **12.5 a.m. (Friday),** Operetta Music; Selection from Le petit duc (Lecocq), and White Horse Inn (Stolz-Benatzky). **12.15,** Selection from Mascarade (Lacome) by the Symphony Orchestra. **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo.** **TURIN.**—Relays **Milan.**

VATICAN CITY

15,120 kc/s, 19.84 metres; 10 kW. **(Morning); 5,970 kc/s, 50.26 metres (Evening).**—**11.0 to 11.15 a.m.,** Religious Information in French. **8.0 to 8.15 p.m.,** Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz,** and **Salzburg, 1,294 kc/s, 231.8 metres.**—**9.0 a.m.,** News. **9.20,** Market Prices. **9.30,** Weather. **10.50,** Water Level. **11.30,** Talk: Austria. **11.55,** Weather. **12 Noon,** Records. **1.0,** Time; News. **1.10,** Records. **2.0,** Announcements. **2.10 to 2.30,** Records. **3.30,** Time; News. **3.50,** Talk for Unemployed Youth. **4.10,** Fairy Tale for Children. **4.35,** News. **4.40,** Recital by Mara Wopalenska (Soprano), Grete Nowak (Pianoforte): Du kleines, blitzendes Sternelein (Abt); Der Jüngling an der Quelle (Schubert); Seligkeit (Schubert); Märchen (Wolf); Aria from William Tell (Rossini); Pastorale and Capriccio (Scarlatti-Tausig); Hungarian Rhapsody No. 6 (Liszt). **5.10,** Talk: The Vienna Autumn Fair. **5.20,** Talk: Goldoni. **5.45,** Talk: Falconry. **6.5,** Symphony in D No. 2 (Brahms), by the New York Symphony Orchestra; Conductor, Damrosch, on Records. **6.45,** Talk: Kaiser Franz Josef I. **7.10,** Time; News. **7.30,** Topical Talk. **7.45,** Holiday Reminiscences. **8.15,** Concert by the Vienna Philharmonic Orchestra, relayed from the Festspielhaus, Salzburg; Conductor, Toscanini: Overture, Anacreon (Cherubini); Symphony No. 3 in F, Op. 90 (Brahms); L'aprèsmidi d'un faune (Debussy); Queen Mab (Berlioz); Passacaglia (Bach-Respighi). **10.5** Concert by the Wiener Symphoniker; Conductor, Holzer: March (Hauswirth); Overture, The Girl in the Taxi (Gilbert); Musical Box Tune, Nimm dir die Kleine (Engel-Berger); Lola Walzer (Beeth); Violin Solo, Hungarian Fantasia (Lehár). **10.30,** News. **10.50,** Concert (contd.): March (Wacek); Waltz, Goldene Myrthen (Xaver); Song from Die Wirtin von Venedig (Frey); Uberlandpartie (Leopoldi); Gehn S', sag'n S', warum? (Stropp); Selection from Frühling im Wienerwald (Ascher); Polka, Leichtflüssig (Hellmesberger). **11.45,** Concert of Light Music by the Biedermeier Quartet.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.,** Hymn. **6.35,** Records. **6.38,** Gym. **6.53,** Records. **7.5,** News. **7.10,** Records. **7.20,** Hints for Housewives. **7.25 to 7.40,** Announcements. **11.57,** Time Signal. **12 Noon,** Fanfare from St. Mary's Church, Cracow. **12.3 p.m.,** Weather. **12.5,** Press Review. **12.10,** Concert by the Hermann Salon Orchestra, relayed from **Cracow, 986 kc/s, 304.3 metres.** **1.0,** News. **1.5,** Programme for Children. **1.20,** Records. **2.0 to 2.15,** Announcements. **4.0,** Concert of Light Music by the Sygietynski Orchestra; Soloist, Loda Halama (Songs). **5.0,** Letter-box. **5.15,** Silesian Folk Song Suite for Mixed Choir (Niczego), by the Railway Employés Choir; Conductor, The Composer; Relayed from **Katowice, 758 kc/s, 395.8 metres.** **5.40,** Recital by Zygdlo (Violin), and Lefeld (Pianoforte). **6.0,** Talk for Women, relayed from **Poznan, 868 kc/s, 345.6 metres.** **6.15,** Extracts from The Cherry Orchard—Play (Tchekhov). **7.0,** Announcements. **7.15,** Programme of Light Music by the Paul Godwin Orchestra (on Records). **7.50,** Sports Notes. **8.0,** Great Thoughts. **8.2,** Interval. **8.15,** See **Vienna.** In the intervals, News; Talk for Farmers. **10.5,** Talk. **10.15,** Dance Music from the Oaza. **11.0,** Weather for Aviators.

ZURICH.—Relays **Beromünster.**

FRIDAY

AUGUST THE THIRTY-FIRST

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.**—**1.30 to 2.30 p.m.,** Time Signal; Weather; Exchange; Records. **6.0,** Programme for Children. **6.45,** News. **7.0,** Talk on Gardening. **7.15,** Literary and Dramatic Talk. **7.30,** Time Signal; Concert by the Station Orchestra. **8.0,** Song Recital by W. J. McDaid (Baritone). **8.20,** Concert by the Station Orchestra. **8.40,** Song Recital by Nora Finn (Contralto). **8.55,** Concert by the Innisfail Vocal Quartet. **9.20,** Traditional Fiddle Solos by Charles O'Brien. **9.30,** Irish Song Recital by Muiris MacIonnraoie. **9.45,** Pipes Recital by Leo Rowsome. **10.0,** Variety Programme. **10.30,** Time Signal; News; Weather. **10.40,** Records. **11.0** (approx.), Close Down.

BARCELONA

795 kc/s, 377.4 metres; 5 kW.—**8.15 a.m.,** News; Records. **9.0,** Chimes; Records. **9.20,** News; Records. **10.0,** Obituary. **12 Noon,** Chimes; Weather. **1.0 p.m.,** Programme for Women. **1.45,** Records. **2.30,** Theatre Notes; Records. **3.0,** Film Review; Sextet Concert. In the interval, Tourist Report. **4.0,** Programme for Hospitals. **5.0,** News; Exchange. **7.0,** Trio Concert: Träumerei (Schumann); Waltz in A minor (Chopin); Selection from Norma (Bellini); Gavotte (Gluck); Moment Musical (Nucci); Canzonetta (Tchaikovsky); Selection from Tannhäuser (Wagner). In the interval, News. **8.0,** Request Records. **8.30,** Exchange; Talk; Request Records. **9.0,** Educational Talk. **9.10,** Records. **9.45,** Press Review. **10.0,** Chimes; Weather. **10.5,** Social Notes; Announcements; Exchange. **10.10,** Concert by the Station Orchestra. **11.0,** Talk: Telescopes. **11.15,** Song Recital by Josefina Blanch (Soprano); Aria from L'Africaine (Meyerbeer); Aria from Madame Butterfly (Puccini); Aria from La Favorita (Donizetti); Aria from Lohengrin (Wagner). **12 Midnight,** Dance Music by the Melody Boys from the Shanghai Bar. **1.0 a.m. (Saturday),** News; Close Down.

BASLE.—Relays **Beromünster.**

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.20,** See **Hamburg. 7.0,** News. **7.10,** See **Hamburg. 8.0,** Interval. **8.45,** Gym. for Women. **9.0,** Harvest Folk Songs. **9.40,** Reading. **10.0,** News. **10.10,** In an Alchemist's Laboratory—Sequence (Walter Schirmeier) (on Records). **10.50,** Gym. for Schools. **11.15,** Weather. **11.30,** Interval. **11.55,** Weather. **12 Noon,** See **Breslau. 12.55 p.m.,** Time. **1.0,** Records; Weather. **1.45,** News. **2.0,** Interval. **2.45,** Greetings; Announcements. **3.0,** Weather; Exchange. **3.15,** Dance Records. **3.40,** Discussion for Girls: A Trip through Brandenburg. **4.0,** See **Munich. 5.30,** Book Review. **5.45,** Reading: The Explorers' Africa (Dr. Berger and Paul Spatz). **6.10,** Chamber Music. Three Romances for Oboe and Pianoforte (Schumann); Trio in E flat for Pianoforte, Violin and Horn (Brahms). **6.55,** A Poem; Weather. **7.0,** Dialogue: The 1934-1935 Theatre Year. **7.15,** Report: The Baden-Baden Grand Prix Horse Race. **7.30,** Greenland—Talk by the Explorer, Max Grotewahl, with Introduction by the Danish Ambassador. In the intervals: Records of Greenland Songs. **8.0,** Motto; News. **8.15,** Transmission for all German Stations: Concert by the Berlin Philharmonic Orchestra; Conductor, Hildebrand: Part I, Humperdinck Programme; Prelude to The Sleeping Beauty; Humperdinck Reminiscences by the Composer's Son; Moorish Rhapsody. Part II: Overture, La dame blanche (Boieldieu); Humoresque (Balan); Pan and Syrinx (Nielsen); Dance from Mascarade (Nielsen). **10.0,** Political Report (on Records). **10.10,** News; Sports Notes. **10.30,** Commentary on the International Six Days' Motor Run. **10.45,** Weather. **11.0,** Concert from **Cologne. 12 Midnight** (approx.), Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Hymn; Gym. **6.15,** Weather; Meditation. **6.20,** See **Hamburg. 7.0,** News. **7.10,** See **Hamburg. 8.0,** Gym. **8.20,** Records; Announcements. **9.0,** See **Berlin (Deutschlandsender). 9.40,** Talk for Housewives. **10.0,** News. **10.10 to 10.25,** Market Prices. **11.25 to 11.30,** Exchange. **12 Noon,** Concert by a Military Trumpet Band; Conductor, Harmens: March (Lautenschläger); Overture, Alessandro Stradella (Flotow); Waltz, Pensée d'automne (Waldteufel); March (Berndt-Schwittmann); March (Skibbe); Slav Rhapsody (Friedmann); March (Fürst); Selection from The Bird Fancier (Zeller); March (Schadewitz-Harmens). In the interval at **12.30 p.m.,** Weather. **1.0,** News. **1.15,** Records: Light Music. **2.0,** News. **2.15,** Recital by Else Jörn (Soprano), Melanie Wolff (Violin) and Käthe Conrad (Pianoforte): Sonata in G (Stamitz); Three Songs (Jensen); Two Songs (Taubert); Pianoforte Pieces (Schubert): (a) Moment musical in F minor, Op. 94, (b) Valse noble in A minor, Op. 77, (c) Moment musical in C sharp minor, Op. 94, (d) March in G minor, Op. 40. **3.0 to 3.20,** Exchange. **4.0,** See **Königsberg. 6.0,** Announcements. **6.5,** Book Review. **6.30,** Wetzel Song Recital by Heinz Marten (Tenor), the Composer at the Pianoforte: An die Natur: An die Liebe; Die schöne Nacht; Mit einem gemalten Band; Frische Fahrt; Ich schlaf, ich wach; Ueberall blüht; Frühlingstag; Wie der stöhnende Wind; Weg zur Geliebten. **7.0,** Topical Talk. **7.10,** Health Talk. **7.25,** Echoes of the Day. **7.45,** Political Review. **8.0,** News. **8.15,** See **Berlin (Deutschlandsender). 9.0,** Talk: The Brandenburg Frontier. **9.30,** Recital of Bach Preludes and Choral Fantasias by Hans Luedtke (Organ): Prelude in G minor; So ist das unser Trost allein; Prelude in B flat; Liebster Jesu, wir sind hier; Prelude in G; Nun freut euch, lieben Christen. **9.50,** Die andere Bettina (von Arnim)—Sequence (Lisa Schultze-Kunstmann). **10.20,** News. **10.40,** Haydn Concert by the Station Orchestra; Conductor, Frickhoeffer; Soloist, Eva Liebenberg (Contralto); Scene from Ariana a Naxos; Symphony in E flat; The Drum Roll. **11.30,** Talk by Dr. Horst Rüdiger: German Art. **12 Midnight** (approx.), Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**12.15 p.m.,** Report on the Cycle Tour of Switzerland. **12.45,** See **Sottens. 2.0 p.m.,** Interval. **4.0,** See **Sottens. 7.30,** Report on the Cycle Tour of Switzerland. **8.0,** Records. **8.30,** Market Prices; Sports Notes; Tourist Notes. **8.45,** Dialogue: The Football Season. **8.55,** Accordion Duets. **9.15,** Weather; News. **9.30,** Choral Concert. **10.15** (approx.), Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 to 7.15 a.m.,** See **Prague. 9.55,** Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian. **10.30,** See **Moravská-Ostrava. 11.0,** Water Level. **11.5,** See **Prague. 12 Noon,** Talk for Farmers. **12.10 p.m.,** Local News in Slovak. **12.15,** Record. **12.20,** See **Prague. 1.40,** News; Weather in German and Hungarian. **1.50 to 2.0,** See **Prague. 3.15,** See **Moravská-Ostrava. 4.15 to 4.20,** See **Prague. 5.40,** Records. **5.50,** See **Brno. 6.0,** Sports Notes. **6.10,** Notes for Housewives. **6.15,** Hungarian Transmission: Records. **6.55,** See **Prague. 7.35,** Talk. **7.45,** Concert. **8.30,** Traia—Sketch (Klein). **8.50,** See **Prague. 10.45 to 11.0,** News in Hungarian. **11.0** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.**—**5.0 a.m.,** Hymn; Motto. **5.10,** Records. In the interval at **5.40,** Time; Weather. **6.0,** Time; Weather; Gym. **6.25,** See **Leipzig. 7.0,** News. **7.10,** See **Leipzig. 8.0,** Cookery Talk. **8.10,** Records. **8.40,** Gym. for Women. **9.0,** Time; News. **10.10 to 10.40,** Programme for Schools. **11.30,** Time; News. **12 Noon,** Concert by the Station Orchestra; Conductor, Topitz: March (Dostal); Overture, Maritana (Wallace); Romance (Jos. Strauss); Catalan Rhapsody (Ailbout); Waltz, Künstlerleben (Joh. Strauss); Selection from La Bohême (Puccini); Herbststimmung (Rust); Selection from Der goldene Pierrot (Götze). In the interval at **12.30,** Time; Weather. **1.30,** Time; News. **1.45,** Concert by the Station Orchestra; Conductor, Topitz. **2.20,** Exchange. **2.25,** Post Office Propaganda; Records. **2.50,** Market Prices. **3.10,** Recital of Schumann and Trunk Songs by Elfriede Nöldner (Soprano). **3.40,** Review of Gardening Books. **3.50,** Reading. **4.0,** See **Stuttgart. 5.30,** Report. **5.35,** Animal Stories. **6.0,** Programme to be announced. **6.20,** Talk for Young People. **6.35,** Talk: The German Actor in Athens. **6.50,** Announcements; Report for Farmers. **7.0,** New Records: Rhine and Danube Music. **7.45,** See **Berlin (Funkstunde). 8.0,** News. **8.15,** See **Berlin (Deutschlandsender). 9.0,** Stine—Play (Hanns Ulrich Röhl). **10.20,** Time; News. **10.45,** Dances of the Nations—Concert by the Station Orchestra; Conductor, Rischka: Persian Dances from Khovanstchina (Mussorgsky); Polovtsian Dances (Borodin); Upper Silesian Dances (Strecke); Swedish Dances (Aulin); English Dance (Grainger); Spanish Dance (Granados); Piedmontese Dance (Sinigaglia). **12 Midnight** (approx.), Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 10.30,** See **Moravská-Ostrava. 11.0,** See **Prague. 12 Noon,** See **Bratislava. 12.10 p.m.,** See **Prague. 1.30,** Economic Talk. **1.40,** See **Prague. 2.0 to 2.5,** Market Prices. **3.15,** See **Moravská-Ostrava. 4.15 to 4.20,** See **Prague. 5.40,** Announcements. **5.45,** Record. **5.50,** Talk. **6.0,** Records. **6.20,** German Transmission; Between Battles—Play, after Björnson. **6.55,** See **Prague. 7.10,** Saxophone Solos by Otcovsky. **7.35,** From a Forest Source to the Water Works—Sequence. **8.20,** See **Prague. 11.0** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Records: The Insect World in Music. **1.0 p.m.,** News. **1.10,** Orchestral Concert of French Music: Marche lorraine (Ganne); Overture, The Crown Diamonds (Auber); Mazurka No. 2 (Godard); La lettre de Manon (Gillet); Selection from Herodiade (Massenet); Canzonetta for Clarinet (Pierné); Extracts from the Suite algérienne (Saint-Saëns). **2.0,** Interval. **4.55,** Announcements. **5.0,** Concert by the Radio Orchestra: March (Calvette); Overture, Les Saltimbanques (Ganne); Selection from The Merry Peasant (Fall); Romance for Violin (Svendsen); Ouverture leggiera (Dame); Arlequinade (Cazaneuve); Piece (Caludi); Ballet Music from Lakmé (Delibes); Nocturne (Brenta). **6.0,** Talk for Women. **6.15,** Request Records. **6.45,** Recital of Rachmaninov Preludes by Wilmet Lambert (Pianoforte); Preludes in C sharp minor, G flat, D minor, B flat, F sharp minor, E flat, D, G minor. **7.15,** Talk for Parents. **7.30,** Legal Talk. **7.45,** Literary Talk. **8.0,** Orchestral Concert of Light Music; Soloist, Jenny Sosset (Songs): Overture, Le cheval de bronze (Auber); Selection from Rose-Marie (Friml); Extract from La vie parisienne (Offenbach); Suite saharienne (Ackermans); Songs: (a) Aria from Céphale et Procris (Grétry), (b) Vous m'avez dit tel soir (de Sutter); Insalah (d'Agrèves); Gavotte (Delisle); Marche russe (Ganne); Le lac d'amour (Lagye). **9.0,** Talk for Schools. **9.15,** Concert (contd.): Loustics en fête (Marsick); Songe d'amour (Marsick); Selection from Hansel and Gretel (Humperdinck); Songs; Oh, Kate (Gershwin); Cobweb Castle (Liza Lehmann); Russian Melodies (Higgs). **10.0,** News. **10.10,** Request Records. **10.25,** Dance Records. **11.0,** La Brabançonne.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish.—**11.57 a.m.,** Weather. **12 Noon,** Orchestral Concert. Soloist, Serissen ('Cello). March (Spoel); Valse militaire belge (Frémaux); Overture, Lysistrata (Lincke); Piece (Candiolo); Selection from Madame (Christiné); 'Cello Solo, Canzonetta (Caludi); Potpourri (Dostal). **1.0 p.m.,** News. **1.10,** Records. **2.0,** Interval. **4.55,** Announcements. **5.0,** Concert by Lionel's Club Orchestra from the Continental Palace Hotel, Blankenberg. **6.0,** Records: Variations on a Beethoven Theme (Saint-Saëns). **6.15,** Talk: Joan of Arc and Voltaire. **6.30,** Orchestral Concert. Soloist, Joiret (Accordion). March, Entry of the Gladiators (Fucik); Waltz (Fétras); Overture, Giralda (Adam); Wood Nymphs (Coates); Schubert Fantasia (Foulds); Accordion Solos: (a) Overture, The Thieving Magpie (Rossini), (b) Pistonette (Hansen); Potpourri (Salabert). **7.30,** Wireless Notes. **8.0,** Quartets Nos. 5 and 6 (Beethoven), by the Pro Arte Quartet. **9.10,** Die van de Jenettebloem en de nieuw'kunst—Play (M. A. Thiry). **10.0,** News. **10.10,** Concert by the Lionel's Club Orchestra from the Continental Palace Hotel, Blankenberg. **11.0** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records. **1.15,** Time; News. **1.40,** Records of Light Music. **6.0,** Time; Weather. **6.5,** Concert by the Station Orchestra. **7.0,** Educational Talk. **7.15,** Concert of Light Music by the Station Orchestra; Soloist, Teodoru (Violin). **8.0,** "Carmen"—Opera in Four Acts (Bizet), on Records. In the interval, Talk. After the Opera, News.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym. **9.45,** News. **10.0,** Talk. **10.40,** Talk for Gardeners. **11.10,** Water Level. **12 Noon,** Chimes. **12.5 p.m.,** Concert by the Hédervári Cigány Band. **1.30,** Concert by the Bertha Chamber Orchestra. **2.40,** Programme for Housewives. **4.0,** Programme for Schools. **5.0,** Talk: Women in History. **5.30,** Recital by Esztet Réthi (Songs). **6.10,** Talk. **6.45,** Sports Notes. **7.0,** Recital by Sári Hir (Pianoforte). **7.45,** Wireless Talk. **8.0,** Concert by the Opera Orchestra; Conductor, Rajter: Carnaval de Paris (Svendsen); Ballet Music from The Demon (Rubinstein); Eventide (Szerémi); Variations (Ochs); Polka (Strauss). **9.15,** News. **9.35,** Concert by the Dakatos Cigány Band. **10.20,** Chamber Music by the Waldbauer-Kerpely Quartet. **11.30,** Dance Music by the Nogrády Jazz Band.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Hymn; Records. **6.5,** Gym. **6.25,** Talk for Farmers. **6.35,** Request Records. **6.50 to 7.5,** Hymn; Time; News. **7.5,** Request Records. **8.0,** Time; Weather; Water Level **8.5,** Gym. for Women. **8.20 to 8.30,** Topical Talk. **10.0,** Time; News. **10.10,** Concert by the Station Orchestra; Soloists, Peter König (Tenor), and Ida Gille (Guitar). **10.30,** Topical Talks. **11.30,** Post Office Propaganda; Records. **12 Noon,** Records. **12.45 p.m.,** Announcements; Greetings. **1.0 to 2.45,** Concert by the Station Chamber Orchestra; Conductor, Hartmann: Prelude to Die schöne Galathee (Suppé); Waltz (Komzak); The Crown of India (Elgar); Selection from Louise (Charpentier); Prelude to Der Bettelstudent (Millöcker); Piece (Popy); Volksliedchen (Komzak); Märchen (Komzak); Selection from Boccaccio (Suppé); March (von Blon). In the interval at **1.45,** Announcements. **3.15,** Talk: Housing. **3.30,** Time; Exchange. **3.45,** Hints for Housewives. **4.0,** See **Stuttgart. 5.0,** Reading. **5.15,** Karl Kämpf Concert by Gerda Schüler-Rehm (Soprano), Franz Fassbender ('Cello) and Hans Haass (Pianoforte): Three Songs: (a) Winterlied, (b) Märzkätzchen, (c) Klingender Frühling; Pathetic Sonata for 'Cello and Pianoforte Op. 62; Two Songs: (a) Hinterm Deich, (b) Du bist doch mein. **5.45,** Travelogue: Sauerland. **6.0,** Programme for Young People: Night Attack—Play (Otto Ottinghaus). **6.20,** English Conversation. **6.40,** Topical Talk. **6.50,** Time; Weather; Exchange; Sports Report. **7.0,** German Folk Songs and Dances by the Station Chamber Choir, the Six Merry Singers and Soloists: Friedrich Eugen Engels (Tenor) and Rolf Hartmann (Pianoforte); Conductor, Breuer. **7.45,** See **Berlin (Funkstunde). 8.0,** News. **8.15,** See **Berlin (Deutschlandsender). 9.0,** Talk: The Labour Struggle. **9.30,** Pianoforte Recital by Karl Delseit; Sonata No. 3 Op. 26 (Clementi); Les Jeux d'eaux à la Villa d'Este (Liszt); Invitation to the Dance (Weber). **10.0,** Time; News. **10.30,** Concert by the Small Station Orchestra; Conductor, Eysoldt. **12 Midnight** (approx.), Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**11.30 to 12 Noon,** Programme in English arranged by the International Broadcasting Company of London. **11.30,** Records. **12 Noon to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English by the I.B.C. **4.30,** Bournemouth, Weymouth, Southampton and Winchester Concert: The Spendthrifts. **5.0,** Part 2. Dance Music. **5.30,** Part 3. Orchestral Music. **6.0 to 11.0,** Programme in French. **11.0** till Close Down, Programme in English by the I.B.C. **11.0,** Talkie Time: Tunes from the Talkies. **11.30,** Request Programme—Beside the River. **12 Midnight,** Club Concert for Macclesfield Listeners—Part 1. Dance Music. **12.30 a.m. (Saturday),** I.B.C. Time Signal. **12.31,** Part 2. Dance Music (contd.). **1.0,** I.B.C. Goodnight Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.40,** Time; Announcements. **6.50,** Weather. **6.55,** See **Stuttwart. 7.25,** See **Munich. 8.10,** Water Level; Weather. **8.15 to 8.35,** Gym. **10.0,** News. **11.0,** Announcements; Records. **11.40,** Announcements; Exchange; Weather. **11.50,** Social Notes. **12 Noon,** See **Stuttgart. 1.0 p.m.,** Time; News. **1.20,** See **Stuttgart. 1.50,** Time; News. **2.0,** See **Stuttgart. 2.40,** Programme for Women. **3.20,** Weekly Art Review. **3.30,** Weather. **3.35,** Economic Notes. **3.50,** Time; Exchange. **4.0,** See **Stuttgart. 5.30,** Talk: Karl Bosch. **5.45,** Recital of Beethoven Lieder by Emil Bartholmes (Baritone). **6.0,** Talk for Young People. **6.25,** Dialogue: The Agate Industry at Idar-Oberstein. **6.45,** Weather; Exchange; Announcements. **6.50,** Topical Talk. **7.0,** Concert of Light Music by the Station Orchestra; Conductor, Caspar. **7.45,** See **Berlin (Funkstunde). 8.0,** News. **8.15,** See **Berlin (Deutschlandsender). 9.0,** Singing Competition. **10.20,** Time; News. **10.35,** Local News; Sports Notes. **10.45,** Variety Programme. **11.0** Der Trifels—Historical Play in Five Scenes (Hörnbach-Ginthum). **12 Midnight,** Serenade. **1.0 a.m. (Saturday),** Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg,** and **Hanover, 1,330 kc/s, 225.6 metres.**—**5.45 a.m.,** Time; Weather; Notes for Farmers. **6.0,** Gym. **6.15,** Time; Weather. **6.20** (from **Kiel**), Orchestral Concert; Conductor, Döring. **7.0,** News. **7.10** (from **Kiel**), Concert (contd). **8.0,** Weather; Programme for Housewives. **8.10,** Announcements; Records. **10.50,** News. **11.0,** Hundert kleine Holzschuh' klappern—Play (Saner). **11.30** (from **Bremen**), Concert by Fredo Niemann's Wind Instrument Orchestra from the Town Hall. **12.0 Noon,** Report for Housewives. **12.5 p.m.,** Time; Announcements. **12.15** (from **Bremen**), Concert (contd.). **1.0,** Exchange. **1.15,** Weather. **1.20,** Musical Programme. **2.15,** News. **2.30,** Records. **3.0,** Exchange. **3.40,** Shipping and Aviation Notes. **4.0,** See **Munich. 5.30** (from **Hanover**), Talk: The Reorganisation

of the German Theatre Regulations. **5.45** (from **Kiel**), Talk: Careers for Young People. **6.0**, Topical Talk. **6.45**, Exchange. **6.55**, Weather. **7.0**, See **Cologne.** **7.45**, See Berlin (**Funkstunde**). **8.0**, News. **8.15**, See **Berlin (Deutschlandsender).** **9.0**, Kasper und Marieken fahren ins Grüne—Sketch (Peter Maria Vrolik). **10.0**, News. **10.20**, Musical Programme. **11.0**, (from **Bremen**), Municipal Band Concert; Conductor, Krug: Duet, Nordische Sennfahrt (Gade); Song, The Lark (Glinka); Waltz, Wenn die Sonne lacht (Siede); Eine Sommerfahrt, Op. 15 (Zöllner); March (Stumpf); Piece (Dvorák); Frohsinn auf den Bergen (Fetras); Wanderlied (Schumann); March (Wendel). **12 Midnight** (from **Hanover**), Orchestral Concert from the Abbey Ruins, Walkenried; Conductor, von Sosen; Soloists, Käthe Glenewinkel (Soprano); Heinz Bensing (Tenor); Karl Elbe (Flute); and Ernst Mühldorfer (Clarinet). **12.50 a.m. (Saturday)**, Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW (until **3.40 p.m.**); transmitted on **Kootwijk,** 50 kW, from **3.40 p.m.—7.40 a.m. to 7.40 p.m.**, Programme of the General Broadcasting Society (A.V.R.O.). **7.40 a.m.**, Time; Records. **8.10**, Concert relayed from **Rotterdam.** **8.40**, Concert of Dutch Music by the A.V.R.O. Orchestra; Conductor, Treep: Dutch Folk Song Potpourri (Brusse); Old Dutch Dances (Röntgen); Paraphrase (Alterego); Suite, In Holland (Kriens); Dances (van Blaricum); Boer Song Potpourri (A. W. Samehtini). **9.35**, Records; Service. **9.55**, Records. **10.10**, Recital by Frans Hasselaar (Organ) and Beatrix Schut (Contralto); in the interval, Reading. **11.40**, Carillon from St. John's Cathedral, Bois-le-Duc. **12.10 p.m.**, Concert of Light Music by the A.V.R.O. Orchestra; Conductor, Nico Treep: March (Bosc); Overture, Le cheval de bronze (Auber); Selection from The Barber of Seville (Rossini); Waltz (Lohr); Records; Potpourri, Fortissimo (Kalman); Indian Romance (Reeves); Hiawatha (Moret); Puszta-Legenden (Lindsay-Theimer); Records; Overture, Frau Luna (Lincke); The Japanese Screen (Ketelbey); Caravanserei (Rey); March Potpourri (Ciere). **2.10**, Pianoforte Recital by Cola de Joncheere; Toccata and Chromatic Fantasia (Sweelinck); Sonatina No. 2 (Pijper); Wilhelm von Nassau Variations (Mozart). **2.40**, Records. **3.25**, Interval. **3.40**, Programme for Hospitals. **4.10**, Songs by a Children's Choir. **4.40**, Programme for Children. **5.10**, Light Music by the Kovacs Lajos Orchestra. **6.10**, Sports Talk. **6.40**, Light Music (contd.). **7.10**, Talk. **7.40**, Talk by the Liberal Protestant Radio Society (V.P.R.O.). **8.10 to 9.55**, A.V.R.O. Programme. **8.10**, Symphony Concert by the Residenz Orchestra, relayed from the Kurhaus, Scheveningen; conductor, Carl Schuricht; in the interval, Talk. **9.55, to 10.40**, V.P.R.O. Programme. **9.55**, News; Religious Notes. **10.10**, Recitations. **10.40** till Close Down. A.V.R.O. Programme. **10.40**, News. **10.50**, Records. **11.40** (approx.), Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW (until **6.40 p.m.**), 20 kW. from **6.40 p.m.** Programme of the Christian Radio Society (N.C.R.V.). **7.40 a.m.**, Bible Reading; Meditation. **7.55**, Records. **9.10**, Interval. **10.10**, Service. **10.40**, Concert of Netherlands Folk Music by the Van der Horst Ensemble. **11.40**, Announcements. **12.10 p.m.**, Records. **1.40**, Carillon Récital by Vincent. **2.10**, Religious Reading. **2.40**, Concert of Popular Music by The Hague Philharmonic Orchestra; Conductor, Zeldenrust: La belle France (Zeldenrust); Overture, Neerlandia (Wesly); Selection from The Gipsy Princess (Kálmán); Extracts from Madame Butterfly (Puccini-Bekker). **3.25**, Interval. **3.40**, Concert (contd.): Overture, Franz Schubert (Suppé); Netherlands Folk Song Potpourri (Geye); Intermezzo from Cavalleria rusticana (Mascagni); Selection from I Pagliacci (Leoncavallo); In the Mall (Goldmann). **4.40**, Chopin-Brahms Pianoforte Recital by Willem de Roos: Polonaise in A flat (Chopin); Fantasia in F minor (Chopin); Ballad in G minor (Brahms). **5.10**, National Songs by a Choir of 3,500 Children, relayed from the Square, Groningen; Conductor, Kuiper. **5.40**, Records. **6.10**, Talk for Gardeners. **6.40**, Announcements. **6.55**, Records. **7.10**, Literary Talk. **7.40**, Service in honour of H.M. the Queen of Holland's Birthday, relayed from Amsterdam. **9.10**, Recital of Sacred Music relayed from the English Church, Amsterdam: Ankie van Wickevoort Crommelin (Soprano), Anton v. d. Horst (Organ), and an Instrumental Ensemble: Prelude and Fugue in C minor (Bach); O Gottes Stadt (Buxtehude); Symphony (Locatelli); Wachet auf, ruft uns die Stimme (Tunder); Ach Herr, lass deine liebe Engelein (Tunder); Sacred Trio Sonata in B minor (Corelli); Concerto (Handel); Jauchzet Gott, alle Lande (Weiland). **10.40**, Records. **11.10**, Close Down.

INNSBRUCK.—Relays **Vienna.**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres;** and **Skamlebaek, 49.5 metres,—7.0 a.m.**, Gym.

AUG. 31st FRIDAY *continued*

7.27, Weather. **8.30**, Service from Copenhagen Cathedral. **11.0**, Weather; Fish Market Prices. **12 Noon,** Chimes from the Town Hall; Weather. **12.5 p.m.**, Report from the Town Hall Square. **12.20**, String Ensemble Concert from the Bellevue Strandhotel. **2.0**, Interval. **3.0**, Concert by the Radio Orchestra; Conductor, Reesen: March (Olsen); Overture, Martha (Flotow); Waltz (Vollstedt); Chanson triste (Tchaikovsky); Spanish Dance (Granados); Selection from The Tales of Hoffmann (Offenbach); Reading; Overture, Flotte Bursche (Suppé); Selection from The Gipsy Princess (Kálmán); Slav Dances Nos. 16 and 8 (Dvorak); March, Per aspera ad astra (Urbach). **5.0**, Reading from Pickwick Papers (Dickens). **5.30**, Exchange; Fish Market Prices. **5.45**, Talk: Gustav Wied's Novels. **6.15**, Elementary German Lesson. **6.45**, Weather; Announcements. **7.0**, News. **7.15**, Time. **7.30**, Talk on Politics. **8.0**, Chimes from the Town Hall. **8.5**, Review by Per Knutzon. **8.10**, Trio in E flat Op. 12 (Hummel). **8.34**, Weather. **8.35**, Bettine—Comedy in One Act (de Musset). **9.50**, News. **10.5**, Suites by the Radio Orchestra; Conductor, Gröndahl: Suite in A minor for Strings and Harpsichord (Telemann); Petite Suite (Debussy); Extract from the Marionetten Suite (Rosenberg). **11.0**, Dance Music from the Wivex Restaurant. **12 Midnight,** Chimes from the Town Hall. **12.5 a.m. (Saturday)**, Dance Music (contd.). **12.30**, Close Down.

KIEL.—Relays **Hamburg. KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.—5.0 a.m.**, Records. **5.50**, Weather. **6.0**, Gym. **6.20**, See **Hamburg.** **7.0**, News. **7.10**, See **Hamburg.** **8.0**, Prayers. **8.30**, Gym. for Women. **9.0** (from **Danzig**), French Lesson for Schools. **10.40**, News. **11.30 to 1.0 p.m.**, See **Hamburg.** In the interval at **12 Noon**, Weather. **1.1 p.m.**, Time; Weather. **1.5**, Records. **1.20**, News; Records. **2.0**, News; Records. **2.30**, Post Office Propaganda; Records. **3.0**, Exchange. **3.15**, Reading for Children. **3.40**, Programme for Women. **4.0** (from **Danzig**), Concert by the State Theatre Orchestra; Conductor, Kallipke: Overture, Prometheus (Beethoven); Norwegian Rhapsody No. 2 (Svendsen); Minuet and Gavotte from Manon (Massenet); Suite from Der Rosenkavalier (R. Strauss); In the Mystic Land of Egypt (Ketelbey); Intermezzo from Naila (Delibes); Three Military Marches (Schubert); Preludes to Acts II, III and IV of Carmen (Bizet); Waltz, Brun ou blonde (Waldteufel); Wiener Spaziergänge (Komzak); Tscherkessischer Zapfenstreich (Machts). In the interval at **5.0** (approx.), Book Review. **5.50** (from **Danzig**), Talk for Farmers. **6.15**, Market Prices. **6.25**, Gym. for Young People. **6.55**, Weather. **7.0**, Records. **7.20** (from **Danzig**), Reading. **7.45**, See **Berlin (Funkstunde).** **8.0**, News. **8.15**, See **Berlin (Deutschlandsender).** **9.0**, Zilcher Concert. Part 1, Nacht und Morgen for Two Pianofortes, Strings and Kettle Drums; Conductor, Brückner; Soloists, The Composer and Heinz Reinhardt Zilcher (Pianofortes). Part II, Symphony No. 2 in F minor, Op. 23; The Opera House Orchestra; Conductor, The Composer. **10.0**, News; Sports Notes. **10.30**, Topical Report. **11.0**, See **Munich.** **12 Midnight** (approx.), Close Down.

KOSICE.—Relays **Prague. LAUSANNE.**—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.—5.50 a.m.**, Report for Farmers. **6.0**, Gym. **6.25** (from **Dresden**), Concert by the Philharmonic Orchestra. **7.0**, News. **7.10**, Concert (contd.). **8.0**, Gym. **8.20**, Records. **9.0**, See **Berlin (Deutschlandsender).** **9.40**, Exchange. **9.45**, Announcements. **9.55**, Weather; Water Level. **10.10 to 10.50**, Programme for Schools. **11.0**, Post Office Propaganda; Records. **11.30**, News. **11.45**, Programme for Farmers. **12 Noon**, See **Breslau.** **1.0 p.m.**, News. **1.10** (from **Dresden**), Concert by the Soloist Ensemble: Overture, The Barber of Bagdad (Cornelius); Waltz Fantasia (Glinka); Liebeswalzer (Reger); Canzonetta for Violin and Pianoforte (Blumer); Waltz, Perlen der Liebe (Jos. Strauss); Selection from Les Cloches de Corneville (Planquette); Gavotte (Rehberg); Selection from The Fair Maid of Perth (Bizet); Waltz, Golden Rain (Waldteufel); Mazurka (Drdla). In the Interval at **2.0**, News. **2.30 to 2.50**, Talk for Women. **3.0**, Literary Talk: Gerrit Engelke. **3.35**, Exchange. **4.0**, Concert by the Station Orchestra; Conductor, Blumer; Soloist, Günther Schulz-Fürstenberg ('Cello); Overture, Prometheus (Beethoven); 'Cello Concerto in B flat (Boccherini); Ballet Music from Armide (Gluck); Symphony No. 1 in D (Haydn); Suite, Op. 39 (Dvorák). **5.30**, Literary Report: Hans Grimm. **5.50**, Exchange; Weather; Time. **6.0**, Talk; Peace and War Economics. **6.20**, Reading of Metzger's Humorous Verse. **6.50**, Concert by the EmDe Orchestra; Conductor, Dreyer: March (Kunze); Overture, Peter Schmoll (Weber); Improvisation for 'Cello and Pianoforte (Wennig); Waltz, Frühling in der Heimat (Krome); Neapolitan Suite (de Micheli); Spatzen-Promenade (Egg); Liebesreigen (Hentschel); Gallop (Dreyer). **7.45**, See **Berlin (Funkstunde).** **8.0**, News. **8.15**, See **Berlin (Deutschlandsender).** **9.0**, See **Stuttgart.** **10.20**, News; Sports Notes. **10.50**, Report: The First Leipzig Women's Gymnastic Display. **11.10**, Concert from **Stuttgart.** **12 Midnight** (approx.), Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 120 kW.—**7.45 a.m.**, Records. **8.0**, News in French; Record; News in German; Record. **12 Noon,** Concert by the Station Orchestra; Conductor, Pensis: Overture, Hamlet (Bach); Waltz, Wiener Praterleben (Translateur); Asiatic Suite (Preston); Cupid's Garden (Eugene); Selection from White Horse Inn (Stolz-Benatzky); Prairie Lily (Mills); Retraite aux Flambeaux (Meyerbeer); March (Rosey); In the interval at **12.30**, News in French and German; and at **1.0 p.m.**, Exchange. **1.15**, Records. **1.30**, Exchange. **1.35**, Records. **2.0**, Exchange. **3.45**, Exchange. **6.30** till Close Down, Dutch Evening. **6.30**, Variety Concert. **7.30**, Racing Results. **7.35**, Concert by the Station Orchestra; Conductor, Pensis: March (Bosc); Selection from Paganini (Lehár); Ballet égyptien (Luigini); In the mystic Land of Egypt (Ketelbey); Intermezzo (Kálmán); Selection from Tosca (Puccini). In the intervals at **8.0**, News in French and German; and at **8.30**, Exchange. **8.50**, Scottish Programme by the MacDuncans. **9.30**, Orchestral Concert relayed from Mondorf les Bains; Conductor, Dubois-Sylva. **10.30**, Dance Music by the Station Dance Band; Conductor, Jusa.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**9.0 a.m.**, News. **10.0 to 10.30**, Announcements. **2.0 p.m.**, Chimes; Weather; Variety Music. **2.30**, Concert by the Station Sextet: Military March in E (Schubert); Ave Maria (Gounod); Pavane (del Campo); Selection from Thais (Massenet). **3.0**, Announcements; Exchange; Popular Music. **3.30**, Sextet Concert (contd.), Selection from El Principe Carnaval (Serrano); Piece (Granados). **4.0**, Popular Music. **4.15**, Sextet Concert (contd.), Selection from The Pearl Fishers (Bizet); Overture, La princesse jaune (Saint-Saëns). **4.50**, News. **5.0**, Interval. **6.0**, Chimes; Light Music. **7.0**, News; Spanish Operetta Music. **7.30**, Exchange. **7.35**, Orchestral Concert: Pasodoble and Jota (Chueca); Pieces from Kamennoi Ostrov (Rubinstein); Intermezzo from Cavalleria rusticana (Mascagni); Idyll from Lysistrata (Lincke); March (Chapí); American Songs. **8.30**, News; Programme for Women. **9.50**, Announcements. **10.0**, Chimes. **10.5**, Flamenco Poems with Guitar Accompaniment. **10.30**, Symphony Records. In the Interval at **11.0**, News. **12.45 a.m. (Saturday)**, News. **1.0**, Chimes; Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.—7.30 a.m.**, Gym. **7.45**, Time; News. **11.30**, Light Music. **12.30 p.m.**, Records. **12.45**, News. **1.0**, Time; Announcements. **1.5 to 2.15**, Concert by the Malatesta Chamber Orchestra. In the Interval at **1.30**, Records; Exchange. **2.15 to 2.25**, Exchange. **4.35**, News. **4.45**, Programme for Children. **5.10**, Songs. **5.55**, Weather. **6.0 to 6.10**, Report for Farmers; Wheat Market Prices. **7.0**, Announcements. **7.15**, News in Foreign Languages. **8.0**, Time; News; Records. **8.30**, Government Notes. **8.45**, Wienerblut—Operetta (Strauss). After the Play, Dance Music by the Weintraubs Syncopators, from the Giardino Diana, Milan. **11.0**, News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**12 Noon,** Announcements. **12.5 p.m.**, Light Music by the Station Orchestra: March (Fucik); Waltz, Dreams on the Ocean (Gungl); Overture, Le Maçon (Auber); Si vous l'aviez compris (Denza). **12.29**, Time; Weather. **12.33**, Light Music (contd.): Selection from Turandot (Puccini); Slav Folk Song Potpourri (Hrbacek). **12.55**, News. **1.5**, Records. **1.30**, Interval. **3.59**, Time. **4.0 to 6.0**, See **Sottens.** **7.45**, News. **8.0**, Concert of Light Music by the Station Orchestra: Overture, Paragraph III (Suppé); The Emperor Waltz (Strauss); L'ultimo canzone (Tosti); Selection from Carmen (Bizet). **8.30**, Wireless Notes. **8.35**, Concert by a Tessin Children's Choir. **9.0**, Talk. **9.15**, 'Cello Recital by De Signori: Suite française, Op. 114 (Bazelaire); Spanish Serenade (Glazunov); Litanei (Schubert-Maréchal); Scherzo (v. Goëns). **9.30**, Dialogue: Young People and Sport. **9.45**, Song Recital by Olga des Combes: Berceuse de Jocelyn (Godard); Si vous l'aviez compris (Denza); Aria from Manon (Massenet); Aria from Turandot (Puccini). **10.0**, Report on the Cycle Tour of Switzerland.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.0-7.15 a.m.**, See **Prague.** **10.0**, See **Prague.** **10.30**, Concert by a Miners' Band; Conductor, Vitek. **11.0**, See **Prague.** **12 Noon**, Talk for Farmers. **12.10-2.0 p.m.**, See **Prague.** **3.15**, Concert by the Station Orchestra; Conductor, Divis: Overture, Rosamunde (Schubert); Selection from Faust (Gounod); Slav Dance No. 4 (Dvorák); Czech Dances Op. 18 (Rihovsky); March (Kricka). **4.15-4.20**, See **Prague.** **5.40**, Records. **5.55**, Local Report. **6.0**, Tourist Report. **6.10**, Talk. **6.20**, German Transmission: Songs and Arias. **6.55**, See **Prague.** **7.35**, See **Brno.** **8.20**, See **Prague.** **11.0** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.**, News. **5.30**, Fanfare. **5.45**, Gym. **6.15**, Programme Announcements. **7.30**, Records. **9.0**, Musical Programme. **9.55**, Time Signal. **10.0**, News. **10.15**, Wind Instrument and Trio Concert. **11.15**, Technical Talk for Farmers. **2.45 p.m.**, News. **3.15**, Military Sketch for Children. **3.55**, Time Signal. **4.0**, News. **5.30**, Review of Periodicals; Military Talk. **6.30**, Orchestral Concert. Conductor, Krisch. **8.0**, Literary Programme; Dance Records. **9.0**, Talk in Czech: Bolshevists. **9.55**, Chimes. **10.5**, Literary Talk in English. **11.5**, Talks in German: (a) Bolshevists, (b) Lenin.

MOTALA. — Relays **Stockholm. MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nürnberg, 1,267 kc/s, 236.8 metres;** and **Kaiserslautern, 1,195 kc/s, 251 metres.—6.30 a.m.**, Gym. **6.45**, Motto; Records. **7.15**, Time; News. **7.25**, Song Recital by Josefine Kling-Stoll (Soprano), Walter Römer (Tenor) and Hans Böck (Bass). **9.50**, Gym. for Women. **10.55**, Market Prices. **11.5**, Programme for Farmers. **11.15**, Time; News. **11.30**, Post Office Propaganda; Records. **12 Noon,** Records. **1.15 p.m.**, Time; News. **1.25**, Orchestral Concert; Conductor, Kloss. **2.0**, News. **2.20**, Reading. **2.30**, Programme for Women. **3.30**, Reading. **3.50**, Weather; Notes for Farmers. **4.0**, Orchestral Concert; Conductor, Kloss; Soloist, Hugo Reker (Violin). **5.30**, Talk: East Friesland. **5.50**, Liebe, Treue und Ehe—Song Cycle (Bittner), by Moja Petrikowski (Contralto) and Richard Klewitz (Baritone). **6.10**, Education Talk. **6.30**, Holiday Talk: Augsburg. **6.50**, Time; Weather; Notes for Farmers. **7.0**, See **Cologne.** **7.45**, See **Berlin (Funkstunde).** **8.15**, See **Berlin (Deutschlandsender).** **9.0**, The Prodigal Son—Play (Münsterer), with Music by Marx. **10.0**, Time; News. **10.20**, Programme to be announced. **11.0**, Dance Music by the Station Dance Band; Conductor, Aulich. **12 Midnight,** Close Down.

NAPLES. — Relays **Rome. NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres, 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres,** and **Jeloy, 6,990 kc/s, 42.92 metres.—10.0 a.m.**, Butter Prices. **11.15**, Service. **11.50**, Exchange. **12.45 p.m.**, News. **12.55**, Time. **1.0-2.0**, Records. In the interval at **1.15**, Weather; Talk for Farmers; and at **1.45**, Exchange. **2.0**, Exchange. **5.0**, Concert. **6.0**, Talk. **6.30**, Records. **7.0**, Announcements. **7.15**, Weather; News. **7.30**, Time. **7.31**, Talk for Farmers. **7.45**, Theatre Notes. **8.0**, Recital of Olsen Music by Willy Johansen (Violin) and Robert Levin (Pianoforte). **8.30**, A Microphone Visit to Bergen. **9.5**, Song Recital by Valborg Landberg. **9.35**, Book Review. **9.40**, Weather; News. **10.0**, Topical Talk. **10.15**, Accordion Music. **10.45** (approx.), Close Down.

OSTERSUND.—Relays **Stockholm.**

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 to 8.30 a.m.**, News. **10.30**, Concert relayed from **Bordeaux-Lafayette, 1,077 kc/s, 278.6 metres. 12 Noon,** Tourist Report. **12.15 p.m.**, Concert by the National Orchestra; Conductor, Georgis; Soloists, Paul Payen (Songs) and Blot (Horn). **1.15**, Concert. **2.0**, Records. **3.30**, Concert relayed from the Casino Park, Vichy; Conductor, Brouillac. **5.45**, Talk. **6.0**, Programme for Women. **6.30**, News. **7.45**, Talk: Museums. **7.53**, Talk on Foreign Politics. **8.0**, Records. **8.30**, Concert of French Operetta Music; Conductor, Rosenthal. After the Concert, News. **10.30**, Dance Music by the Audier Jazz Band.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.10 a.m.**, Fanfare; Records. In the interval, News. **8.0 to 8.30**, Concert. In the interval, News. **8.45**, Cookery Talk. **12 Noon,** Exchange. **12.5 p.m.**, Records. In the interval at **12.25**, News. **1.5**, Exchange. **1.15**, Records. In the interval at **1.30**, Exchange. **2.0**, Exchange. **3.15**, Exchange. **3.45**, Exchange. **4.50**, Exchange. **6.45**, Exchange. **6.49**, Report for Farmers. **6.50**, Talk. **6.58**, Records. **7.10**, News. **7.30**, Records. **8.0**, Interval. **8.10**, Announcements. **8.12**, Con-

cert by the Station Orchestra; Conductor, Mathieu; Four Pieces (Mendelssohn): (a) Overture, Fingal's Cave, (b) Serenade, (c) Die Spinnerin, (d) Movements from the Italian Symphony; Pieces (Pierné): (a) Basque Rhapsody, (b) Suite from Izel, (c) Suite, Bouton d'or; Pieces (Debussy: (a) Petite Suite, (b) Aria from l'Enfant prodigue, (c) Prélude, Cortège and Air de danse. **10.20**, News. **10.30** till Close Down, Programme in English arranged by the International Broadcasting Company of London; Celebrity Concert (Gramophone Records). **11.0**, I.B.C. Good-night Melody and Close Down.

PARIS

RADIO-PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.**, Gym. **7.0**, Records. **7.15**, News. **7.45**, Gym. **8.0**, Records. **10.15**, Concert, relayed from **Vichy**: Marche Magyare (Auvray); Two Pieces (Epinat); Overture (Delmas); Cantilène du Souvenir (Borghini); Pour ma Poupée brune (Borghini); Selection from La Rose de St. Flour (Offenbach); Ballet Music from Terpsichore (Ganne); Waltz, Sentiers fleuris (Waldteufel). **12 Noon**, Dance Music by the Lucien Goldy Orchestra; Jean Sorbier (Songs). In the interval, at **1.20 p.m.**, Exchange. **3.45**, Exchange. **6.20**, Weather; Programme for Farmers; Exchange. **6.45**, Talk: The Exhibition of Sacred Dances at the Trocadero **7.0**, Talk on Hunting. **7.15**, Records: España (Chabrier). **7.25**, Social Assurance Societies' Report. **7.30**, Topical Talk. **8.0**, Reading from Jude the Obscure (Hardy). **8.30**, News. **8.45**, Aimer—Comedy (Geraldy). In the interval, at **9.15**, News; Review. **10.30**, Dance Music.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. **Relayed by W8XK on 48.86 metres and 25.27 metres.—3.0 p.m.**, Edward MacHugh. **3.15**, Sammy Fuller. **3.30**, To-day's Children. **3.45**, News; Cooking School. **4.0**, Marine Band; Shut-in-Hour. **5.0**, Soloist. **5.15**, Fields and Hall. **5.30**, Vic and Sade. **5.45**, Hotel William Penn Orchestra. **6.0**, Market Reports. **6.15**, Hon. Archie and Frank. **6.30**, Farm and Home Hour. **7.30**, KDKA Home Forum. **8.0**, Gale Page. **8.15**, Visit Foreign 'Villiage. **8.30**, Temple of Song. **9.0**, Betty and Bob. **9.15**, Singing Stranger. **9.30**, Business News and Markets. **9.45**, Arm Chair Driver. **10.0**, Ernie Holst's Orchestra. **10.15**, KDKA Kiddies' Klub. **10.30**, Jackie Heller. **10.45**, Little Orphan Annie. **11.0**, Dan and Sylvia. **11.14**, Baseball Resumé. **11.30**, Comedy Stars of Hollywood. **11.45**, Lowell Thomas. **12 Midnight**, News; Drama; Music. **12.15 a.m. (Saturday)**, To be announced. **12.30**, Nancy Martin. **12.45**, Frank Buck. **1.0 to 6.0**, Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 to 7.15 a.m.**, Time; Gym; Music and Songs; News. **10.0**, Record. **10.5**, News. **10.5**, News in German. **10.25**, Record. **10.30**, See **Moravská-Ostrava.** **11.0**, Record. **11.5**, Concert by the Prague Salon Orchestra; Conductor, Hertl: March (Blon); Overture, Light Cavalry (Suppé); Berceuse de Jocelyn (Godard); Clog Dance (Tichy); Selection from Polenblut (Nedbal); Polka (Straub). **11.55**, Report for Farmers; Weather. **12 Noon**, Time; Talk, relayed from **Bratislava.** **12.10**, Records. **12.20**, News. **12.30**, Concert by Muzik's Quartet. **1.30**, Labour Exchange. **1.40**, Records. **1.50**, Exchange. **1.55**, Exchange and Weather in German. **2.0**, Interval. **3.15**, See **Moravská-Ostrava.** **4.15**, Exchange; Weather. **5.40**, Records. **5.50**, Local Report. **5.55**, Talk. **6.5**, Record. **6.10**, Exchange. **6.20**, German Transmission: Talk: The International Congress of Philosophers in Prague; Talk for Workers. **6.55**, News in German. **7.0**, Time; News. **7.10**, Humorous Programme by Karel Hruska. **7.35**, See **Brno.** **8.20**, Records. **8.30**, An Actor's Reminiscences. **8.45**, Record. **8.50**, Introductory Talk to the following Transmission. **9.0**, Time. **9.1**, Concert of Dutch Music; Talk: Frantisek Skroup, Composer of Czechoslovakia's National Anthem; Record, Old Dutch Song (Sweelinck); Trio in G, Op. 21, for Pianoforte, Violin and 'Cello (de Lange); Old Dutch Folk Songs (arr Roentgen); Quintet (Brandt-Buys). **10.0**, Time; News. **10.15**, Records. **10.45**, News in Russian. **11.0** (approx.), Close Down.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan No. 2, 1,348 kc/s, 222.6 metres; Turin No. 2, 1,357 kc/s, 221.1 metres;** and **2RO, 11.810 kc/s, 25.4 metres.—7.30 a.m.**, Gym. **7.45**, Time; News. **12.30 p.m.**, Records. **1.0 to 2.15**, See **Milan.** In the Interval at **1.30**, Time; News. **4.30**, Children's Radio Review. **4.50**, News. **5.10**, See **Milan.** **5.55**, Weather. **6.0**, Wheat Market Prices. **6.10**, Religious Talk. **7.0**, Announcements. **7.15**, News in Foreign Languages. **8.0**, Time; News. **8.10**, Records. **8.30**, Government Notes. **8.45**, Trio in G for Pianoforte, Violin and 'Cello (Castelnuovo-Tedesco). **9.15** (approx.), Debbo farvi una confidenza—Play (Ugo de Vita). **10.0** (approx.), Light Music. **10.15**, Chamber Music. **11.0**, News.

AUG. 31st FRIDAY *continued*

RUYSSELEDE

1.330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.**, News in French. **8.0**, Records. **9.0**, News in Flemish. **9.15** (approx.), Close Down.

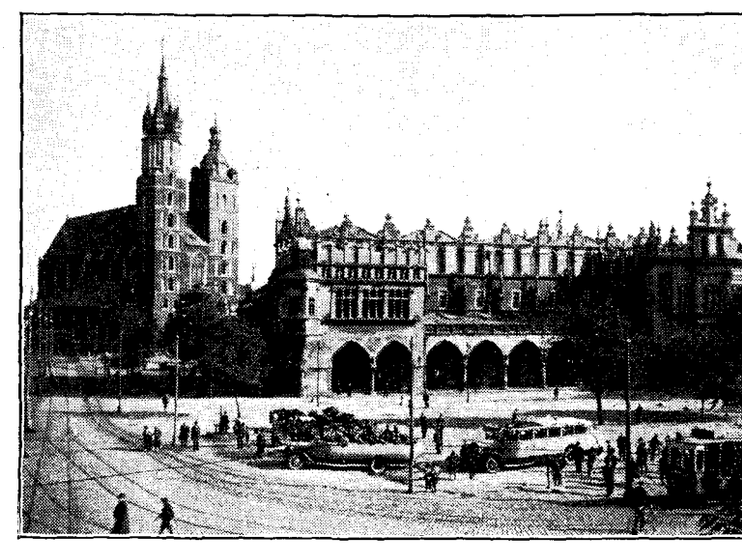
SALZBURG.—Relays **Vienna.**

SOTTENS

677 kc/s, 443.1 metres; 25 kW; and **Geneva, 401 kc/s, 748 metres.— 6.0 a.m. to 6.15**, Gym. **12.15 p.m.**, See **Beromünster.** **12.45**, News. **12.52**, News in German. **1.0**, Concert by the Radio Lausanne Orchestra: Overture, Si j'étais roi (Adam); Canzonetta (d'Ambrosio); Selection from Carmen (Bizet); Un soir (Schmitt); Après l'été (Fl. Schmitt); Humoreque (Dvorák); Rondino on a Beethoven Theme (Kreisler); Gipsy Dance (Bach). **2.0**, Interval. **3.59**, Time Signal from Neuchâtel Observatory. **4.0**, Concert by the Station Orchestra; Conductor, Echenard: Overture, Raymond (Thomas); Suite Savoyarde (Chanaud); Selection from Countess Maritza (Kálmán); Joyeuses fileuses (Gillet); Sonne und Erde (Bayer). **4.45**, Records. **5.15**, Concert (contd.): American March (Sousa); Two Pieces (Middleton); Americana (Thruban); Two Negro Spirituals; Rhapsody, Virginia (Wood). **6.0**, Literary Programme. **6.30**, Light Music by the Radio Lausanne Orchestra. **7.30 to 9.15, See Beromünster. 9.15**, News. **9.22**, News in German. **9.30**, See **Beromünster.** **10.15** (approx.), Close Down.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 **kW.—5.35 a.m.**, Programme for Farmers. **5.45**, Hymn; Time; Weather. **5.50**, Gym. **6.15**, Records. **6.40**, Time; News. **6.55**, Records. **7.25**, See **Munich.** **8.10**, Weather. **8.15**, Gym. **8.35**, Interval. **9.0 to 9.15**, Programme for Women. **10.0**, News. **10.10**, Recital of Spohr and Riester Songs by Julie Maier (Soprano). **10.35**, Harmonium Solos by Alfred Kaul: Reigen seliger Geister (Gluck); Canzonetta (Bizet); Romance (Reger); Sarabande (Hermann); Gavotte (Kistler); Alla marcia (Reinhard). **11.0**, Records. **11.25**, Post Office Propaganda; Records. **11.55**, Weather. **12 Noon**, Orchestral Concert from **Baden-Baden**; Conductor, Assmus; Overture, Die Abreise (d'Albert); Ballet Music from La Gioconda (Ponchielli); Symphonic Poem, Orpheus (Liszt); Selection from The Mastersingers (Wagner); Hungarian Dances Nos. 5 and 6 (Brahms); Waltz from Der Rosenkavalier (R. Strauss). **1.0**, Time; News. **1.20**, Records: Wedding Music. **1.50**, Time; News. **2.0 to 2.20**, Records. **3.15**, (Mozart); Träumerei (Schumann); Abendlied (Schumann-Hussonmorel); Ballet Music from Romeo and Juliet (Gounod); Overture, Raymond (Thomas). **7.30**, Time; News. **7.45**, Records. **8.0**, Press Review in German; Lottery Results; Announcements. **8.30**, Concert relayed from **Vichy.** **10.0** (approx.), Press Review.



THE NOONDAY FANFARE broadcast from Warsaw comes from the tower of St. Mary's Church, Cracow, seen in the background.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres. —7.45 a.m.**, Service. **8.0**, Weather. **12.30, p.m.**, Weather. **12.45**, Exchange. **12.55**, Time Signal. **1.0**, Concert from **Kalundborg.** **2.0**, Talk. **2.30**, Tenor Song Records. **3.0**, Interval. **5.0**, Weather. **5.5**, Concert of Folk Music, relayed from **Gävle.** **5.20**, Reading. **5.45**, Records. **6.45**, Report. **7.15**, Weather. News. **7.30**, Talk. **7.45**, Orchestral Concert; Conductor: Hellman; Soloists, Tornqvist (Violin) and Christiansen ('Cello): Symphony in E flat (Haydn); Concerto in A minor for Violin and 'Cello (Brahms); Ballet Suite (Reger). **9.15**, Talk: The Brontë Sisters, relayed from **Uppsala, 1,312 kc/s, 228.7 metres.** **9.45**, Weather; News. **10.0**, Concert of Light Music: Overture, The Gipsy Baron (Strauss); German Dances (Haydn); Waltz (de Micheli); Country Gardens (Grainger); Melody from Arlette (de Taeye); Tango from Das kleine Café (Benatzky); Humoresque (Dvorák); Potpourri (Zimmer). **11.0** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.30 a.m.**, Programme from **Bordeaux-Lafayette.** **12 Noon**, Records. **12.45 p.m.**, News. **1.0**, Time; Exchange. **1.5**, Records. **1.15 to 2.0**, See **Paris (Ecole Supérieure).** **3.30**, Concert, relayed from **Vichy.** **4.45**, Talk: Great French Chefs. **5.0**, Orchestral Concert; Conductor and 'Cello Soloist, Roskam: Andalusian March (Krier); Overture, The Bohemian Girl (Balfe); Waltz, Tales from The Vienna Woods (Joh. Strauss); 'Cello Solo; Selection from Rigoletto (Verdi); Piece (Wesly); Musette for Violin and 'Cello (Pfeiffer); Italian Ballet (Bozi). **6.0**, Talk in German. **6.15**, Elocution. **6.30**, Orchestral Concert; Conductor, de Villers: The Jupiter Symphony in C Reading. **3.30**, Sonata in E minor for Violin and Pianoforte (Pfitzner) by Emmy Schech and Alfred Kunzsch, from **Karlsruhe.** **4.0**, Concert by the Philharmonic Orchestra; Conductor, Wallenborn: Overture, Poet and Peasant (Suppé); Rhapsody in B minor (Hartung); Concert Waltz from Blue Eyes (Mackeben); Four Pieces from Das kleine Café (Benatzky); Japanese Overture (Yoshitomo); Waltz-Intermezzo, Wasserspiele (Rusch); Two Pieces (Gabriel-Marie). In the interval at **4.15 to 4.45**, Report from Iffezheim: The Baden-Baden Grand Prix Horse Race. **5.30**, Violin Recital by Willy Kleemann: Suite in Old Style (Reger); Scherzo (Brahms). **6.0**, Jungen im Sturm—Play for Young People (Cay-Dietrich Voss). **6.25**, Concert of Light Music from **Karlsruhe:** Hanni Schoen (Pianoforte), Heddy Stützel (Pianoforte), Georg Valentin Panzer (Viola) and Nico Schnarr (Flute). **7.0**, Open-Air Concert from the Schillerplatz. **7.30**, Programme to be announced. **7.45**, Time; Weather; Report for Farmers. **8.0**, News. **8.15**, See **Berlin (Deutschlandsender).** **9.0**, The Black Forest—Concert by the Station Orchestra, Choir and Soloists; Conductor: Görlich. **10.20**, Time; News; Sports Report. **10.45**, Programme to be announced. **11.0**, Concert of Light Music by the Station Orchestra, Choir and Soloists; Conductor, Görlich. **12 Midnight**, Serenade. **1.0 a.m. (Saturday)**, Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.**, Dance Refrains. **8.30**, News. **8.35**, Popular Songs. **8.45**, Light Orchestral Music. **12 Noon**, Opera Music. **12.15 p.m.**, Operetta Music. **12.30**, News; Exchange. **12.45**, Request Music. **1.0**, Market Prices. **1.5**, Light Orchestral Music. **1.15**, Sound Film Music. **1.30**, Light Orchestral Music. **1.45**, Operetta Songs. **2.0**, Amusement Guide. **6.0**, News. **6.15**, Songs. **6.30**, Tourist Report. **6.35**, Opera Music: Extracts from Tannhäuser (Wagner); Rigoletto (Verdi); Peer Gynt (Grieg); Philémon et Baucis (Gounod). **6.45**, Popular Songs. **7.0**, Sound Film Music. **7.15**, Opera Music: Arias from Hérodiade (Massenet); The Tales of Hoffmann (Offenbach); The Damnation of Faust (Berlioz); Lohengrin (Wagner). **7.30**, News; Racing Results; Wheat Market Report; Exchange. **7.45**, Light Orchestral Music. **8.0**, A Fable (La Fontaine). **8.15**, Orchestral Music: Extracts from La Rédemption (Franck); Danse macabre (Saint-Saëns). **8.30**, Medical Talk. **9.0**, Au Clair de Lune—Fantasy. **9.30**, Military Band Music. **10.0**, Operetta Songs. **10.15**, News. **10.30**, Light Orchestral Music. **11.0**, Duets. **11.15**, Rumbas. **11.30**, Portuguese Songs. **11.50**, Ensemble Music. **12 Midnight**, News; Announcements. **12.5 a.m. (Saturday)**, Au Caveau de Minuit—Fantasy. **12.15**, Operetta Music: Selection from Marietta (O. Straus); Ciboulette (Hahn). **12.30** (approx.), Close Down.

TRONDHEIM. — Relays **Oslo. TURIN.**— Relays **Milan.**

VATICAN CITY

15,120 kc/s, 19.84 metres; 10 kW. **(Morning), 5,970 kc/s, 50.26 metres (Evening).—11.0 to 11.15 a.m.**, Religious Information in German. **8.0 to 8.15 p.m.**, Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz,** and **Salzburg, 1,294 kc/s, 231.8 metres.—9.0 a.m.**, News. **9.20**, Market Prices. **9.30**, Weather. **10.50**, Water Level. **11.30**, Records. **11.55**, Weather. **12 Noon**, Concert by the Vienna Symphony Orchestra; Conductor, Christoph: Overture, Sakuntala (Goldmark); Polovtsian Dances (Borodin); Norwegian Rhapsody (Svendsen); Tasso (Liszt); Overture, The Hebrides (Mendelssohn); Airs from Der Kuhreigen (Kienzl); Suite (Coleridge-Taylor); Coronation March from The Prophet (Meyerbeer). In the Interval at **1.0**, Time; News. **2.0**, Announcements. **3.30**, Time; Weather; Exchange. **3.50**, Programme for Women. **4.10**, Talk: Jenny Lind. **4.35**, News. **4.40**, Talk on Photography. **4.55**, Records: Opera Choruses. **5.40**, Talk: Farming in Denmark. **6.0**, Talk: The Timber Trade. **6.10**, Recital of Songs and Arias by Otto Staeren (Baritone); Three Songs to the Harp (Schubert); An den Mond (Brahms); Minnelied (Brahms); Romance from Don Sébastien (Donizetti); Romance from William Tell (Rossini); Barcarolle from La Gioconda (Ponchielli); Cavatina from Ernani (Verdi); Don Juan's Serenade (Tchaikovsky). **6.40**, Weekly Sports Report. **6.50**, Tourist Report. **7.5**, Travelogue: The Erzberg District. **7.30**, Time; News. **7.40**, Announcements. **8.0**, Poor as a Church Mouse—Comedy in Three Acts (Ladislaus Fodor). **9.45**, Concert by the Vienna Symphony Orchestra; Conductor, Holzer: March (Haupt); Overture, Ein tolles Mädel (Ziehrer); In der Osteria (Stefanides); Strauss Potpourri (Weber); Song from Das kleine Café (Benatzky); Song from Die geschiedene Frau (Fall); Japanese Lullaby (Armandola); Song from A Kiss in Spring (Kálmán); Overture, Gri-Gri (Lincke); Waltz from The Arabian Nights (Joh. Strauss); Potpourri (Friderich). In the Interval at **10.30**, News. **11.45**, Concert by the Adolf Sieberth Quartet. **1.0 a.m. (Saturday)**, Close Down.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.**, Hymn. **6.35**, Records. **6.38**, Gym. **6.53**, Records. **7.5**, News. **7.10**, Records. **7.20**, Hints for Housewives. **7.25 to 7.40**, Announcements. **11.57**, Time Signal. **12 Noon**, Fanfare from St. Mary's Church, Cracow. **12.3 p.m.**, Weather. **12.5**, Press Review. **12.10**, Records. **1.0**, News. **1.5**, Dance Music from **Wilno, 536 kc/s, 559.7 metres.** **1.55**, Labour Exchange. **2.0 to 2.15**, Announcements. **4.0**, Concert by the Echo Mandoline Orchestra; Conductor, Galazka, relayed from **Poznan, 868 kc/s, 345.6 metres.** **4.40**, Violin Recital by Benedetti (on Records). **5.0**, Programme for Invalids, relayed from **Lwow 795 kc/s, 377.4 metres** **5.30**, Warsaw-Lwow Exchange Programme; Luczaj (Bass) and Lefeld (Pianoforte), from **Warsaw**; Griffel (Soprano) and Seredynski (Pianoforte) from **Lwow**: Arias from L'Amico Fritz (Mascagni); Le Rondine (Puccini); Sadko (Rimsky-Korsakov); Ballad (Rubinstein); Song (Szymaninow); Song (Rachmaninov); Soldier's Song and Ballad (Maszynski); Il y a des moments (Wielhorski). **6.0**, Report. **6.15**, Pianoforte Recital by Madame Berkwic, relayed from **Cracow, 986 kc/s, 304.3 metres**: Elégie and Tambourin (Rameau-Godwsky); Prelude, Choral and Fugue (Franck); Two Pieces (Debussy), (a) Jardin sous la pluie, (b) Feux d'artifice. **6.45**, Talk on Aviation. **6.55**, Holiday Hints. **7.0**, Announcements. **7.15**, Dance Records. **7.50**, Sports Notes. **8.0**, Great Thoughts. **8.2**, Letter-Box and Technical Notes. **8.12**, Concert by the Station Symphony Orchestra; Conductor, Latoszewski; Soloist, Maj (Songs): The Nutcracker Suite (Tchaikovsky); Arias from The Flying Dutchman (Wagner), Hamlet (Thomas), The Demon (Rubinstein); Symphony No. 5, in E minor (Tchaikovsky). In the interval, at **8.50**, News: at **9.0**, Fanfare from **Gdynia**: and at **9.2**, Talk for Farmers. **10.0**, Talk: A Day in the Country. **10.15**, Dance Music, relayed from the Café Europe, **Ciechocinek.** **11.0**, Weather for Aviators.

ZURICH.—Relays **Beromünster.**

SATURDAY
SEPTEMBER THE FIRST

ATHLONE

565 kc/s, 531 metres; 60 kW. Relayed by **Dublin, 1,348 kc/s, 222.6 metres;** and **Cork, 1,240 kc/s, 241.9 metres.—1.30 to 2.30 p.m.,** Time Signal; Weather; Exchange; Records. **6.0,** Records. **6.45,** News. **7.0,** Readings. **7.15,** Irish Talk. **7.30,** Time Signal; Concert by the Station Orchestra. **8.0,** Song Recital by Mary Flood (Soprano). **8.15,** Talk by Mrs. Edmund Leamy. **8.30,** Song Recital by Marcus Ruddle (Baritone). **8.45,** Means to an End—Play presented by Flora MacDonald and Company. **9.15,** Concert by the Station Orchestra. **9.50,** Traditional Fiddle Solos by Master Davidson. **10.0,** Variety Programme. **10.30,** Time Signal; News; Weather. **10.40,** Records. **11.0** (approx.), Close Down.

BARCELONA

795 kc/s, 377.4 metres; 5 kW.—**8.15 a.m.,** News; Records. **9.0,** Chimes; Records. **9.20,** News; Records. **10.0,** Obituary. **12 Noon,** Chimes; Weather. **1.0 p.m.,** Programme for Women. **1.45,** Records. **2.30,** Theatre Notes; Records. **3.0,** Announcements; Sextet. Concert. In the interval, Talk. After the Concert, Labour Exchange. **4.0,** Programme for Hospitals. **4.30,** Literary and Musical Request Programme. **5.0,** News; Exchange. **7.0,** Trio Concert. In the interval at **7.30,** News. **8.0,** Request Records. **8.15,** Medical Talk; Request Records. **9.0,** Educational Talk. **9.10,** Records. **9.30,** Medcal Talk. **9.45,** Press Review. **10.0,** Chimes; Weather. **10.5,** Social Notes; Exchange. **10.15,** See **Madrid (EAJ7). 1.0 a.m. (Sunday),** News. **2.0** till Close Down, Programme in English arranged by the International Broadcasting Company of London. **2.0,** Orchestral Music. **2.30,** Variety Concert. **3.0,** I.B.C. Goodnight Melody and Close Down.

BASLE.—Relays **Beromünster.**

BERLIN

DEUTSCHLANDSENDER, 191 kc/s, 1,571 metres; 60 kW.—**5.45 a.m.,** Weather. **5.50,** News. **6.0,** Gym. **6.15,** Motto. **6.20,** See **Königsberg. 7.0,** News. **7.10,** See **Königsberg. 8.0,** Interval. **8.45,** Gym. for Women. **9.0,** Interval. **9.40,** Sports Talk. **10.0,** News. **10.10,** Fairy Play for Children. **10.50,** Programme for Children. **11.15,** Weather. **11.30,** Reading. **11.45,** Talk: Medical Science. **11.55,** Weather. **12 Noon,** See **Breslau. 12.55 p.m.,** Time. **1.0,** Records; Weather. **1.45,** News. **2.0,** Interval. **2.45,** Greetings; Programme Notes. **3.0,** Weather. **3.15,** Handwork for Children. **3.45,** Economic Review. **4.0,** See **Leipzig. 6.0,** Weekly Sports Review. **6.20,** Talk for Workers. **6.40,** Programme Announcements. **6.50,** Carl Maria Holzapfel at the Microphone. **7.0,** Report from Partenkirchen: The International Six Days' Motor Run Results. **7.10,** Reminiscences of the Summer Holidays—Four Sketches. **8.0,** Motto; Weather; News. **8.10,** Indian Summer—Concert: Folk Songs; Mouth Organ Solos; Banjo and Hawaiian Guitar Music; Siegel and his Soloists. **10.0,** News. **10.25,** Talk: August Sport and Play. **10.45,** Weather. **11.0,** Dance Music from **Frankfurt. 12 Midnight,** Close Down.

BERLIN

FUNKSTUNDE, 841 kc/s, 356.7 metres; 100 kW.—**6.0 a.m.,** Hymn; Gym. **6.15,** Weather. **6.20,** See **Königsberg. 7.0,** News. **7.10,** See **Königsberg 8.0,** Gym. **8.20,** Interval. **10.0,** News. **10.10,** Market Prices. **10.30,** Records; Announcements. **11.30;** Interval. **12 Noon,** Concert from **Königsberg.** In the interval at **12.30 p.m.,** Weather. **1.0,** News. **1.15,** Records of Marches and Dances: Mussinan-Marsch (Carl); Turner-Marsch (Christ); Polka (Niel); Marching Song (Fürchtenicht); Minuet-Waltz (Meissner); Dance, The Skaters (Jours); Polka (Kollo); Polka (Wappaus); Hungarian Rheinländer (Kahnt); Rheinlander, Wiener Puppen (Mühlenau); March, Feuert los (Holzmann); March, El Capitan (Sousa). **2.0,** Weather; News; Water Level. **2.15,** Records of Operetta Music: Overture, Poet and Peasant (Suppé); Song from Gasparone (Millöcker); Selection from the Geisha (Jones); Overture, Flotte Bursche (Suppé); Song from Wild Violets (Stolz); Overture, A Night in Venice (Strauss); Dream Waltz from Der Feldprediger (Millöcker); Potpourri of Strauss Operetta Music (Schlögel); Overture, Die schöne Galathée (Suppé). **3.0,** Market Prices. **3.20,** Interval. **3.35,** Three Radio Reports: (a) A Sea Journey to England, (b) A Week in the Franconian Forests, (c) Twenty-Four Hours on the Baltic. **4.0,** Concert by the Small Station Orchestra: Waltz, Briefe aus Wien (Wetzel); Serenade: Sonne, Mond und Sterne (Meisel); Liebeslied (Schmalstich); Saxophone Quartet: (a) Der Lindenbaum, (b) Sah ein Knab' ein Röslein stehn, (c) Die Loreley; Overture, Indra (Flotow); La mia cara danza (de Micheli); Selection from Gasparone (Millöcker); Dialogue: Actors of the Young Generation; Waltz, Jubel und Trubel (Lautenschläger); Liebeslied (Rust); Saxophone Quartet: (a) Hindu Song (Rimsky-Korsakov), (b) Humoresque (Bumcke); Rubin und Smaragd (Kick-Schmidt); Rondo (Gabriel-Marie); Saxophone Quartet: (a) Swedish Dance, (b) Among Roses (Laké); Springtanz (Schütte); Russian Dance (Bullerian). **6.0,** Announcements. **6.5,** Review of Sports Events. **6.20,** Reaping the Oats—Play (Hahn), with Music by Jentsch. **7.0,** Humperdinck Concert by the Zernick Quartet; Charlotte Schultze-Stiefbold (Soprano); Talk by Humperdinck's Son: Memories of my Father; Four Children's Songs: (a) Im Freien zu singen, (b) Wiegenlied, (c) Die Schwalbe, (d) Rosenringel; Three Songs: (a) Wiegenlied, (b) Das Waldvöglein, (c) Die Lerche; String Quartet in G. **7.40,** Echoes of the Day. **8.0,** News. **8.15,** An 1874 First Night; A Carnival in Rome—Operetta in Four Acts (Joh. Strauss), followed by Programme of Dance Music and Variety Items; The Station Orchestra and Choir; Conductor, Karl Knauer. In the interval at **10.20,** News. **1.0 a.m. (Sunday),** Close Down.

BERNE.—Relays **Beromünster.**

BEROMUNSTER

556 kc/s, 539.6 metres; 60 kW.—**8.45 a.m.,** Commentary on the Cycle Tour of Switzerland. **9.15,** Interval. **12.15 p.m.,** Programme to be announced. **2.30,** Interval. **3.15** (approx.), Commentary on the Cycle Tour of Switzerland. **4.0,** See **Monte Ceneri. 6.0,** Records. **6.30,** Talk for Young People. **7.0,** Chimes; Time; Weather; Market Prices. **7.15,** Records. **7.30,** Commentary on the Cycle Tour of Switzerland. **8.0,** See **Sottens. 11.0** (approx.), Close Down.

BODEN.—Relays **Stockholm. BODO.**—Relays **Oslo.**

BRATISLAVA

1,004 kc/s, 298.8 metres; 13.5 kW.—**6.0 a.m. to 7.15,** See **Prague. 9.55,** Announcements. **10.0,** See **Prague. 10.25,** News in Hungarian. **10.30,** Records. **11.0,** Water Level. **11.5,** See **Prague. 12.5 p.m.,** Talk for Farmers. **12.10,** Local News in Slovak. **12.15,** Record. **12.20,** See **Prague. 1.40,** News; Weather in German and Hungarian. **1.50 to 2.0,** See **Prague. 3.15,** See **Prague. 5.40,** Topical Talk. **5.50,** Record. **5.55,** Talk for Workers. **6.10,** Notes for Housewives. **6.15,** Hungarian Transmission. Play with Music. (Juhász). **6.55,** See **Prague. 7.10,** Talk. **7.25,** Military Band. Conductor, Langer. Yugoslav March (Fucik); Introduction to the third act of The Devil and Kate (Dvorák); Walzer, Seid umschlungen Millionen (Joh. Strauss); Song (Langer); Overture, The Caliph of Bagdad (Boieldieu); Serenade (Hellmann); Selection from Der Freischütz (Weber). **8.15,** Play in One Act (Tajovsky), relayed from **Košice, 1,113 kc/s, 269.5 metres. 9.0,** See **Prague. 9.15,** See **Moravská-Ostrava. 10.0,** See **Prague. 10.15,** News in Hungarian. **10.30 to 11.30,** See **Moravská-Ostrava. 11.30** (approx.), Close Down.

BREMEN.—Relays **Hamburg.**

BRESLAU

950 kc/s, 315.8 metres; 60 kW. Relayed by **Gleiwitz, 1,231 kc/s, 243.7 metres.—5.0 a.m.,** Hymn; Motto. **5.10,** Records. In the interval at **5.40,** Time; Weather. **6.0,** Time; Weather; Gym. **6.25,** Concert by the Silesian Orchestra; Conductor, Weisshaupt. **7.0,** Time; News. **7.15,** Concert (contd.). **8.0,** Cookery Hints. **8.15,** Concert (contd.). **9.0,** Time; News; Local News. **10.40 to 11.10,** Programme for Children. **11.30,** Time; News; Water Level. **12 Noon,** Concert by a Military Trumpet Band; Conductor, Spagl: Military March; Overture, Fedora (Tchaikovsky); March, Vindobona (Komzak); Selection from The Mastersingers (Wagner); Die Wolgaschlepper (Kubat); Marsch der Lanzenreiter (Fischer); German Dances (Schubert); March (Backer-Heinlein); Solothurner Rhapsodie No. 7 (Kaempfert). In the interval at **12.30 p.m.,** Time; Weather. **1.45,** Concert (contd.): Cavalry March (Moltke); Auf- und Abzug der Gnomengarde (Watzlaff); Overture, Wallenstein Lager (Rosenkranz); Argonnermarsch (Männecke); Selection from Die Winterreise (Schubert); Uhlan March (Kermbach); March (Mühlberger); March (Roland). **2.20,** Exchange. **2.25,** Post Office Propaganda; Records. **2.50,** Market Prices. **3.10,** Concert by Zanke (Flute) and Janz (Violin): Caprice (Zanke); Scherzo (Karg-Elert); Irish Air (Scott); Slav Songs and Dances (Slavenski); Trio for Flute, Violin, and Pianoforte, Op. 56 (Cui). **3.40,** Talk: The Modern Operetta. **4.0,** See **Berlin (Funkstunde). 6.0,** Book Review. **6.20,** Programme to be announced. **6.30,** Animal Talk: The Horned Owl. **6.50,** Programme Announcements; Weather. **7.0,** Chimes. **7.5,** Talk: The Retreat from the Marne. **7.30,** Programme Announcements; Records. **8.0,** Today's News. **8.10,** Variety Programme, relayed from the Schlesische Hof, Friedland. The Station Dramatic Society, Orchestra, and Choir, conducted by Rischka, and Soloists. **10.20,** Time; News; Local News; Sports Notes. **10.45,** Dance Music by the Station Band, relayed from the Schlesische Hof, Friedland; Conductor, Ilgner. **2.0 a.m.** (approx.), Close Down.

BRNO

922 kc/s, 325.4 metres; 32 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0 to 10.25,** See **Prague. 10.25,** Records. **11.5,** See **Prague. 1.30 p.m.,** Economic Talk. **1.40,** See **Prague. 2.0 to 2.5,** Market Prices. **3.15.** See **Prague. 5.40,** Announcements. **5.45,** German Transmission: Songs of the Goethe Period Recital by Edith Lenar (Soprano). **8.20,** Recital of Operetta Arias by Ruzickova. **6.35,** Records. **6.45,** Talk for Workers. **6.55,** See **Prague. 9.15,** See **Moravská-Ostrava. 10.0,** See **Prague. 10.30,** See **Moravská-Ostrava. 11.30** (approx.), Close Down.

BRUSSELS (No. 1)

620 kc/s, 483.9 metres; 15 kW.—**11.55 a.m.,** Weather. **12 Noon,** Orchestral Concert of Light Music; Soloist, Mme. Heckx-Vercamer (Songs): March (Vaulet); Kaiserwalzer (Strauss); Overture, The Nuremberg Doll (Adam); Extase (Ganne); Selection from Ta bouche (Yvain); Arias from Romeo and Juliet (Gounod); Gianni Schicchi (Puccini) and La Traviata (Verdi); Piece (Neudo); Extracts from The Sleeping Beauty (Tchaikovsky). **1.0 p.m.,** News. **1.10,** Records. **2.0,** Interval. **4.40,** Announcements. **4.45,** Talk: The Agricultural Section of the International Exhibition in Brussels, 1935. **5.0,** Dance Music. **6.0,** Literary Talk: Henri Simon. **6.15,** Concert by the Symphony Orchestra; Conductor, Meulemans; Spanish Fantasy (Gevaert); Aria from Quentin Durward (Gevaert); Pièces brèves (Ropartz); Duet from Hamlet (Thomas). **7.15,** Records: Spanish Caprice (Rimsky-Korsakov). **7.30,** Science Review; Wireless Notes. **8.0,** Records: Phaëton (Saint-Saëns). **8.15,** Report: From Brussels to Antwerp by Air. **8.45,** Revue with Orchestral Music (Libeau). **9.30,** Request Concert. **10.0,** News; Commentary on the Finale of the Air Pageant from the Evere Aerodrome. **10.45,** Concert by Schnyders' Orchestra, relayed from L'Ancienne Belgique. **12 Midnight,** Close Down.

BRUSSELS (No. 2)

932 kc/s, 321.9 metres; 15 kW. Programme in Flemish.—**11.57 a.m.,** Weather. **12 Noon,** Records: Iolanthe—Opera (Sullivan). **1.0 p.m.,** News. **1.10,** Orchestral Concert; Soloist, Loyens (Tenor): Introduction, The Snow King (Noack); Overture, Le Puits d'amour (Balfe); Waltz (Ziehrer); Selection from Hans, the Flute Player (Ganne); Four Songs (Andelhof); Offenbach Potpourri (Conradi). **2.0,** Interval. **4.40,** Announcements. **4.45,** Talk. **5.0,** Symphony Concert: Overture, Athalia (Mendelssohn); Symphony in B flat (Schubert); Ballet Suite No. 2 (Glück). **6.0,** Records. **6.15,** Mme. E. Boeye-Willems reads from her own Works. **6.30,** Records. **7.30,** News; Film Review. **7.55,** News. **8.0,** Promenade Concert, relayed from **London.** In the interval at **9.35,** Kreisler Records. **10.40,** Concert from **Brussels (No. 1). 12 Midnight** (approx.), Close Down.

BUCHAREST

823 kc/s, 364.5 metres; 12 kW.—**12 Noon,** Water-Level; Records. **12.45 p.m.,** Amusement Guide; Exchange; Records of Light Music. **1.15,** Time; News. **1.40,** Records of Light Music. **5.0,** Time; Weather. **5.5,** Dance Music by the Corologos Jazz Band. **6.0,** News. **6.15,** Dance Music (contd.). **7.0,** Educational Talk. **7.20,** Records. **7.45,** Talk. **8.0,** Slav Music by the Station Orchestra. **9.0,** Letter-box. **9.20,** Waltzes and Overtures by the Station Orchestra. **10.0,** News. **10.30,** Light Music.

BUDAPEST

546 kc/s, 549.5 metres; 120 kW.—**6.45 a.m.,** Gym. **9.45,** News. **10.0,** Talk. **10.40,** Talk for Gardeners. **11.10,** Water Level. **12 Noon,** Chimes. **12.5 p.m.,** Concert. **2.30,** Festival Week Programme, relayed from Szombathely. **4.0,** Talk for Young People. **5.0,** Talk. **5.30,** Recital by Margit Timko (Pianoforte). **6.0,** Announcements. **6.30,** Military Band Concert. **7.45,** Talk. **8.15,** Musical Play. **10.30,** News. **10.50,** Concert by the Farkas Cigány Band from the Café Bodo.

CASSEL.—Relays **Frankfurt.**

COLOGNE

658 kc/s, 455.9 metres; 60 kW.—**5.30 a.m.,** Hymn; Records. **6.5,** Gym. **6.25,** See **Breslau. 6.50,** Hymn. **7.0** (approx.), News; Reading. **7.15,** See **Breslau. 8.0,** Time; Weather; Water Level. **8.5,** Gym. for Women. **8.20,** Discussion for Housewives. **8.35,** Interval. **10.0,** Time; News; Water Level. **10.10,** Programme for Children. **10.30,** Concert by the Fröhliche Fünf; Soloists, Artur Rood (Baritone), Gertrud Maria Kisselbach (Violin), Erich Rummel (Pianoforte): Prelude (Kéler-Béla); Serenade, Tausend rote Rosen blühn (Meisel); Waltz, Fideles Wien (Komzak); Heinzelmännchens Hochzeit (Köpping); Song, Mädel, ich bin dir so gut (Enders); Als wir marschierten (Hagen); Ländler for Violin and Pianoforte; Three Songs (Trunk), In meiner Heimat, Die Nachtigallen, An mein Weib; Serenade for Violin and Pianoforte (Lemacher); Two Songs (Haas), Das Glück, Auf blauer Himmelsaue; Song, Du mein süss verschlafen Mädchen (Siegel). **11.30,** Post Office Propaganda; Records. **12 Noon,** Wind Instrument Orchestra; Conductor, Warwas. News in the intervals at **12.45** and **1.45. 2.0,** Records. **2.45,** Variety. **3.30,** Time; Exchange. **3.45,** Talk. **4.0,** Concert of Light Music; The Station Chamber Orchestra; Conductor, Hartmann: Prelude, Prince Methusaleh (Strauss); Waltz, Grubenlichter (Zeller); Selection, Die Fledermaus (Strauss); Mazurka, Marietta (Millöcker); Gallop, In Saus und Braus (Millöcker); Potpourri of Hellmesberger Operetta Music (Ischpold). **5.0,** Talk: The Gustav-Lübke Museum at Hamm. **5.15,** Songs and Music. **5.45,** Reading: Tales of Westphalia. **6.0,** September—Sequence (Kohlhaas and Häuschen). **6.40,** Topical Talk. **6.50,** Time; Weather; Exchange; Sports Notes. **7.0,** Concert by the Station Orchestra; Conductor, Kühn. **8.0,** News; Local Review. **8.15,** A Summer's Night with Paul Lincke—Concert from the Tonhalle Garten, Düsseldorf; The Düsseldorf Concert Orchestra; Conductor, Paul Lincke; The Cologne Station Orchestra; Conductor, Eysoldt; Elsa Duhr (Soprano), Josef Schömmer (Tenor). **10.0,** News. **10.30** (approx.), Dance Music from **Leipzig. 12 Midnight,** Close Down.

COPENHAGEN.—Relays **Kalundborg. CORK.**—Relays **Athlone. DANZIG.**—Relays **Königsberg. DRESDEN.**—Relays **Leipzig.**

FECAMP

1,456 kc/s, 206 metres; 10 kW.—**11.30 a.m. to 12 Noon,** Programme in English, arranged by the International Broadcasting Company of London: Dance Music. **12 Noon to 4.30 p.m.,** Programme in French. **4.30 to 6.0,** Programme in English, arranged by the I.B.C. **4.30,** Tunbridge Wells, Isle of Thanet, Dover and Folkestone Concert; Part I: Russian Music. **5.0,** Part II: Dance Music. **5.30,** Part III: Light Music. **6.0 to 11.0,** Programme in French. **11.0** till Close Down, Programme in English, arranged by the I.B.C. **11.0,** Vaudeville. **11.30,** Concert, arranged by the I.B.C. (Ireland), Ltd.: Music from Opera. **12 Midnight,** Dance Music. **12.15 a.m. (Sunday),** Dance Music. **12.30,** I.B.C. Time Signal. **12.31,** Club Concert for Birkenhead and New Brighton Listeners: Dance Music. **1.0,** I.B.C. Goodnight Melody and Close Down.

FLENSBURG.—Relays **Hamburg. FLORENCE.**—Relays **Milan.**

FRANKFURT

1,195 kc/s, 251 metres; 17 kW.—**5.45 a.m.,** Hymn; Time; Weather. **5.50,** Gym. **6.40,** Time; News. **6.55,** See **Stuttgart. 8.10,** Water Level; Weather. **8.15 to 8.35,** Gym. **10.0,** News. **10.10,** A Sequence for Schools. **11.0,** Announcements; Records. **11.30,** Programme Announcements; Exchange; Weather. **11.50,** Announcements. **12 Noon,** See **Munich. 1.0 p.m.,** Time; News. **1.10,** Local News. **1.20,** Orchestral Concert; Conductor, Hoffmann. In the interval at **1.50,** Time; News. **2.30,** Variety Programme from **Kaiserslautern. 3.10,** See **Stuttgart. 3.30,** Weather. **3.40,** Economic Review. **4.0,** See **Berlin (Funkstunde). 6.0,** Talk: Frontier Problems. **6.20,** Weekly Review. **6.35,** Announcements. **6.50,** Time; Weather. **7.0,** Military Band Concert (on Records), relayed from **Mainz. 8.0,** Time; News. **8.10,** Concert. **10.20,** Time; News. **10.30,** Local News; Weather; Sports Report. **10.40,** Report: The Hitler Youth March. **11.0,** Serenade. **12 Midnight,** Records. **2.0 a.m. (Sunday),** Close Down.

FREDRIKSSTAD.—Relays **Oslo. FREIBURG.**—Relays **Stuttgart. GENEVA.**—Relays **Sottens. GENOA.**—Relays **Milan. GLEIWITZ.**—Relays **Breslau. GOTEBORG.**—Relays **Stockholm. GRAZ.**—Relays **Vienna. HAMAR.**—Relays **Oslo.**

HAMBURG

904 kc/s, 331.9 metres; 100 kW. Relayed by **Bremen, Flensburg,** and **Hanover, 1,330 kc/s, 225.6 metres.—5.45 a.m.,** Time; Weather; Programme for Farmers. **6.0,** Gym. **6.15,** Time; Weather. **6.20,** See **Königsberg. 7.0,** Time; Weather; News. **7.10,** See **Königsberg. 8.0,** Weather; Talk for Housewives. **8.10,** Announcements; Records. **10.50,** News. **11.0,** Programme for Young People. **11.30,** See **Königsberg.** In the interval at **12 Noon,** Programme for Housewives; Time; Weather; Shipping Report. **1.0 p.m.,** Exchange. **1.15,** Weather. **1.20,** Musical Programme. **2.15,** News. **2.30,** Records of Wind Instrument Music: Teutonenmarsch (Lüling); Am Lagerfeuer (Siede); Song from Im Reiche des Indra (Lincke); March, Weidmannsheil (Reckling); Down South (Myddleton); Matrosen auf See (Leuschner); Triumphal Marsch (Schattmann). **3.0,** Wireless Notes. **3.15,** Exchange. **3.40,** Shipping; Aviation Notes. **4.0,** See **Berlin (Funkstunde). 5.30,** Ludwig Benninghof reads. **6.0,** Orchestral Records: Overture, Donna Diana (Reznicek); Bravoura Variations (Adam); Poupée valsante (Poldini); Entr'acte from The Arabian Nights (Joh. Strauss); Selection from Der goldene Pierrot (Götze); Faust-Walzer (Gounod-Liszt); Wie nett (Fischer). **6.35,** Military Programme. **6.55,** Weather. **7.0,** Friedrich Silcher Concert; The Silcher Double Quartet; Conductor, Bein; Chamber Orchestra; Conductor, von Sosen; Willy Lantelme (Songs to the Lute): Prelude, Sein Lied (Stierlin); Quartet: (a) Das Herz, (b) Die drei Röslein; Song, S' Blümeli; Folk Melodies after Silcher (arr. Lehnhoff); Quartet: (a) O wie herbe ist das Scheiden, (b) Morgen muss ich fort von hier; Songs:

(a) Das Gedenken, (b) Ade; Wie ist die Welt so schön beim Wandern (Lindemann); Song, Juchhei, dich muss ich haben. **8.0,** News. **8.10,** Strandfest in Rummelshagen—A Humorous Sequence (Tegtmeier-Federan); Male Voice Choir; Conductor, Gregor; the Heinemann Dance Band; and Soloists. **10.0,** News. **10.20,** Musical Programme. **11.0,** Dance Music by the Station Dance Band. **1.0 a.m. (Sunday),** Close Down.

HANOVER.—Relays **Hamburg.**

HILVERSUM

160 kc/s, 1,875 metres; 7 kW. (until **3.40 p.m.**). Transmitted on **Kootwijk,** 50 kW., from **3.40 p.m.—7.40 to 9.40 a.m.,** Programme of the Workers' Radio Society (V.A.R.A.). **7.40,** Records. **9.40,** Religious Programme of the Liberal Protestant Radio Society (V.P.R.O.). **9.55** till Close Down, V.A.R.A. Programme. **9.55,** Concert for Night Workers. **11.40,** Concert of Light Music by the V.A.R.A. Ensemble; Conductor, Bakels: Im D'Zug (Blon); Waltz, Gold and Silver (Lehár); Melody (Taylor); Nights of Gladness (Ancliffe); Extracts from Les cloches de Corneville (Planquette); Records; Waltz, Flattergeister (Strauss); Japanese Puppet Play (Yoshitomo); Grossmütterchen (Langer); Serenade (Heykens); Der Gaukler (Rosey). **12.40 p.m.,** Orchestral Concert of Light Music; Conductor, Van der Horst. **1.40,** Interval. **1.55,** Orchestral Concert of Light Music; Conductor, Wins: Schritte in Zweivierteltakt (Kockert); Valse triste (Berger); Zwei Märchenaugen (Kálmán); La Castilliana (Salter); Melody (Zamenick); Polospiele (Fétras); Weiberl und Weinderl (Fall); National Dances (Mannfred); Sonja (Partos). **2.40,** Film Review. **2.55,** Concert (contd.): Wiener Weisen auf Reisen (Recktenwald); Letzte Liebe (Gungl); Canzonetta (Godard); Melody (Llossas); Melody (Eisemann); Guadiano (de Leur). **3.25,** Interval. **3.40,** Records. **4.20,** Talk. **4.40,** Concert by the V.A.R.A. Mandoline Ensemble; Records. **5.20,** Talk. **5.40,** Literary Talk. **6.0,** Song Recital by Busch. **6.40,** Talk. **7.0,** Records. **7.10,** Talk. **7.15,** Records. **7.40,** Announcements. **7.43,** Concert by the V.A.R.A. Orchestra, from **Amersfoort;** Conductor, de Groot; Soloist, Lammen (Bass). **8.40,** Talk. **9.10,** Organ Recital by Jong. **9.40,** Press Review; Announcements. **9.55,** Orchestral Concert from **Amersfoort;** Conductor, v.d. Horst; Soloist, Booy (Songs). **10.40,** Records. **11.40,** Close Down.

HORBY.—Relays **Stockholm.**

HUIZEN

995 kc/s, 301.5 metres; 7 kW. (until **6.40 p.m.**), 20 kW. from **6.40 p.m.** Programme of the Catholic Radio Society (K.R.O.). **7.40 a.m.,** Records. **8.55,** Interval. **9.40,** Records. **10.10,** Concert. **10.40,** Records. **11.10,** Religious Address. **11.40,** Police Notes. **11.55,** Concert by the K.R.O. Boys; Conductor, Lustenhouwer: Vive la France (Warren); Overture, Das blaue Bild (Lincke); Herbststimmung (Lincke); Anno dazumal (Morena); Jazz Caricature (Offenbach-Ralph); La Gitana (Lopez); Records; Echos d'España (Dolz); Potpourri (Komzák); Melody (Kudritzky); Finale. In the interval, Announcements. **1.25 p.m.,** Interval. **1.40,** Programme for Young People. **2.10,** Records. **2.40,** Programme for Children. **3.40,** Jewish Programme. **4.40,** Concert by the K.R.O. Orchestra; Conductor, van 't Woud: March (Blankenburg); Overture, Marinarella (Fucik); Selection from Frederika (Lehár); March (Sousa). **5.10,** Talk. **5.25,** Concert (contd.): Berlin, wie es weint und lacht (Conradi); Suite (Wesly); Tesoro mio (Becucci); Schweizer Schützengilde (Zimmer). **6.0,** Press Review. **6.25,** Concert (contd.): Selection from The Rose of Stamboul (Fall). **6.40,** Police Notes. **6.55,** Talk. **7.15,** Records. **7.40,** Concert of Light Music by the K.R.O. Boys; Conductor, Lustenhouwer. **8.10,** Press Review. **8.15,** Meneer de Directeur—Play (Halass). **8.45,** Records. **8.55,** Cabaret by the Richard Schut Ensemble. **9.10,** Recitation. **9.25,** Concert of Light Music by the K.R.O. Boys; Conductor, Lustenhouwer. **10.10,** Press Review. **10.15,** Cabaret by the Richard Schut Ensemble. **10.30,** Records. **11.40,** Close Down.

INNSBRUCK.—Relays **Vienna.**

KALUNDBORG

238 kc/s, 1,261 metres; 75 kW. Relayed by **Copenhagen, 1,176 kc/s, 255.1 metres;** and **Skamlebaek, 49.5 metres.—7.0 a.m.,** Gym. **7.27,** Weather. **8.30,** Service from Copenhagen Cathedral. **11.0,** Weather. **11.10,** Fish Market Prices. **11.15 to 11.45,** Programme for Schools. **12 Noon,** Chimes from the Town Hall; Weather. **12.5 p.m.,** Concert by the Bendix String Ensemble from the Wivex Restaurant. **2.0,** Interval. **2.30,** Vocal Records. **3.0,** Reading. **3.30,** Concert by Louis Preils' Instrumental Ensemble; Soloist, Helge Rungwald (Songs): March (Varadi); Extract from The Merrymakers (Coates); Serenade (Heykens); Cuban Love Song (Hugh-Fields); Scottish Fantasy (Nussbaum); Cantos de amor (Alonso); Rhapsody (Gade); Piece (Breuer); English Songs: Somewhere a Voice is Calling, The World is waiting for the Sunrise (Seitz), Grey Eyes (Philips); I heard you singing (Coates), A Bowl of Roses (Clarke), Sussex by the Sea (Higgs); Patsy (Myddleton); Waltz (Matys); Melody (Rasbach); Extracts from Bolero (Rainger); Intermezzo (Savino); Gipsy Romance (Kierulff); Here comes the Sun (Woods); Foxtrot (Ravicz), **5.30,** Exchange. **5.42,** A Poem. **5.45,** Talk. **6.15,** French Lesson. **6.45,** Weather. **7.0,** News. **7.15,** Time Signal. **7.30,** Talk: Technique and Trade. **8.0,** Chimes from the Town Tall. **8.5,** Musical and Literary Programme; Fischer (Pianoforte), Connie Claire (Readings), Juhl (Songs): Pianoforte Solos: Four Pieces from Akvareller (Gade): (a) Caprice, (b) Romance, (c) Novellette, (d) Scherzo; Readings; Five Ballads; Pianoforte Solo: Three Dances (Lumbye). **9.0,** Concert by the Station Orchestra; Conductor, Mahler: Overture and Polka from Schwanda the Piper (Weinberger); Two Pieces from the Bunte Suite (Toch); Ballet Music from The Mask (Hubay); Hungarian Rhapsody No. 6 (Liszt). **9.45,** Vocal Duets by Erna Schröder and Kiss Gregers. **10.0,** News. **10.15,** Viennese Operetta by the Station Orchestra; Conductor, Mahler: March (Suppé); Three Pieces (Lehár): (a) Dance from Tatjana, (b) Prelude to Eva, (c) Hungarian March from Gipsy Blood; Waltz from Die Faschingsfee (Kálmán); Overture, A Waltz Dream (O. Straus). **11.0,** Dance Music from the Nimb. In the interval at **12 Midnight,** Chimes. **12.15 a.m. (Sunday),** Close Down.

KIEL.—Relays **Hamburg.** **KLAGENFURT.**—Relays **Vienna.**

KONIGSBERG

1,031 kc/s, 291 metres; 60 kW. Relayed by **Danzig, 1,303 kc/s, 230.2 metres.—5.0 a.m.,** Records. **5.50,** Weather. **6.0,** Gym. **6.20,** Military Band Concert; Conductor, Kosemund. **7.0,** News. **7.10,** Concert (contd.). **8.0,** Service. **8.30 to 9.0,** Gym. for Women. **10.40,** News. **10.55,** Weather. **11.30,** Concert by the Small Station Orchestra; Conductor, Eugen Wilcken. In the Intervals at **12 Noon** and **12.30 p.m.,** Weather. **1.0,** Time; Weather. **1.5,** Records. In the Intervals at **1.20** and **2.0,** News. **2.30,** Post Office Propaganda; Records. **3.0,** Market Prices; Exchange. **3.20,** Programme for Women. **3.30,** Handwork for Children. **4.0,** Concert by the Small Station Orchestra; Conductor, Wilcken: Homage March from Sigurd Jorsalfar (Grieg); Overture, Im Hochland (Gade); Norwegian Dances (Grieg); Valse triste, Cradle Song and Polonaise (Sibelius); Rhapsody (Atterberg); Nordische Sennfahrt (Gade); Piece (Hartmann); In the Fjords of Norway (Frederiksen); Romance and Polonaise (Svendsen). In the Interval at **5.0,** Road Report. **5.45,** Talk: Ulrich von Hutten. **6.0,** Wind Instrument Concert from the Tiergarten; Conductors, Voigt and Iwan: March, Voran die Polizeil (Voigt); Waltz, Neu Wien (Joh. Strauss); Fridericus Rex (Rhode); Waldteufelein (Reckling); Aus der Jugendzeit (Friedmann); East Prussian Folk Song (Iwan); Für Freiheit, Vaterland, und Ehr (Iwan). In the Interval at **6.15,** Market Prices. **7.0,** A Trip with Dorothy—Humorous Sketch (Witt-Neumann); Music by Neumann. **7.30,** German Folk Songs by a Horn Quartet: Drauss ist alles so prächtig (Silcher); Am Brunnen vor dem Tore (Schubert): Was glänzt dort im Walde (Weber); Sah ein Knab ein Röslein stehn (Schubert); Wem Gott ein braves Lieb beschert (Reinecke); Aennchen von Tharau (Silcher); Wohlauf noch getrunken (Schumann); Nun schlafen die Vöglein (Reinecke); Ach wie ist's möglich dann (Böhmer); Was ist des Deutschen Vaterland (Reichardt); Folk Song, Ich hab mich ergeben; Nun ruhen alle Wälder (Isaac). **8.0,** News. **8.10,** Part Relay of the Schichau Association Festival from **Elbing. 9.0,** Concert by the Opera House Orchestra; Conductor, Brückner: Overture, Euryanthe (Weber); Dorfschwalben aus Oesterreich (Jos. Strauss); Selection from Ariadne auf Naxos (Richard Strauss); Polonaise in E (Liszt). **10.0,** News; Sports Notes. **10.30,** Records. **11.0,** See **Hamburg. 12.30 a.m. (Sunday),** Close Down.

KOSICE.—Relays **Prague.**

LAHTI

166 kc/s, 1,807 metres; 40 kW. Relayed by **Helsinki, 895 kc/s, 335.2 metres.—7.5 to 7.20 a.m.,** Service in Swedish. **7.30 to 7.45,** Service in Finnish. **11.0,** Exchange. **11.5,** Records. **11.30,** Exchange. **11.45,** News in Finnish and Swedish. **11.59,** Time; Weather. **4.0 p.m.,** Records. **5.0,** Talk. **5.30,** Talks. **5.50,** News in Finnish. **5.59,** Time; Weather. **6.10,** News. **6.15,** Talk. **6.35,** Song Recital by Lyyli Siukola. **7.0,** A play (Agapetus). **7.30,** Concert by the Station Orchestra. Conductor, Linko: Air from Madame Butterfly (Puccini); Piece (Lisen): Melody (Sinvo); Idylle de soir d'été (Merikanto): March (Similä). In the interval at **7.55,** Talk. **8.45,** News in Finnish. **9.0,** News in Swedish.

LAUSANNE.—Relays **Sottens.**

LEIPZIG

785 kc/s, 382.2 metres; 120 kW. Relayed by **Dresden, 1,285 kc/s, 233.5 metres.—5.50 a.m.,** Announcements. **6.0,** Gym. **6.25,** See **Breslau. 7.0,** News. **7.15,** See **Breslau. 8.0,** Gym. **8.20 to 9.0,** Records. **9.40,** Economic Notes. **9.45,** Programme Announcements. **9.55,** Weather; Water Level. **11.0,** Announcements; Records. **11.30,** News; Time. **11.40,** Weather. **11.45,** Report for Farmers. **12 Noon,** See **Munich. 1.0 p.m.,** News; Time. **1.10,** Records: Marches and Soldier Songs. **2.0 to 2.15,** News; Exchange; Weather. **3.0,** Programme for Children. **3.45,** Economic Notes. **4.0,** Concert by the Station Orchestra; Conductor, Luh: March (Lossner); Overture, Der Waffenschmied (Lortzing); Two Preludes (Rachmaninov); Pesther-Walzer (Lanner); An Evening in Aranjuez (Schmeling); Two Alsatian Peasant Dances (Merkling); Overture, Gri-Gri (Lincke); Fantasia on the Song, Aus der Jugendzeit (Friedemann); Waltz, A toi (Waldteufel); Selection from Das Dorf ohne Glocke (Künnecke); Radetzky March (Joh. Strauss); Salut d'amour (Elgar); Extase (Ganne); Selection, Martha (Flotow). **5.30,** Weekly Review. **5.45,** Book Review. **6.5,** A Modern Dictionary. **6.20,** Heide—Feez—Sequence (Lepthien), relayed from Halle; The Station Quintet, the Halle Chamber Orchestra and Soloists; Conductor, Fritz Zschicsing. **7.20,** Report from the Fischerstechen. **7.40,** Talk: Maps. **8.0,** News. **8.10,** A Dance Evening—Dance Music, Songs; Humorous Items and Sketches; The Emde Orchestra; Conductor, Schmiedel. In the interval from **10.0 to 10.10,** News; Sports Notes. **12.30 a.m. (Sunday),** Close Down.

LINZ.—Relays **Vienna.**

LUXEMBOURG

230 kc/s, 1,304 metres; 150 kW.—**7.45 a.m.,** Records. **8.0,** News in French; Record; News in German; Record. **12 Noon,** Exchange. **12.2 p.m.,** Concert by the Station Orchestra; Conductor, Pensis: Overture, Les Dragons de Villars (Maillart); Piece (Frederiksen); Selection from Romeo and Juliet (Gounod); Czardas (Michiels); Dance of the Bayadere (Rubinstein); Suite No. 2 from L'Arlésienne (Bizet); Torno a Surriento (de Curtis); Servus du (Stolz); March (Mertens). In the interval at **12.30,** News in French and German; and at **1.0,** Exchange. **1.15,** Records. **3.45,** Exchange. **6.30** till Close Down, French evening. **6.30,** Variety Concert. **7.30,** Exchange. **7.35,** Records of French Music. In the interval at **8.0,** News in French and German. **9.0,** Economic Review. **9.5,** Concert by the Station Orchestra; Conductor, Pensis; Soloist, Panzera (Songs) and Magdeleine Panzera (Pianoforte): Overture, Prometheus (Beethoven); Songs: Chants d'Auvergne (Canteloube); Andante spianato and Polonaise for Pianoforte and Orchestra (Chopin); Songs: L'Horizon chimérique (Fauré); The Flight of the Bumble Bee (Rimsky-Korsakov); Song, Chanson triste (Dupare); Escales (Ebert). **10.10,** Variety Concert. **11.0,** Dance Records.

MADRID

EAJ7, 1,095 kc/s, 274 metres; 7 kW.—**9.0 a.m.,** News. **10.0,** Exchange; Announcements. **10.30,** Interval. **2.0,** Chimes; Time; Weather; Light Music. **2.30,** Sextet Concert: Overture, Rosamunde (Schubert); Nocturne in A flat (Chopin-Turina); Danse macabre (Saint-Saëns). **3.0,** Amusement Guide; Exchange; Light Music. **3.30,** Sextet Concert: Selection from El barbarillo de Lavapiés (Barbieri); Dances from Prince Igor (Borodin). **4.0,** Light Music. **4.15,** Sextet Concert: Prelude, El anillo de hierro (Marqués); Selection from Aritzari (Zabalza); Selection from The Gipsy Princess (Kálmán). **4.40,** News; Film Review. **5.0,** Interval. **6.0,** Chimes; Light Music. **7.0,** Announcements; News. **7.5** (approx.), Concert—Part I, Band: Viva el rumbo (Zabala); Selection from Doña Francisquita (Vives); The Skaters' Waltz (Waldteufel); Spanish Caprice, Moraima (Espinosa); Selection from The Mastersingers (Wagner); Sevilla (Albéniz) Part II: Musical Comedy Extracts from (a) La picara molinera (Luna), (b) Bohemios (Vives), and (c) Gigantes y cabezudos (Caballero). Part III. Orchestra: Selection from El amor brujo (Falla). **8.30,** News. **8.40** (approx.), Operatic Music: Selection from Il Trovatore (Verdi), Hansel and Gretel (Humperdinck), Siegfried (Wagner), Carmen (Bizet) and Faust (Gounod). **9.15** (approx.), Violin Recital: La précieuse (Couperin-Kreisler); Song without Words (Mendelssohn): Hungarian Dance (Brahms); Serenade (Tchaikovsky); Capriccioso (Ries): Andalusian Romance (Sarasate); Estrellita (Ponce); Tambourin chinois (Kreisler); Strauss Waltz Potpourri. **9.50,** Sports Notes. **10.0,** Chimes; Time; News. **10.15** (approx.), Selection from a Musical Comedy, by the Station Orchestra and Soloists. **12.45 a.m. (Sunday),** News; Time; **1.0,** Chimes and Close Down.

MALMO.—Relays **Stockholm.**

MILAN

814 kc/s, 368.6 metres; 50 kW. Relayed by **Turin, 1,140 kc/s, 263.2 metres; Genoa, 986 kc/s, 304.3 metres;** and **Florence, 610 kc/s, 491.8 metres.—7.30 a.m.,** Gym. **7.45,** Time; News. **8.0,** Interval. **11.30,** Records. **12.45 p.m.,** News. **1.0,** Time; Announcements. **1.5,** Chesi-Zanardelli-Cassone Trio. **1.30,** Records. **1.45,** Chesi-Zanardelli-Cassone Trio. **2.15,** Interval. **4.30,** News. **4.45,** Programme for Children. **5.0,** Notes for Women. **5.10,** Dance Music by the Tavazza Band, relayed from the Pagoda, Turin. **5.55,** Weather. **6.0,** Notes for Farmers; Wheat Market Prices; Lottery Results. **6.10,** Interval. **7.0,** Tourist Report; Announcements. **7.15,** News in Foreign Languages. **8.0,** Time; Announcements; News; Weather; Records. **8.30,** Sports Notes. **8.45,** See **Rome.** In the intervals, Talk. After the Opera, Announcements; News.

MONTE CENERI

1,167 kc/s, 257.1 metres; 15 kW.—**12 Noon,** Announcements. **12.5 p.m.,** Concert by the Station Orchestra. In the interval at **12.29,** Time; Weather. **1.5,** Records. **1.30,** Report for Motorists. **1.40,** Records. **1.50,** Talk for Housewives. **2.0,** Interval. **3.59,** Time. **4.0,** Marches. **4.20,** Tessin Songs by the St. Cecilia Choir; Conductor, Vicari. In the interval at **4.30,** Sports Report. **5.0,** Concert of Waltzes and Polkas. **5.20,** Swiss Music by the Three Minstrels. **6.0,** Interval. **7.45,** News. **8.0,** Popular Music. **8.30,** A Competition. **8.35,** Popular Songs. **9.0,** Talk. **9.25,** Concert of Classical Dances. **10.0,** Report on Cycle Tour of Switzerland. **10.5,** English Dance Records. **10.30,** Close Down.

MORAVSKA-OSTRAVA

1,158 kc/s, 259.1 metres; 11.2 kW.—**6.0 to 7.15 a.m.,** See **Prague. 10.0,** See **Prague. 10.25,** Records. **11.5 to 2.0 p.m.,** See **Prague. 3.15,** See **Prague. 5.40,** Talk: The Last Days of Summer. **5.56,** Topical Talk. **6.0,** Talk for Workers. **6.10,** Talk. **6.20,** Song Recital. **6.40,** Accordion Solos by Siegl. **6.55,** See **Prague. 9.15,** Violin Concerto in D (Brahms), by Cerny and the Station Orchestra. Conductor, Divis. **10.0,** See **Prague. 10.30,** Concert by the Station Orchestra. Conductor, Musil. Overture, Casanova (Lincke); Waltz (Lanner); Modern Ballet Suite (Armandola); Intermezzo (Leopold); Minuet (Kostal); Tango (Kricka); Slovak Dance (Smatek); Descriptive Piece (Volkov); Polka (Kubin); March (Balling). **11.30** (approx.), Close Down.

MOSCOW (No. 1)

174 kc/s, 1,724 metres; 500 kW.—**5.0 a.m.,** News. **5.30,** Fanfare. **5.45,** Gym. **6.15,** Programme Announcements. **7.30,** Records. **9.0,** Musical Programme. **9.55,** Time Signal. **10.0,** News. **10.15,** Request Concert by an Orchestra, Choir and Soloists; Conductor, Svechnikoff. **11.15,** Technical Talk for Farmers. **2.45 p.m.,** News. **3.15,** Concert for Children. **3.55,** Time Signal. **4.0,** News. **4.30,** Communist Party Programme. **5.30,** Military Sketch, with Music. **6.30,** Programme for Collective Farm Workers. **8.0,** Classical Music on Records. **9.0,** Programme in German: Weekly Review, Letter-box; Sports Notes. **9.55,** Chimes. **10.5,** Weekly Review and Letter-box in French. **11.5,** Programme in Spanish: International Day for Young People; Weekly Review.

MOTALA.—Relays **Stockholm.** **MUHLACKER.**—See **Stuttgart.**

MUNICH

740 kc/s, 405.4 metres; 100 kW. Relayed by **Augsburg** and **Nürnberg, 1,267 kc/s, 236.8 metres;** and **Kaiserslautern, 1,195 kc/s, 251 metres.—6.30 a.m.,** Gym. **6.45,** Motto; Records. **7.15,** News. **7.25,** Concert from **Stuttgart. 10.40,** Notes for Farmers. **10.50,** Market Prices. **11.0,** History Talk. **11.20,** News. **11.30,** Post Office Propaganda; Records. **12 Noon,** Concert of Light Music by the Small Station Orchestra; Conductor, Kloss. **1.15 p.m.,** News. **1.25,** Records. **2.0,** News; Exchange. **2.20,** Traumsuse—A Play for Young People (Jo von Wich). **2.45,** Chess for Beginners. **3.15,** Summer Holiday—A Literary Sequence. **3.35,** Weather; Notes for Farmers. **3.50,** Labour Exchange. **4.0** (from **Nürnberg**), Orchestral Concert; Conductor, Böhm; Soloist, Wilhelmine Holzinger-Rauh. **5.30,** Talk: Through Bush and Jungle. **5.50,** Danish Children's Songs—Sequence (Jansen), by Marianne Rau-Höglauer (Soprano). **6.10,** Programme for Young People. **6.30,** Talk: A Night in the Pine Woods of the Palatinate. **6.50,** Weekly Review. **7.0,** Popular Music by the Station Schrammel Orchestra; Soloists, The Brothers Winter (Songs). **8.0,** News. **8.10,** Old Time Favourites by the Station Orchestra; Conductor, Kloss; Soloist, Andersen (Songs). **9.5,** Popular Songs by Grete Deditsch. **9.20,** Three Days of Love—Play (Hawtung), with Music by Eichhorn. **10.0,** News. **10.20,** Variety Programme. **11.0,** Dance Music by the Station Dance Band; Conductor, Aulich. **12 Midnight** (approx.), Close Down.

NAPLES.—Relays **Rome.** **NOTODDEN.**—Relays **Oslo.**

OSLO

260 kc/s, 1,154 metres; 60 kW. Relayed by **Hamar, 519 kc/s, 578 metres;** and **Jeloy, 6,990 kc/s, 42.92 metres.—11.15 a.m.,** Service. **11.50,** Exchange. **12.45 p.m.,** News. **12.55,** Time. **1.0 to 2.0,** Records. In the Interval at **1.15,** Weather; Talk for Farmers, and at **1.45,** Exchange. **5.0,** Concert. **6.0,** Programme for Children. **6.45,** Talk on Economics. **7.0,** Announcements. **7.15,** Weather; News. **7.30,** Time. **7.31,** Popular Norwegian Music. **8.0,** Concert by the Station Orches-

tra; Conductor, Kramm: Concerto in F minor (Locatelli); Suite, Four Ways (Coates). **8.30,** Talk. **9.10,** Concert (contd.): Suite, Coppélia (Delibes); Slav Folk Melodies. **9.35,** Book Review. **9.40,** Weather; News. **10.0,** Topical Talk. **10.15,** Old Dance Music. **11.0,** Dance Records. **12 Midnight** (approx.), Close Down.

OSTERSUND.—Relays **Stockholm.**

PARIS

ECOLE SUPERIEURE, 695 kc/s, 431.7 metres; 7 kW.—**8.0 to 8.30 a.m.,** News. **10.30,** Concert relayed from **Marseilles, 749 kc/s (400.5 m.). 12 Noon,** Tourist Report. **12.15 p.m.,** Quintet Concert relayed from **Paris (Radio Colonial) (19.68 metres). 1.0,** News. **1.15,** Quintet Concert (contd.) **2.0,** Records. **2.30,** Variety Programme: Let's Try—One Act Comedy (Liausu). **6.0,** Variety Items. **6.30,** News. **7.45,** Legal Review. **7.53,** Talk: The Protection of Animals. **8.0,** Records. **8.30,** Symphony Concert by the National Orchestra; Conductor: Desormière; Soloists: Turba Rabier (Songs) and Alice Netchen ('Cello). After the Concert, News. **10.30,** Dance Music by the Mêlé Jazz Band.

PARIS

POSTE PARISIEN, 959 kc/s, 312.8 metres; 100 kW.—**7.10 a.m.,** Fanfare; Records. In the intervals at **7.30** and **8.20,** Press Review, and at **8.45,** Cookery Hints. **12 Noon,** Exchange. **12.5 p.m.,** Cinema Organ Records. **12.15,** Soloist Records. **12.25,** News. **12.35,** Records of Light Music. **1.5,** Exchange. **1.15,** Concert of Light Music by the Station Orchestra: Overture, Rip Van Winkle (Planquette); Wine, Women and Song (Joh. Strauss); Minuet from Le Bourgeois gentilhomme (Lulli); Selection from The Girl in the Taxi (Gilbert); Heure exquise (Hahn); Divertissement (Luigini); Selection from Le Comte Obligado (Moretti). **2.0,** Exchange. **3.15,** Exchange. **3.45,** Exchange. **6.45,** Exchange. **6.49,** Talk for Workers. **6.56,** Selection from Mirella (Gounod) on Records. **7.2,** Topical Talk. **7.10,** News. **7.30,** Extracts from Conversation Piece (Noel Coward) on Records. **8.0,** Interval. **8.10,** Weekly Review. **8.20,** Humorous Musical Programme. In the interval at **8.40,** Exchange. **8.56,** Interval. **9.0,** Dance Music. **10.20,** News; Exchange. **10.30,** Celebrity Vaudeville arranged by the International Broadcasting Company of London. **11.0,** I.B.C. Goodnight Melody; Close Down.

PARIS

RADIO-PARIS, 182 kc/s, 1,648 metres; 75 kW.—**6.45 a.m.,** Gym. **7.0,** Records. **7.15,** News. **7.45,** Gym. **8.0,** Records. **10.15,** Concert, relayed from **Vichy. 12 Noon,** Symphony Concert; Conductor, Labis: Marche des petits Soldats de Plomb (Pierné); Overture, Zampa (Hérold); Suite No. 2 from L'Arlésienne (Bizet); Selection from Lilac Time (Schubert-Berté); Ronde des lutins (Razigade); Ballet Music from Alceste (Gluck); Song and Dance from Le Timbre d'argent (Saint-Saëns); Overture, The Merry Wives of Windsor (Nicolai); Prayer (Boelmann); Piece (Szulc); Selection from Patrie (Bizet); Ballet Music from Isoline (Messager); Scènes pittoresques (Massenet); Waltz, Gold and Silver (Lehár); Selection from La Fille de Madame Angot (Lecocq); Selection from La Vierge (Massenet); Selection from Hans, the Flute Player (Ganne). **3.0,** Programme for Children. **6.20,** Weather; Programme for Farmers; Racing Results. **6.50,** Talk: The Ballet School of the Opéra. **7.0,** Talk: The French Revolution. **7.30,** Topical Talk. **8.0,** Frederica—Operetta (Lehár); Conductor, Labis. In the intervals at **8.30,** News, and at **9.15,** News; Review. **10.30,** Dance Music.

PITTSBURGH

KDKA, 980 kc/s, 306 metres; 50 kW. Relayed by **W8XK** on **48.86 metres** and **25.27 metres.**—**3.0 p.m.,** Edward MacHugh. **3.15,** KDKA Home Forum. **3.30,** Singing Strings. **3.45,** News; Originalities. **4.0,** Bobby and Sue—Helen Irwin. **4.15,** KDKA Kiddies' Klub. **5.0,** Genia Fonariova. **5.15,** Fields and Hall. **5.30,** Vic and Sade. **6.0,** Words and Music. **6.15,** Songfellows. **6.30,** Farm and Home Hour. **7.30,** Royal Hawaiian Orchestra. **8.0,** Tommy Tucker's Orchestra. **8.30,** Saturday's Songsters. **9.0,** Terrace Gardens Orchestra. **9.15,** Platt and Niermann. **9.30,** Chicago Symphony Orchestra. **10.30,** A Recreo—Bill and Alex. **10.45,** Orphan Annie. **11.0,** Time; Temperature; Weather. **11.15,** Goodrich Baseball Résumé. **11.30,** Twenty Fingers Harmony. **11.45,** John Herrick (Baritone). **12 Midnight,** Stanley Metcalfe; News. **12.15 a.m. (Sunday),** Al Williams. **12.30,** Hotel William Penn Orchestra. **1.0 to 6.0,** Popular Programme.

PORSGRUND.—Relays **Oslo.**

PRAGUE

638 kc/s, 470.2 metres; 120 kW.—**6.0 to 7.15 a.m.,** Time; Gym.; Music; News. **10.0,** Records. **10.5,** News. **10.20,** News in German. **10.25,** Records. **11.5,** Concert by Fleischhans Orchestra: Carnival Overture (Glazunov); Selection from Iolanthe (Tchaikovsky); Violin Solo, Falling Leaves (Carena); Japanese Suite (Yoshitomo); Slav Dance No. 8 (Dvorák); Saxophone Solo, Valse triste (Vecsey). **12 Noon,** Time; Programme for Farmers. **12.10 p.m.,** Records. **12.20,** News. **12.30,** Concert by an Orchestra of Unemployed Musicians: March, Le Père la Victoire (Ganne); Overture, The Caliph of Bagdad (Boieldieu); Waltz, from Das Veilchenmädel (Hellmesberger); Tango (Tichy); Polka (Sejk); Waltz (Vipler); ABC Potpourri (Komzák); In the Shadows (Finck); March (Hasler). **1.30,** Industrial Review. **1.40,** Records. **1.50,** Exchange. **1.55 to 2.0,** Exchange; Weather in German. **3.15,** Concert of Light Music. **4.15,** Records. **4.20,** Educational Talk. **4.40,** Concert of Light Music. **5.40,** Local News. **5.45,** Records. **5.50,** Programme for Farmers. **5.55,** Records. **6.0,** Talk: The International Situation. **6.10,** Records. **6.15,** German Transmission: Song Recital; Sports Notes. **6.55,** News in German. **7.0,** Time; News. **7.10,** Humorous Programme. **7.25,** Military Band Concert. **8.15,** Variety Programme. **9.0,** Time; **9.1,** Talk. **9.15,** See **Moravská-Ostrava. 10.0,** Time; News. **10.15,** Records. **10.30,** See **Moravská-Ostrava. 11.30** (approx.), Close Down.

RJUKAN.—Relays **Oslo.**

ROME

Call 1RO, 713 kc/s, 420.8 metres; 50 kW. Relayed by **Naples, 1,104 kc/s, 271.7 metres; Milan (No. 2), 1,348 kc/s, 222.6 metres; Turin (No. 2), 1,357 kc/s, 221.1 metres;** and **2RO, 11,810 kc/s, 25.4 metres.**—**7.30 a.m.,** Gym. **7.45,** Time; News; Announcements. **8.0,** Interval. **12.30 p.m.,** Records. **1.30,** Time; Announcements; News. **1.45,** Records. **2.15,** Interval. **4.30,** Programme for Children: **4.55,** News; Exchange; Lottery Results. **5.10,** Vocal and Instrumental Concert; Soloists, Leonori ('Cello), Elisa Capolino (Soprano), Cavagnis (Tenor) and Elvira Primo (Pianoforte): Sonata in G minor (Eccles); Aria for Soprano from Carmen (Bizet); Duet for Soprano and Tenor from Carmen (Bizet); 'Cello Solos: (a) Elegy (Scharwenka), (b) Slav Dance (Scharwenka); Duet for Soprano and Tenor from Madame Butterfly (Puccini). **5.55,** Weather. **6.0,** Wheat Market Prices. **7.0,** Tourist Notes; Report of the Royal Geographical Society; Announcements. **7.15,** News in Foreign Languages. **8.0,** Time; Announcements; News; Sports Notes. **8.10,** Records. **8.30,** Announcements. **8.45** (approx.), Lakmé—Opera in Three Acts (Delibes). Conductor, Casolari. In the interval, Talk. After the Opera, Announcements; News.

RUYSSELEDE

10,330 kc/s, 29.04 metres; 8 kW.—**7.45 p.m.,** News in French. **8.0,** See **Brussels (No. 2). 9.0,** News in Flemish. **9.15** (approx.), Close Down.

SALZBURG.—Relays **Vienna.**

SCHENECTADY

WGY, 790 kc/s, 379.5 metres; 50 kW. Relayed at intervals by **W2XAF** on **31.48 metres** and by **W2XAD** on **19.56 metres.**—**7.0 p.m.,** Green Brothers Novelty Orchestra. **7.30,** Week-End Review; Musical Variety. **11.40,** Exchange. **12 Midnight,** General Electric Programme. **12.30 a.m. (Sunday),** Hands across the Border. **1.0 to 3.0,** Popular Programme.

SOTTENS

677 kc/s, 443.1 metres; 25 kW.; and **Geneva, 401 kc/s, 748 metres.**—**6.0 a.m. to 6.15,** Gym. **8.45 to 9.15,** See **Beromünster. 12.29 p.m.,** Time Signal from Neuchâtel Observatory. **12.30,** News. **12.37,** News in German. **12.45** (from **Geneva**), Records. **2.0,** Interval. **3.15,** See **Beromünster. 4.0 to 6.0,** See **Monte Ceneri. 6.0 to 7.47,** See **Beromünster. 7.47,** Interlude. **7.59,** Weather. **8.0** (from **Geneva**), Trio in B flat, Op. 99 (Schubert). **8.40,** Concert by the Station Orchestra; Conductor, Echenard: Marche vaudoise (Jaques-Dalcroze); Souvenirs des Alpes (Aubrey-Winter); Waltz (Lauterbach); Symphonic Poem, Helvetia (Scassola). **9.15,** News. **9.22,** News in German. **9.30,** Concert (contd.): Concerto grosso No. 6 (Handel); Selection from Hippolyte et Aricie (Rameau); Serenade No.7 —The Haffner (Mozart). **10.15,** Dance Records. **11.0** (approx.), Close Down.

STOCKHOLM

704 kc/s, 426.1 metres; 55 kW. Relayed by **Boden** and **Ostersund, 413.5 kc/s, 726 metres; Göteborg, 941 kc/s, 318.8 metres; Hörby, 1,131 kc/s, 265.3 metres; Motala, 216 kc/s, 1,389 metres;** and **Sundsvall, 601 kc/s, 499.2 metres.**—**7.45 a.m.,** Service. **8.0,** Weather. **12.30 p.m.,** Weather. **12.45,** Exchange. **12.55,** Time. **1.0,** The Opening of Handicrafts' Week by the Crown Prince. **2.0** (from **Göteborg**), Concert of Light Music. **3.0,** Reading. **3.20,** Variety Programme. **4.0,** Technical Talk. **4.20,** Soloist Concert; Sven Wasmouth (Flute), Borberg (Clarinet and Saxophone): German Folk Song Potpourri (Popp); Caprice (Terschak); Serenade (Popp); Tarantella (Saint-Saëns); Adagio (Bargiel-Buncke); Die schöne Rosmarin (Kreisler); Piece (Wiedoeft); Waltz (Wiedoeft). **5.0,** Weather. **5.5** (from **Göteborg**), Programme for Children. **5.30,** Records. **6.30,** Talk. **7.0,** Music. **7.15,** Weather; News. **7.30,** Report on the Sports Championship, Germany v. Sweden. **8.0,** Old Dance Music. **9.0,** Dance Records. **9.45,** Weather; News. **10.0,** Dance Music. In the interval at **11.10,** Songs by the Wiggen Quartet. **12 Midnight** (approx.), Close Down.

STRASBOURG

859 kc/s, 349.2 metres; 15 kW.—**10.30 a.m.,** Concert, relayed from **Marseilles, 749 kc/s, 400.5 metres. 12 Noon,** Records. **12.45 p.m.,** News. **1.0,** Time; Records. **1.15,** See **Lyons la Doua. 2.0,** Records. **2.45 to 3.0,** Music Talk. **3.30,** Concert, relayed from **Vichy. 4.45,** Talk for Women. **5.0,** Beethoven Concert; Conductor, de Villers; Soloist: Grégoire (Violin): Leonora Overture No. 3; Violin Concerto; Overture, Fidelio. **6.0,** French Lesson. **6.15,** Talk for Gardeners in German. **6.30,** Tourist Talk. **6.45,** Orchestral Concert; Conductor, Roskam: March (Pelloud); Waltz (Aubry); Selection, Das goldene Kreuz (Brüll); Selection from Lischen et Fritzchen (Offenbach); Minuet and Dance Suite (Pierné); Cantabile (Sporck); Selection from Rip (Planquette). **7.30,** Time; News. **7.45,** Announcements. **8.0,** Press Review in German; Lottery Results; Announcements. **8.30,** Military Band Concert, relayed from Le Kiosque du Champ de Mars, Colmar; Conductor, Penin: The Tram (Mougeot); Overture, Morning, Noon and Night (Suppé); Serenade (Goublier); Ballet Music from Etienne Marcel (Saint-Saëns); March from Tannhäuser (Wagner); Waltz (Waldteufel); Suite from L'Arlésienne (Bizet); Le Téméraire (Mougeot). In the interval at **9.30,** Press Review. **10.30,** Dance Music, relayed from Le Caveau de l'Aubette. **12 Midnight** (approx.), Close Down.

STUTTGART

MUHLACKER, 574 kc/s, 522.6 metres; 100 kW.—**5.35,** For Farmers. **5.45,** Choral; Time; Weather. **5.50,** Gym. **6.15,** Records. **6.40,** Time; Announcements; Weather. **6.55,** Concert by the Philharmonic Orchestra, from **Mannheim**; Conductor, Becker. **8.10,** Weather. **8.15,** Gym. **8.35,** Interval. **10.0,** News. **10.10,** Violin and Organ Recital from the Palast-Lichtspiel: Larghetto (Handel); Adagio cantabile (Nardini); Melody (Gluck); Adagio (Locatelli); Grave (Friedemann-Bach). **10.40,** Records: Amina (Lincke); Selection from The Dubarry (Millöcker-Mackeben); Miezekätzchens Nachtparade; Auf-und Abzug der Gnomengarde (Watzlaff); Two Alsatian Peasant Dances (Merkling); Tscherkessischer Zapfenstreich (Machts); Asiatische Wachtparade (Sommerfeld). **11.25,** Post Office Propaganda; Music. **11.55,** Weather. **12 Noon,** Concert from **Königsberg. 1.0 p.m.,** Time; News. **1.20,** Records: Aria, Don Giovanni (Mozart); Aria from Der Wildschütz (Lortzing); Soldatenart (Abt); Prayer from Lohengrin (Wagner); Song from Der Waffenschmied (Lortzing); Prize Song and Aria from The Mastersingers (Wagner). **1.50,** Time; News. **2.0,** Records: Song from Undine (Lortzing); Song from Der Trompeter von Säckingen (Nessler); Italian Song; Recitative and Aria from Das Nachtlager von Granada (Kreutzer); Coronation Scene from Boris Godunov (Mussorgsky); Aria, Freundlich blick ich auf diese und jene. **2.30,** Der Freibeuter—Play for Young People (Rasche). **3.10,** Morse Lessons. **3.30,** Accordion Recital; Conductor, Bucher: Deutschmeister-Regimentsmarsch (Jurek); Waltz, Im schönen Wien (Thöni); Gnomentanz (Erlenwein); Ländler, Was Grossväterchen uns erzählt; Parade der Karussellpferde (Thöni); Ländler, Für lustige Leut' (Helbling); Folk Song Potpourri, Abschied und Wiedersehen; March, Tempo-Tempo (Thöni). **4.0,** Concert. **6.0,** See **Frankfurt. 6.20,** Dance Music. **7.0,** Programme to be announced. **7.55,** Time; Weather. **8.0,** News. **8.5,** Local Review. **8.10,** See **Berlin (Deutschlandsender). 10.20,** Time; News. **10.35,** Announcements. **10.45,** Local News. **11.0,** Dance Music by the Waldmann-Gietmann Band, from Baden-Baden. **12 Midnight,** See **Frankfurt. 2.0 a.m. (Sunday),** Close Down.

SUNDSVALL.—Relays **Stockholm.**

TOULOUSE

913 kc/s, 328.6 metres; 10 kW.—**8.0 a.m.,** Dance Refrains. **8.30,** News. **8.35,** Opera Music. **8.45,** Light Orchestral Music. **12 Noon,** Military Band Music. **12.15 p.m.,** Songs. **12.30,** News; Exchange. **12.45,** Request Music. **1.0,** Market Prices. **1.5,** Sound Film Music. **1.15,** Light Orchestral Music. **1.30,** Popular Songs. **1.45,** Accordion Band Music. **2.0,** Amusement Guide. **6.0,** News. **6.15,** Light Orchestral Music. **6.30,** Operetta Music. **6.45,** Light Orchestral Music. **7.0,** Songs. **7.15,** Light Orchestral Music. **7.30,** News; Racing Results; Wheat Market Prices; Exchange. **7.45,** Hunting Horn Music. **7.50,** Talk. **8.15,** Violin Recital: The Fountains of Arethusa (Szymanowski); Andalusian Romance (Sarasate); Hungarian Dance (Brahms); Tambourin (Leclerc); Hymn to the Sun, from The Golden Cockerel (Rimsky-Korsakov). **8.30,** Popular Songs. **9.0,** Concert Version of Enlevez-moi (Gabaroche). **9.30,** Soloist Programme. **10.0,** Au Caveau de Dix Heures—A Radio Fantasy. **10.15,** News; Announcements. **10.30,** Military Band Music. **11.0,** Request Music. **11.15,** Sound Film Music. **11.30,** Light Orchestral Music. **11.50,** Opera Music: Arias from Don Giovanni (Mozart), Don Quixote (Massenet). **12 Midnight,** News. **12.5 a.m. (Sunday),** Hawaiian Guitar Music. **12.15,** Opera Music. **12.30** (approx.), Close Down.

TRONDHEIM.—Relays **Oslo. TURIN.**—Relays **Milan.**

VATICAN CITY

15,120 kc/s, 19.84 metres; 10 kW. **(Morning); 5,070 kc/s, 50.26 metres (Evening).**—**11.0 to 11.15 a.m.,** Religious Information in Various Languages. **8.0 to 8.15 p.m.,** Religious Information in Italian.

VIENNA

592 kc/s, 506.8 metres; 120 kW. Relayed by **Graz, 886 kc/s, 338.6 metres; Innsbruck, 519 kc/s, 578 metres; Klagenfurt, Linz** and **Salzburg, 1,294 kc/s, 231.8 metres.**—**9.0 a.m.,** News. **9.20,** Market Prices. **10.50,** Water Level; Weather. **11.30,** Talk for Women. **11.55,** Weather. **12 Noon,** Records: Overture, The Thieving Magpie (Rossini); Air from The Gipsy Baron (Joh. Strauss); Polka (Waldteufel); Song; Waltz from Im Reiche des Indra (Lincke); Selection from La vie parisienne (Offenbach); Song from The Count of Luxembourg (Lehár); Melody (Markush); Folk Song Potpourri (Markgraf); Hungarian Rhapsody No. 2 (Liszt). **1.0 p.m.,** Time; News. **1.10,** Records: Akademische Festouvertüre (Brahms); Pictures from an Exhibition (Mussorgsky). **2.0,** Announcements. **2.10,** Records: Adagio from the Partita in G minor (Bach); Gnomenreigen (Liszt); La cathedrale engloutie (Debussy); Prelude (Saint-Saëns); Abendlied (Schumann). **2.30,** Interval **3.0,** Time; Weather; Exchange. **3.15,** Talk in French: France and Her People. **3.40,** Talk: Old Bridges in Bosnia and Herzogovina. **4.5,** News. **4.10,** Reading. **4.40,** Concert by the Vienna Mandoline Orchestra; Conductor, Schmidhuber: Overture, Tancred (Rossini); La Serenata del Paggio (Nani); Minuet from Suite No. 2, L'Arlésienne (Bizet); Three Pieces (Grieg): (a) Albumblatt, (b) Berceuse, (c) Elfentanz; Tanz der Teepuppen (Bass); In a Persian Market (Ketelbey); Amina (Lincke). **5.20,** Talk: A Customs and Excise Conference a Thousand Years Ago. **5.40,** Orchestral Concert; Conductor, Pehm: Overture, Der Waffenschmied (Lortzing); Melody from The Queen of Spades (Tchaikovsky); Styrian Dances (Lanner); Pieces from the Suite, Bilder aus Wien (Pehm); Suite, Meissner Porzellan (Hellmesberger); Waltz, Morgenblätter (Joh. Strauss); Overture, The Three Wishes (Ziehrer). **6.55,** Talk: Gorodok. **7.20,** Time; News. **7.40,** Topical Talk. **8.5,** Tenor Song and Aria Recital by Juljus Patzak: Songs (Schubert): (a) Die Gebüsche, (b) Widerschein, (c) Das Lied im Grünen, (d) Fischerweise; Songs (Wolf): (a) Auf dem grünen Balkon, (b) Bedeckt mich mit Blumen, (c) Wer sein holdes Lieb verloren, (d) Und schläfst du, mein Mädchen, (e) Ach im Maien war's Arias from L'Elisir d'amore (Donizetti); The Force of Destiny (Verdi), and The Girl of the Golden West (Puccini). **8.45,** Report on Records: Prebersee. **9.15,** Das Musikantenmädel—Operetta in Three Acts (Jarno); The Vienna Symphony Orchestra and the Volksoper Choir; Conductor, Holzer. In the interval at **10.30,** News. **11.15,** Dance Music by the Leo Jaritz Jazz Band; Emil Petoff (Songs). **1.0 a.m. (Sunday),** Close Down.

WARSAW

223 kc/s, 1,345 metres; 120 kW.—**6.30 a.m.,** Hymn. **6.35,** Records. **6.38,** Gym. **6.53,** Records. **7.5,** News. **7.10,** Records. **7.20,** Hints for Housewives. **7.25,** Programme Announcements. **7.30,** Announcements. **7.40,** Interval. **11.57,** Time. **12 Noon,** Fanfare from St. Mary's Church, Cracow. **12.3 p.m.,** Weather. **12.5,** Polish Press Review. **12.10,** Records. **1.0,** News. **1.5,** Light Music by the Grossmann Orchestra. **2.0,** News. **2.5,** Economic Review. **2.15,** Interval. **4.0,** Records. **5.0,** Programme for Children relayed from **Lwow, 795 kc/s, 377.4 metres. 5.25,** Recital on Two Pianofortes by Lefeld and Ign. Rosenbaum: Variations on a Theme of Haydn, Op. 56 (Brahms); Fantasia in F minor (Mozart-Busoni); Andante con variazioni (Schumann). **6.0,** Divine Service from **Wilno, 536 kc/s, 559.7 metres. 7.0,** Announcements. **7.10,** Programme Announcements. **7.15,** Dance Music by an Hawaiian Orchestra. **7.50,** Sports Notes. **8.0,** Chopin Recital by Sztompka (Pianoforte); Nocturne in E minor, Op. 72; Waltzes: (a) in A flat major, Op. 69, (b) in D flat major, Op. 70; Two Mazurkas: (a) Mazurka in A minor, (b) Mazurka in C sharp minor, Op. 63; Ballad in G minor, Op. 23. **8.30,** Talk in a Foreign Language. **8.40,** Concert of Polish Music by the Symphony Orchestra; Conductor, Oziminski. **9.0,** Fanfare. **9.2,** News. **9.12,** Orchestral Concert of Light Music; Conductor, Nawrot; Soloist, Witas (Songs); March (Blankenburg); Overture, Gri-Gri (Lincke); Songs: (a) Ideale (Tosti), (b) Dolore d'amore (Bucci-Peccia), (c) Popular Spanish Song (Sorentina); Waltz from La marche aux filles (Jacobi); Oriental Scene (Rust); Songs: (a) La voix du coeur (Tagliaferri), (b) Mare chiare (Tosti); Mazurka (Wronski). **10.0,** Topical Talk. **10.10,** Programme from **Poznan, 868 kc/s, 345.6 metres. 11.0,** Weather. **11.5,** Dance Music by the Paradis Orchestra.

ZURICH.—Relays **Beromünster.**

SEPT. 1st SATURDAY *continued*

PRINCIPAL BROADCASTING STATIONS OF EUROPE

Arranged in Order of Frequency and Wavelength

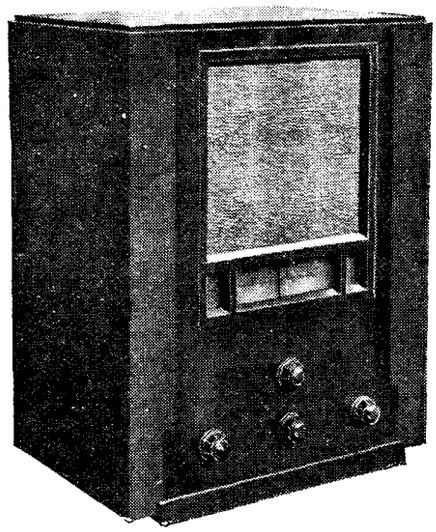
(Stations with an aerial power of 50 kW. and above in heavy type)

Station.	kc/s.	Tuning Positions.	Metres.	kW.
Kaunas (Lithuania)	155	.....	1935	7
Brasov (Romania)	160	.....	1875	20
Hilversum (Holland). (*Kootwijk, 50 kW. after 3.40 p.m.*)	160	.....	1875	7.5
Lahti (Finland)	166	.....	1807	40
Moscow, No. 1, RW1 (Komintern) (U.S.S.R.)	174	.....	1724	500
Paris (Radio Paris) (France)	182	.....	1648	75
Madrid, No. 3 (Telecommunicaciones) (Spain)	183	.....	1639	1
Istanbul (Turkey)	185	.....	1621	5
Berlin (Deutschlandsender Zeesen) (Germany)	191	.....	1571	60
Daventry National	200	.....	1500	30
Minsk, RW10 (U.S.S.R.)	208	.....	1442	35
Reykjavik (Iceland)	208	.....	1442	16
Paris (Eiffel Tower)	215	.....	1395	13
Motala (Sweden). (*Relays Stockholm*)	216	.....	1389	30
Novosibirsk, RW76 (U.S.S.R.)	217·5	.....	1379	100
Warsaw, No. 1 (Raszyn) (Poland)	223	.....	1345	120
Ankara (Turkey)	229	.....	1310	7
Luxembourg	230	.....	1304	150
Kalundborg (Denmark)	238	.....	1261	75
Leningrad, No. 1, RW53 (Kolpino) (U.S.S.R.)	245	.....	1224	100
Oslo (Norway)	260	.....	1154	60
Madona, No. 1 (Latvia)	262	.....	1145	50
Moscow, No. 2, RW49 (U.S.S.R.)	271	.....	1107	100
Rostov-on-Don, RW12 (U.S.S.R.)	355	.....	845.1	20
Sverdlovsk, RW5 (U.S.S.R.)	375	.....	800	50
Smolensk, RW24 (U.S.S.R.)	364	.....	824.2	10
Geneva (Switzerland). (*Relays Sottens*)	401	.....	748.1	1.3
Moscow, No. 3 (RCZ) (U.S.S.R.)	401	.....	748.1	100
Voroneje, RW25 (U.S.S.R.)	413.5	.....	725.5	10
Oulu (Finland)	431	.....	696.1	1.5
Oufa, RW22 (U.S.S.R.)	436	.....	688.1	10
Hamar (Norway)	519	.....	578	0.7
Innsbruck (Austria). (*Relays Vienna*)	519	.....	578	0.5
Ljubljana (Yugoslavia)	527	.....	569.3	5
Viipuri (Finland)	527	.....	569.3	10
Bolzano (Italy)	536	.....	559.7	1
Wilno (Poland)	536	.....	559.7	16
Budapest, No. 1 (Hungary)	546	.....	549.5	120
Beromunster (Switzerland)	556	.....	539.6	60
Athlone (Irish Free State)	565	.....	531	60
Palermo (Italy)	565	.....	531	4
Stuttgart (Mühlacker) (Germany)	574	.....	522.6	100
Riga (Latvia)	583	.....	514.6	15
Vienna (Bisamberg) (Austria)	592	.....	506.8	120
Rabat (Radio Maroc) (Morocco)	601	.....	499.2	6.5
Sundsvall (Sweden). (*Relays Stockholm*)	601	.....	499.2	10
Florence (Italy). (*Relays Milan*)	609	.....	492.6	20
Cairo, No. 1 (Abu Zabal) (Egypt)	620	.....	483.9	20
Brussels, No. 1 (Belgium). (*French Programme.*)	620	.....	483.9	15
Lisbon (Bacarena) (Portugal)	629	.....	476.9	20
Tröndelag (Norway)	629	.....	476.9	20
Prague, No. 1 (Czechoslovakia)	638	.....	470.2	120
Lyons, P.T.T. (La Doua) (France)	648	.....	463	15
Cologne (Langenberg) (Germany)	658	.....	455.9	60
North Regional (Slaithwaite)	668	.....	449.1	50
Sottens (Radio Suisse Romande) (Switzerland)	677	.....	443.1	25
Belgrade (Yugoslavia)	686	.....	437.3	2.5
Paris, P.T.T. (Ecole Supérieure) (France)	695	.....	431.7	7
Stockholm (Sweden)	704	.....	426.1	55
Rome, No. 1 (*Short-wave station*, 25.4 *metres*)	713	.....	420.8	50
Kiev, RW9 (U.S.S.R.)	722	.....	415.5	36
Tallinn (Esthonia)	731	.....	410.4	20
Madrid, No. 1, EAJ2 (Radio España) (Spain)	731	.....	410.4	0.3
Munich (Germany)	740	.....	405.4	100
Marseilles, P.T.T. (France)	749	.....	400.5	5
Katowice (Poland)	734	.....	408	16
Midland Regional (Daventry)	767	.....	391.1	25
Toulouse, P.T.T. (France)	776	.....	386.6	2
Leipzig (Germany)	785	.....	382.2	120
Barcelona, EAJ1 (Spain)	795	.....	377.4	5
Lwow (Poland). (*Relays Warsaw*)	795	.....	377.4	16
Scottish Regional (Falkirk)	804	.....	373.1	50
Milan (Italy)	814	.....	368.6	50
Bucharest (Romania)	823	.....	364.5	12
Moscow, No. 4, RW39 (Stalina) (U.S.S.R.)	832	.....	360.6	100
Berlin (Funkstunde Tegel). (*Short-wave Stations*, 16.89, 19.73, 25.5, 31.38 *and* 49.83 *metres.*)	841	.....	356.7	100
Bergen (Norway)	850	.....	352.9	1
Valencia (Spain)	850	.....	352.9	1.5
Simferopol, RW52 (U.S.S.R.)	859	.....	349.2	10
Strasbourg, P.T.T. (France)	859	.....	349.2	15
Poznan (Poland)	868	.....	345.6	16
London Regional (Brookmans Park)	877	.....	342.1	50
Graz (Austria). (*Relays Vienna*)	886	.....	338.6	7
Limoges, P.T.T. (France)	895	.....	335.2	0.5
Helsinki (Finland)	895	.....	335.2	10
Hamburg (Germany)	904	.....	331.9	100
Toulouse (Radio Toulouse) (France)	913	.....	328.6	60
Brno (Czechoslovakia)	922	.....	325.4	32
Brussels, No. 2. (*Flemish Programme*)	932	.....	321.9	15
Algiers, P.T.T. (Radio Alger) (Algeria)	941	.....	318.8	12
Göteborg (Sweden). (*Relays Stockholm*)	941	.....	318.8	10
Breslau (Germany)	950	.....	315.8	60
Paris (Poste Parisien) (France)	959	.....	312.8	100
Grenoble, P.T.T. (France)	968	.....	309.9	20
West Regional (Washford Cross)	977	.....	307.1	50
Cracow (Poland)	986	.....	304.3	2
Genoa (Italy). (*Relays Milan*)	986	.....	304.3	16
Huizen (Holland). (7 *kW.* till 6.40 p.m.)	995	.....	301.5	20
Bratislava (Czechoslovakia)	1004	.....	298.8	13.5
North National (Slaithwaite)	1013	.....	296.2	50
Barcelona, EAJ15 (Radio Asociación) (Spain)	1022	.....	293.5	3
Königsberg (Heilsberg Ermland) (Germany)	1031	.....	291	60
Leningrad, No. 2, RW70 (U.S.S.R.)	1040	.....	288.5	10
Scottish National (Falkirk)	1050	.....	285.7	50
Bari (Italy)	1059	.....	283.3	20
Tiraspol, RW57 (U.S.S.R.)	1068	.....	280.9	4
Bordeaux, P.T.T. (Lafayette)	1077	.....	278.6	12
Zagreb (Yugoslavia)	1086	.....	276.2	0.7
Falun (Sweden)	1086	.....	276.2	2
Madrid, No. 2, EAJ7 (Union Radio) (Spain)	1095	.....	274	7
Madona, No. 2 (Latvia)	1104	.....	271.1	50
Naples (Italy). (*Relays Rome*)	1104	.....	271.7	1.5
Alexandria, No. 1 (Egypt)	1122	.....	267.4	11
Belfast	1122	.....	267.4	1
Nyiregyhaza (Hungary)	1122	.....	267.4	6.2
Hörby (Sweden). (*Relays Stockholm*)	1131	.....	265.3	10
Turin, No. 1 (Italy). (*Relays Milan*)	1140	.....	263.2	7
London National (Brookmans Park)	1149	.....	261.1	50
West National (Washford Cross)	1149	.....	261.1	50
Kosice (Czechoslovakia). (*Relays Prague*)	1158	.....	259.1	2.6
Moravska-Ostrava (Czechoslovakia)	1158	.....	259.1	11.2
Monte Ceneri (Switzerland)	1167	.....	257.1	15
Copenhagen (Denmark). (*S.-w. Stn.*, 31.51 m.)	1176	.....	255.1	10
Kharkov, RW4 (U.S.S.R.)	1185	.....	253.2	10
Frankfurt (Germany)	1195	.....	251	17
Prague, No. 2 (Czechoslovakia)	1204	.....	249.2	5
Lille, P.T.T. (France)	1213	.....	247.3	5
Trieste (Italy). (*Relays Milan*)	1222	.....	245.5	10
Gleiwitz (Germany). (*Relays Breslau*)	1231	.....	243.7	5
Cork (Irish Free State)	1240	.....	241.9	1
Nice (Juan-les-Pins) (France)	1249	.....	240.2	2
Rome, No. 3 (Italy)	1258	.....	238.5	1
San Sebastian (Spain)	1258	.....	238.5	3
Nürnberg and Augsburg (Germany)	1267	.....	236.8	2
Norwegian Relay Stations	1276	.....	235.1	0.5
Dresden (Germany)	1285	.....	233.5	1.5
Aberdeen	1285	.....	233.5	1
Austrian Relay Stations	1294	.....	231.8	0.5
Danzig. (*Relays Heilsberg*)	1303	.....	230.2	0.5
Swedish Relay Stations	1312	.....	228.7	1.25
Budapest, No. 2 (Hungary)	1321	.....	227.1	0.8
German Relay Stations	1330	.....	225.6	1.5
Montpellier, P.T.T. (France)	1339	.....	224	5
Lodz (Poland)	1339	.....	224	1.7
Dublin (Irish Free State)	1348	.....	222.6	1
Milan, No. 2 (Italy)	1348	.....	222.6	4
Turin, No. 2 (Italy). (*Relays Rome*)	1357	.....	221.1	0.1
Warsaw, No. 2 (Poland)	1384	.....	216.8	2
Lyons (Radio Lyon) (France)	1393	.....	215.4	5
Tampere (Finland)	1420	.....	211.3	1.2
Newcastle	1429	.....	209.9	1
Béziers (France)	1429	.....	209.9	2
Paris, (Radio LL)	1429	.....	209.9	2
Miskolc (Hungary)	1438	.....	208.6	1.25
Fécamp (Radio Normandie)	1456	.....	206	10
Pecs (Hungary)	1465	.....	204.7	1.25
Bournemouth	1474	.....	203.5	1
Plymouth	1474	.....	203.5	0.3
Antwerp (Belgium)	1492	.....	201.1	0.1

Stand-to-Stand Report—

HALCYON (36)

One of the most interesting of the universal small superheterodynes for operation on either A.C. or D.C. mains is the Halcyon model, which employs a Westinghouse rectifier for H.T., and Westectors for detection and automatic volume control. The A.V.C. system embodies several interesting features,



Halcyon transportable battery superheterodyne.

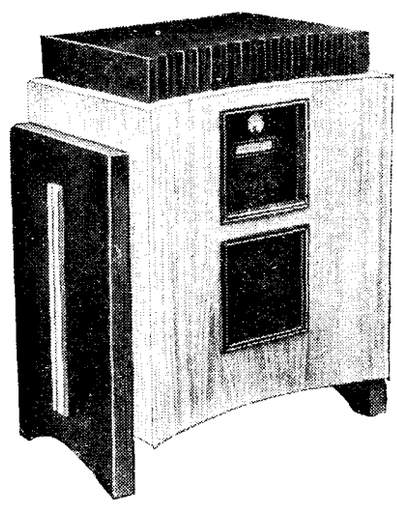
including an arrangement whereby delay is introduced in the application of controlling voltages to the frequency-changer, but not to the I.F. valve. The inclusion of an anti-interference filter in the mains feed is noticed; this small refinement often makes a world of difference on "noisy" mains. The set is available either as a table model or in radiogramophone form.

A rather more ambitious receiver is the nine-stage A.C. superheterodyne, which was recently reviewed in these pages. There are also three- and four-valve "straight" battery sets, and also a brand-new battery transportable with frame aerial, in which a seven-stage superheterodyne circuit is employed.

Halcyon Radio, Ltd., 83a, Valetta Road, Acton, W.3.

HARTLEY-TURNER (119)

All the equipment produced by this firm is directed towards one aim—high-fidelity



The Hartley-Turner radiogramophone.

reproduction. The loud speaker and the "short range" S7 and S12 receiver kits and the M and M12 receivers are already known to readers, but two recent developments are shown for the first time. These are the "boffle," and a new complete cabinet radiogramophone.

The "boffle" is a box type of baffle which is totally closed at the back. The sound energy from the back of the diaphragm is dissipated in a number of cells separated by absorbent material, and it is claimed that the effect of an infinite baffle is obtained without resonances. A complete set of cells for the standard size (18in. cube) costs 37s. 6d.

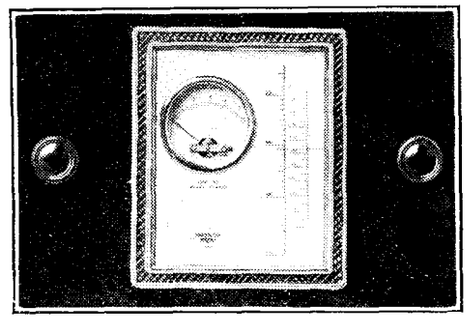
The Hartley-Turner loud speaker and "boffle" are used in the radiogramophones which are available with the S12 chassis at 60 guineas or the M12 chassis at 70 guineas. The pick-up is of the piezo-electric type.

The range of accessories designed for high-quality work now includes a tunable absorption whistle filter giving a 30 db. drop at resonance. The price is 42s.

Hartley-Turner Radio, Ltd., Thornbury Road, Isleworth, Middlesex.

HAYNES RADIO (9)

A very ingenious solution of the problem of producing specialised receivers at little more than the cost of standardised mass-produced articles has been devised by Haynes Radio. This is how it is done: there are three high-frequency tuners and three amplifier-power supply units; any tuner can be "married" to any amplifier, the two units being mounted together if required in a normal type of cabinet.



Tuning panel as fitted to all Haynes Radio receivers.

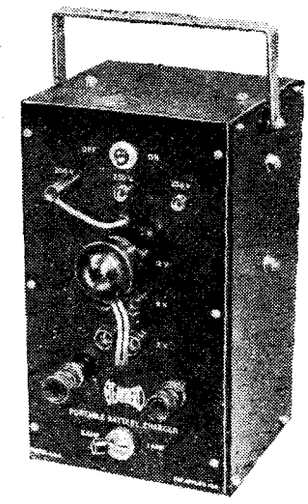
Tuner units with one H.F. stage, two H.F. stages, and with a superheterodyne circuit are manufactured, advanced technique is employed throughout, with Ferrocart coils, band-pass tuning, delayed amplified A.V.C. in the superhet. and 2-H.F. unit, etc., etc. The amplifiers are all of the duo-phase resistance-coupled type, giving outputs of 2½, 6 and 14 watts. All the apparatus is of exceptionally sound and workmanlike design.

Haynes Radio, 57, Hatton Garden, E.C.1.

HEAYBERD (24)

A feature of the new mains H.T. unit shown by this firm is an adjustment to maintain a constant voltage at all current loads from 15 to 50 mA. It has two variable tappings and one fixed at 150 volts, and the price is £4 8s. 6d. for A.C. mains. The range of L.T. chargers has been extended, and several new models for 2-, 6- and 12-volt batteries are shown, a useful size being the 1-amp. model A.O.3 at 50s.

Power to operate miniature railways and other small electric models is provided by a special series of mains transformers. The



Heayberd Model A.O.5 charger for car and radio batteries, with switch for 1- or 2-amp. output.

type T.100 gives two amps, and the output can be varied in one-volt steps from 6 to 18 by a built-in and totally enclosed switch.

F. C. Heayberd and Co., 10, Finsbury Street, E.C.2.

HELLESENS (78)

This well-known firm of dry-cell manufacturers produce H.T. batteries of every conceivable voltage and in a number of capacities. Replacement batteries for standard self-contained receivers are a special feature of the exhibit.

A series of L.T. accumulators have recently been added. These include cells in glass and celluloid containers, and also free-acid and jelly electrolyte batteries for portables.

Hellesens, Ltd., Morden Road, S. Wimbledon, S.W.19.

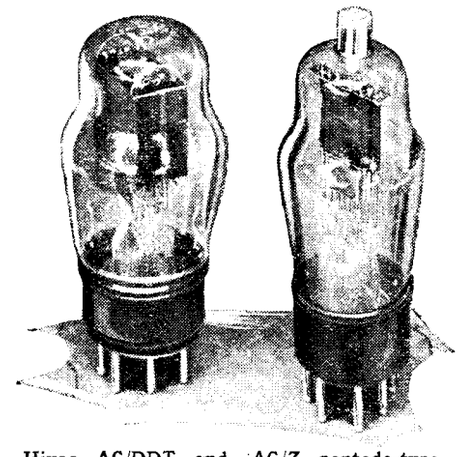
HENLEY'S (109)

Apart from a range of connecting leads available only to the trade, this exhibit is confined mainly to electric soldering irons. The well-known Solon iron is available in many different models at prices ranging from 9s. 6d. to 37s. 6d. according to size.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.

HIVAC (27)

The present range of Hivac valves now includes no fewer than thirty different



Hivac AC/DDT and AC/Z pentode-type valves.

Stand-to-Stand Report—

types, seventeen are for battery and thirteen for A.C. mains operation. A double-diode-triode, two H.F. pentode types, and a combined driver and Class "B" valve are outstanding examples in the battery series. In the mains section are two H.F. pentode equivalents, a double-diode-triode, and two indirectly heated full-wave rectifiers, also a very efficient output pentode type.

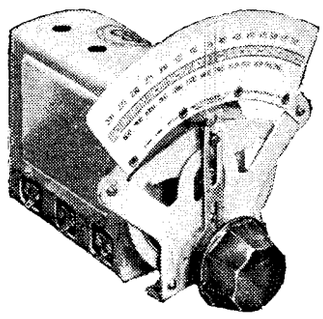
In the construction of the A.C. valves particular care is given to the heater-cathode insulation, and the filament wires are first threaded through a ceramic tube.

A last-minute announcement is a reduction in the price of some of the battery valves, three of the triodes now costing 3s. 9d. each.

High Vacuum Valve Co., Ltd., 113, Farringdon Road, E.C.1.

J.B. (114)

One of the most interesting of the newer J.B. products is the modified Linacore Band-Pass Tuner for use in straight sets and for universal mains or battery valves. There are four controls arranged in two concentric groups and a full vision horizontal scale with hairline cursor is fitted. Iron-cored coils ensure high selectivity and sensitivity, and the price is 65s.



J.B. Baby Gang condenser and new Arcuate drive.

Other items that are quite new comprise a Baby Gang series of condensers for straight and superhet circuits, also a range of slow-motion dials. The Arcuate model is made in two styles, one having a dual ratio—8 to 1 and 150 to 1—for short-wave use. This costs 6s. 6d.

Jackson Bros. (London), Ltd., 72, St. Thomas' Street, S.E.1.

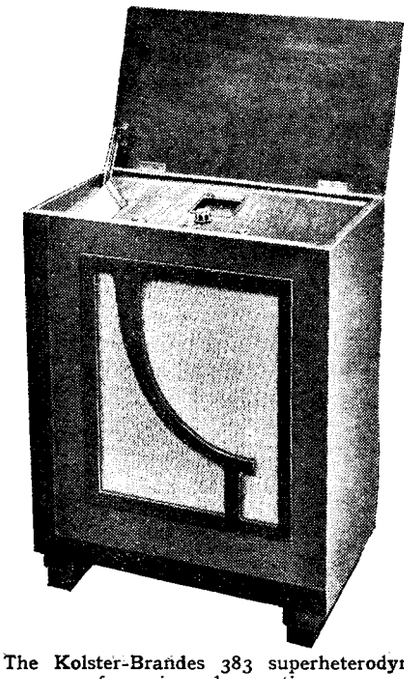
KINGSWAY RADIO (44)

The "Bowl" loud speaker, designed to conform with modern styles of furnishing, and the Simpsons electric turntable, are the two principal lines exhibited by this firm, but a very useful output transformer, giving 28 ratios, is to be noted in the range of power transformers and L.F. components shown.

Kingsway Radio, Ltd., 3-9, Dane Street, W.C.1.

KOLSTER-BRANDES (84)

The smallest receiver shown on this stand is the "New Pup," a two-valve battery receiver with an output of 200 milliwatts at the price of £5 15s. A similar set for A.C. operation with an output of 2 watts is listed at £6 17s. 6d. Among the larger sets, one of the most interesting is the model 383. This is a superheterodyne designed for universal operation and including variable selectivity. A heptode frequency-changer is used with a single I.F. stage, while a duo-diode-triode provides A.V.C. and feeds two

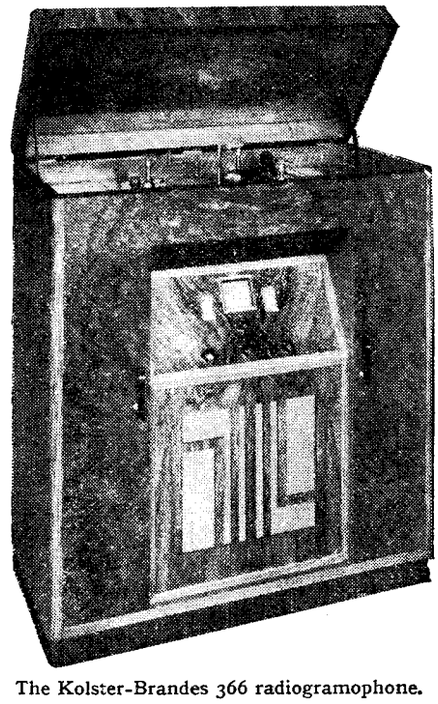


The Kolster-Brandes 383 superheterodyne for universal operation.

parallel output pentodes delivering 3 watts to the moving-coil loud speaker. A separate H.F. pentode is employed to provide Q.A.V.C., a neon tuning indicator is fitted, and a filter is provided in the mains circuit to prevent mains interference. The set is priced at 19 guineas.

The model 366 radiogramophone includes an automatic record-changer in addition to Q.A.V.C. and automatic tone control. Signal-frequency amplification is used, and push-pull pentodes are employed in the output stage to feed 5.5 watts to the dual loud speakers. This set is priced at 65 guineas. A battery set with an output of 2 watts is listed at 16 guineas.

All the sets marketed by this firm are well



The Kolster-Brandes 366 radiogramophone.

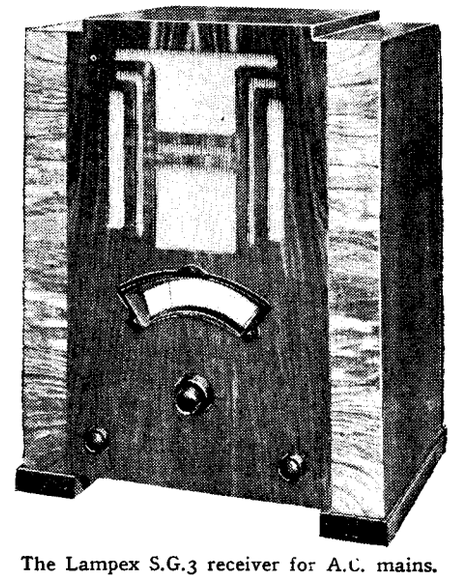
screened to avoid the direct pick-up of local interference, and are specially arranged for use with the Rejectostat system of screened aerial down-lead. The transformers for this are available at 25s., and may be used with any make of receiver.

Kolster-Brandes, Ltd., Cray Works, Sidcup, Kent.

LAMPEX (22)

This firm exhibits a wide range of battery receivers. The Phantom Minx is a two-valve set with a moving-iron type speaker at the price of £3 19s. 6d., but with a moving-coil speaker the same set is listed at 5 guineas. The Phantom S.G.3 is a three-valve battery set with the valves arranged as an H.F. amplifier, detector, and pentode output; a permanent magnet moving-coil speaker is included, and the price is 7 guineas.

A four-valve universal receiver, the Unifive, is also shown, and employs an H.F. pentode in the detector stage. It is priced at £10 19s. 6d. in a table cabinet, but is



The Lampex S.G.3 receiver for A.C. mains.

also available as a radiogramophone with dual loud speakers at 27 guineas.

Lampex Radio and Electric Co., Phantom House, Brewery Road, N.7.

LISSEN (83)

Band-pass tuning and iron-cored coils are among the refinements included in the new Lissen A.C. receiver, which employs an H.F.-det.-L.F. three-valve circuit, and is representative of this arrangement in its most highly developed form. Volume regulation is effected by a combined reaction and H.F. bias control, which is a development of the system employed last year. A battery counterpart of this set is fitted with a pentode output valve and moving-coil loud speaker, and costs only £8 10s.—little more than some two-circuit sets of much lower selectivity.

The new kit set for home constructors is basically similar, and, in spite of its relatively ambitious nature, is planned so that assembly and wiring is particularly easy.

Dry batteries of all ratings are well to the fore; the latest addition is a 120-volt super-power H.T. battery. There is little change in the range of Lissen components, but the series of valves has been extended, and many improvements have been effected.

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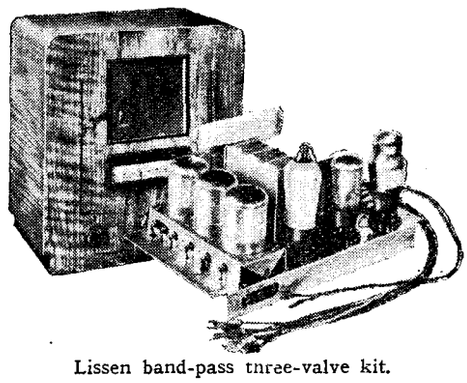
An entirely new valve, for use as a superheterodyne frequency-changer, is particularly interesting; it embodies a triode and a hexode in a single envelope, the triode operating as the oscillator.

Lissen, Ltd., Warple Road, Isleworth, Middlesex.



Lissen band-pass three-valve kit.

M.A.C. (T24)

Maco two-volt accumulators are shown on this stand at 2s. 6d. for a 20-amp.-hour size and at 4s. 9d. for one of 45 amp.-hours. There is a range of Reliomac H.T. batteries at 3s. 9d. for 60 volts, 6s. 3d. for 100 volts and 7s. 9d. for 120 volts. In addition, manufacturers' products are shown in this firm's capacity of wholesale distributors.

Manufacturers Accessories Co. (1928), Ltd., 85, Great Eastern Street, E.C.2.

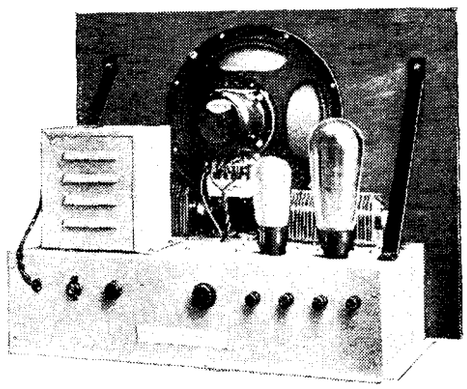
M. & B. RADIO (210)

The Mastersinger loud speaker, made in two sizes, for ordinary domestic use and for halls and large rooms, employs a principle reminiscent of indirect electric lighting. The instrument is suspended from the ceiling, and comprises two ornamental cones, the lower of which, facing the loud-speaker diaphragm, deflects sound upwards.

M. and B. Radio, Turney Road, Dulwich, S.E.21.

M.P.R. (230)

An A.C. mains receiver, with valve rectification and embodying an energised moving-coil loud speaker, is one of the principal productions of this firm. The set costs only £5 17s. 6d. complete. Naturally, a detector-L.F. circuit is employed.



M.P.R. 5-watt amplifier.

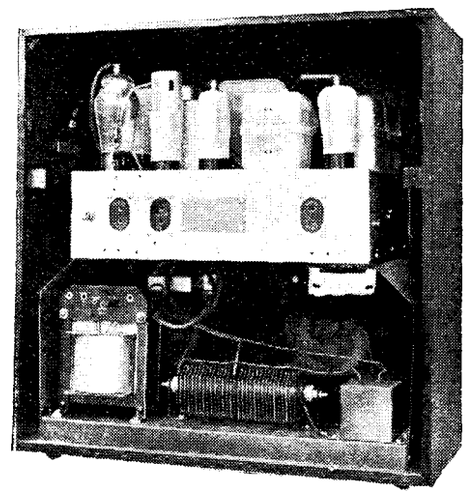
M.P.R. permanent magnet moving-coil loud speakers, both in chassis form and mounted in cabinets, are shown, together with aluminium coil screens, as specified for *The Wireless World* Olympic S-S Six.

Mains Power Radio, Ltd., Broadway Works, Eastern Road, Romford, Essex.

McMICHAEL (60)

This firm was one of the first to appreciate the possibilities of twin loud-speaker units in giving a "stereophonic" quality to reproduction. In previous years the receivers incorporating this feature were of the "straight" type, but this year the twin-speaker model is a superhet. The up-to-date circuit includes a triode-pentode frequency changer and a double-diode-pentode in the output stage rated at 3 watts. Inter-station noise suppression with two degrees of control, automatic tone control to limit background noise on weak stations and, of course, full A.V.C. are important features. The price of the "Twin Speaker Superhet." is 18 guineas.

Self-contained receivers have also been a McMichael speciality, and the "Superhet Mains Transportable" at 16 guineas is a fine example of this type. A screened pentode H.F. stage amplifies the input from the



Rear view of McMichael "Twin-Speaker" superheterodyne.

frame aerial before it reaches the triode-pentode frequency-changer. There is a single I.F. stage and the double-diode-triode detector provides fully delayed A.V.C. and feeds the power pentode output stage. There is a manual tone control and provision for an external loud speaker.

Other self-contained receivers in the McMichael range are the battery "Duplex Transportable" with Class "B" output and the well-known "Suitcase Portable" which is now fitted with automatic grid bias.

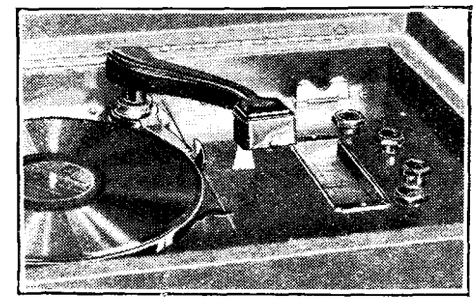
The programme is completed by the table model "A.C. Superhet" which employs the latest types of valves and dust-cored "Square Top Acceptor" circuits in the I.F. stage. Designed for use with an external aerial, this receiver is priced at 14 guineas.

McMichael Radio, Ltd., Wexham Road, Slough, Bucks.

MARCONIPHONE (76)

Completeness is the keynote of this year's Marconiphone programme; he is a somewhat difficult person to satisfy who cannot find something in the series of sets which suits both his taste and his pocket. Some of the receivers, released during the last few months, are already familiar to our readers, and so it will be best to concentrate on two entirely new productions: the Models 289 and 292, both made in radiogramophone form only.

Model 289 has a four-valve (plus rectifier) superheterodyne circuit with a full modern specification, including A.V.C. and visual tuning. All the main controls are fitted

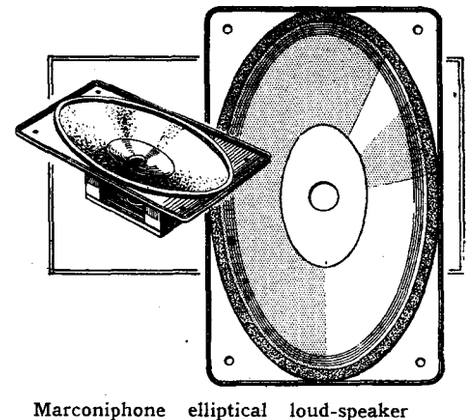


Control panel of Marconiphone Model 289.

under the lid, in the most convenient position, and an automatic record changer is included. Price: 33 guineas.

Model 292 is a more ambitious instrument with a total of eight valves, and includes the refinement of quiet A.V.C. (valve operated), a tone-compensated volume control, and, perhaps most interesting of all, a new type of loud speaker with an elliptical diaphragm, which is designed to give better diffusion of the high-frequency notes, which are not concentrated in a narrow beam. This new type of reproducer may, indeed, be considered as replacing a pair of dual speakers; its centre is reinforced with a metal disc.

Other models range upwards from a three-valve straight H.F.-det.-L.F. battery receiver; the small A.C. superhet. at 13½ guineas is likely to have a wide appeal. As Marconi valves are now produced in such a variety of types, space does not permit



Marconiphone elliptical loud-speaker diaphragm with metal reinforcement.

even of a description of the latest additions, and the reader is referred to the excellent pamphlets issued by the makers.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.

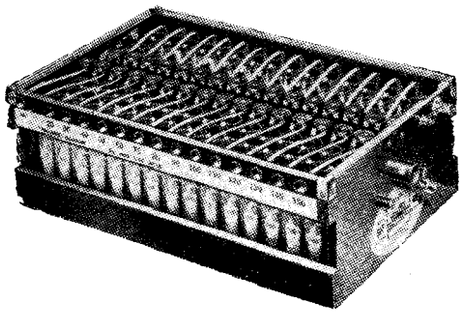
MILNES RADIO CO. (249)

Hitherto the activities of this firm have been devoted to the production and development of the Milnes H.T. Supply Unit. Their programme for this season is more extensive as it includes a battery superhet. and a P.M. moving-coil loud speaker.

The receiver is a five-valve eight-stage

Stand-to-Stand Report—

model having nine tuned circuits and embodies many up-to-date refinements. It is housed in a cabinet designed to accommodate a Milnes unit, L.T. battery and one of their own loud speakers, the price being £14 19s., without batteries, but including valves.



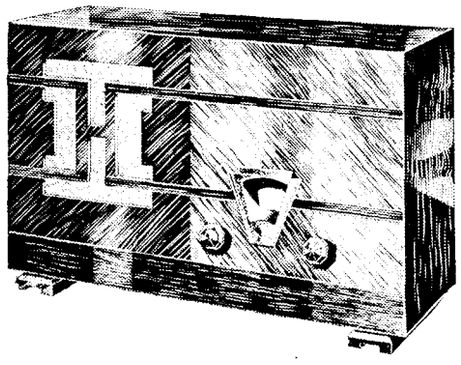
Milnes H.T. supply unit.

The loud speaker, which incorporates the new nickel-aluminium alloy magnet, costs 32s. 6d. in chassis form, with a de luxe model at 43s. 6d. In cabinet, the prices range from 47s. 6d. to 67s. 6d.

Milnes Radio Co., Ltd., Victoria Works, Bingley, Yorks.

MULLARD (65)

The first Mullard receiver, the MB Three, occupies a prominent position on this stand; it is a three-valve battery-operated receiver of unusual design. Two tuned circuits are included with litz-wound air-core coils and a variable-mu H.F. pentode is used for the H.F. amplifier. An H.F. pentode is also employed as a detector, but reaction is not fitted, and this valve is resistance-coupled to the output pentode, which is of the "economy" type. The loud speaker is of the moving-coil type, and the complete receiver is priced at 8 guineas.



Mullard three-valve battery receiver with litz-wound coils.

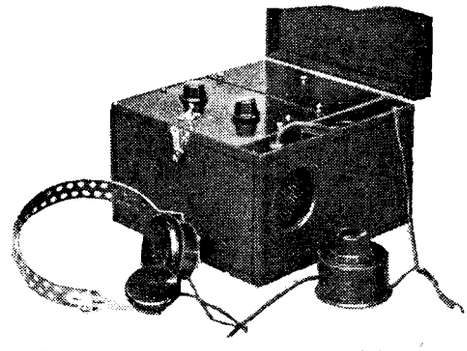
A range of universal valves is on view and includes an octode frequency-changer as well as the usual output pentode, duo-diode, H.F. pentode, and H.T. rectifier. A feature of these valves is the gold-metallising and their side-contact bases. They are intended for use in A.C. or D.C. sets or for direct operation from a 12-volt accumulator in car radio sets. Except for the output pentode and the H.T. rectifier, they are rated for 13 volts at 0.2 ampere for the heaters. Among battery valves the PM22C is of interest in that it is a pentode designed to give its output for a very low anode current when used in an "H.T. economiser" circuit. The PM2BA is a new Class "B" valve intended for operation with negative grid bias, while H.F. pentodes of both variable-mu and straight types are on view. A new two-volt duo-diode-triode, the TDD2A, has been introduced and is intended for use in sets fitted with A.V.C.

Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, W.C.2.

MULTITONE (51)

Those who have listened to deaf-aid appliances have probably noticed that, when volume is increased beyond a certain level, speech actually becomes less intelligible. To quote from a booklet issued by this firm, the reason is that "if speech is made loud beyond a certain point, the middle and low tones drown (and so mask) the high tones . . . that give definition to speech." Working on this theory, a special form of double headphone has been produced; one earpiece reproduces the low and middle registers, while the other takes care of high notes and overtones.

This apparatus is used in conjunction with what may be described as a triple-purpose instrument, which is also usable as a wireless receiver and microphone amplifier.



Multitone portable deaf-aid with high- and low-note headphones.

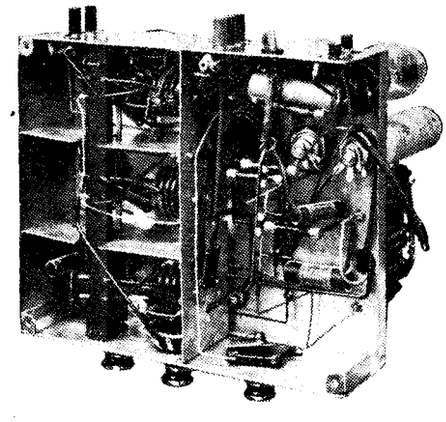
In addition, there is a portable amplifier embodying the "anti-masking" principle, and, of course, the well-known Multitone tone-control transformers.

Multitone Electric, Ltd., 95, White Lion Street, N.1.

NATIONAL RADIO SERVICE (215)

The activities of this firm lie chiefly in the field of maintaining and repairing wireless apparatus. The firm undertakes to service or supply any make of receiver in addition to fitting car and yacht sets. A feature is made of its ability to supply apparatus designed to suit special requirements.

National Radio Service Co., 15-16, Alfred Place, W.C.1.



Underside of Northumbria (Novo) "straight" receiver chassis.

NOVO (17)

Although superheterodynes are so much to the fore this year, the straight circuit still has its adherents, and when two H.F. stages are employed, certainly competes strongly on the scores of sensitivity and selectivity, and, moreover, has certain definite advantages of its own. The Northumbria Five-Six is an interesting example of modern "straight set" technique, with two H.F. stages (three tuned circuits) employing iron-cored coils. An H.F. pentode makes a very sensitive detector, and A.V.C. is provided by a separate diode. An output of 2½ watts is provided by a pentode.

Novo Radio-Electric, Ltd., 34, Lovaine Place, Newcastle-on-Tyne.

NUVOLION (236)

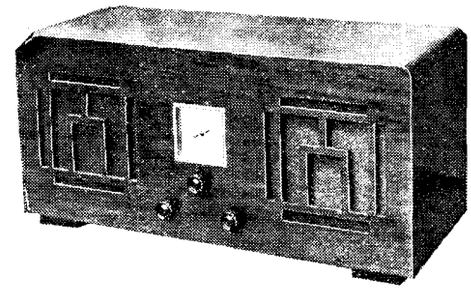
Relay and public address amplifiers employing the principle of grid compensation to obtain increased output without overloading are demonstrated with the aid of a cathode-ray oscillograph. Examples of the Nuvolion range of permanent magnet loud speakers are also available for inspection.

Nuvolion Electrics, Ltd., Meredith Works, Park Crescent, Clapham Park Road, S.W.4.

ORMOND (100)

The Ormond programme for this season includes a range of battery sets embodying a three-valve, det.-driver-class "B" chassis. There are three different styles of cabinets, one with the loud speaker above the chassis, one with the set at the side, and one fitted with a pair of dual matched units. A distinctive tuning dial, resembling a clock face, is employed, and prices range from £6 10s. to £7 10s.

An extension-type moving-coil loud speaker at £2 2s. and fitted with a special matching switch is a new product, and



Ormond three-valve battery set fitted with dual loud speakers.

these are shown in conjunction with their very wide range of condensers, dials, and many other components.

Ormond Engineering Co., Ltd., Ormond House, Rosebery Avenue, E.C.1.

ORR RADIO (64)

The Model 635 receiver which is shown by this firm is of the five-valve type with an octode frequency-changer, a single I.F. stage, and a duo-diode providing detection and A.V.C. The pentode output valve is preceded by a triode L.F. amplifier, and the set is priced at £12 19s. 6d. A three-valve superheterodyne for universal operation is also shown. This is priced at £10 15s., and the octode frequency-changer feeds an H.F. pentode detector, which is in turn coupled to the output pentode.

The Invicta DB/MC is a battery set

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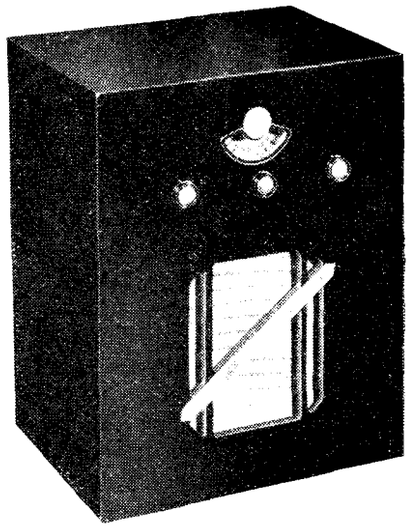
priced at £5 17s. 6d.; it is of the three-valve type, and the detector is followed by two L.F. stages. A moving-coil loud speaker is included.

Orr Radio, Ltd., 79a, Parkhurst Road, N.7.



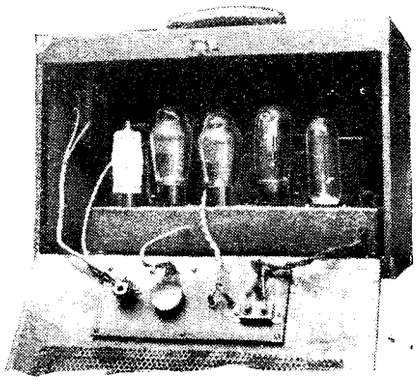
Orr Radio DB/MC three-valve battery receiver

OSSICAIDE (211)

A compact portable amplifier designed especially to assist those with defective hearing is one of the most interesting of the many models shown by this firm. It is a three-stage amplifier, and although the overall size is 7¾in.×6¼in.×4¼in. only, it contains all batteries, a transverse current microphone and earphones. Volume and frequency correction controls are included, and the price is 20 guineas.

There are power amplifiers for battery and A.C. operation, also universal mains models, while microphones in stand and table form are shown in a variety of styles, together with a range of loud speakers mounted in directional baffles.

Ossicaide, Ltd., 447, Oxford Street, W.1.



Ossicaide universal mains portable amplifier, Model UP-6W.

PERTRIX (94)

The exhibits on this stand consist of a comprehensive range of dry batteries and L.T. accumulators. The H.T. batteries are made in four capacities, the smallest, the Yellow Carton series, being intended for 7-10 mA. discharge, while the largest allows for a 20 mA. discharge.

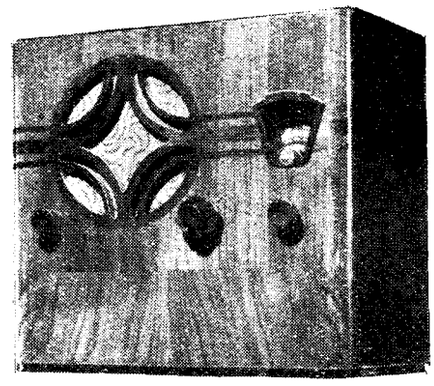
Many models contain a grid bias section which in some cases is not electrically joined to the H.T. portion. There is also a wide range of grid batteries and L.T. cells.

Britannia Batteries, Ltd., Union Street, Redditch, Worcs.

PHILIPS (62)

Although the "straight" receivers for which the firm is justly famous form the backbone of the new season's programme, it cannot be denied that the principal item of interest on this stand is the newly introduced Type 588 superheterodyne. This set is available for A.C. mains or as a universal A.C./D.C. receiver, and employs an octode frequency-changer, a pentode I.F. amplifier, a separate diode detector, and a pentode L.F. amplifier feeding the pentode output stage. It is claimed that the use of a pentode in the first L.F. stage ensures that the output valve is fully loaded on weakly modulated transmissions. The circuit includes A.V.C., and the price of the instrument is 12 guineas. The same chassis is supplied in the Type 538A radiogramophone at 23 guineas.

The leading model in the group of "straight" sets is the 15-guinea Type 472. A diode detector with A.V.C. and pentode first L.F. amplifier is again used, and four "Superinductance" tuned circuits are associated with the two variable-mu pentode



Philips Type 372B battery receiver.

H.F. stages. A new type of Micro-Index dial is fitted, and a special potentiometer coupled to the tuning control ensures even sensitivity over the wave-range. This model is also available as a universal receiver for A.C. or D.C. mains.

A simplified version of the 2H.F. receiver is to be found in the Type 274A at 9 guineas. Two "Superinductance" circuits are employed, but A.V.C. is omitted.

The range is completed by two battery receivers, the Type 372B at 11 guineas being provided with three "Superinductance" tuned circuits, A.V.C. and a Class "B" output stage. The Type 834B at 10 guineas does not provide A.V.C., and makes use of a pentode output with a separate battery economy valve.

Throughout the range the sets are notable for the excellence of the cabinet work and the accurate calibration of the precision tuning dials.

Philips Lamps, Ltd., 145, Charing Cross Road, W.C.2.

PIFCO (111)

This stand is largely devoted to a display of measuring instruments, among which the Rotameter de Luxe is prominent. This is a multi-range voltmeter and milliammeter of the moving-coil type, and its special feature is that the operation of the switch to change the range also changes the scale. This model has voltage ranges up to 400 volts,

The Pifco Radiometer for A.C. and D.C. voltage and current measurements.

with a resistance of 500 ohms per volt, and current up to 250 mA., while resistance and continuity tests can also be made. It is priced at 42s.

Provincial Incandescent Fittings Co., Ltd., Pifco House, High Street, Manchester.

PIX (237)

In addition to the well-known Pix specialities this firm is showing a new lightning arrestor consisting of two electrodes enclosed in a gas-filled tube. Under normal conditions it has no effect on reception, but in the event of the aerial accumulating a charge during electrical storms the high potentials ionise the gas and so provide a path of very low resistance direct to earth.

It is made in two models; in one the outer tube is glass, and in the other bakelite, the price being 2s. and 1s. respectively.

British Pix Co., Ltd., 118, Southwark Street, S.E.1.

PLEW TELEVISION (11)

The instruments shown on this stand are of the scanning disc type for 30-line transmissions, and a useful feature is the stroboscopic speed indicator which should be of great assistance to the non-technical in obtaining accurate synchronisation. Three models ranging in price from 10 to 22 guineas are shown.

Plew Television, Ltd., Waddon, Croydon.

PLUMAX (126)

High tension batteries marketed under the name of "Plumax" and designed to fit all the leading types of battery sets are the principal exhibits on this stand.

Vee Cee Dry Cell Co. (1927), Ltd., Northwold Road, N.16.

POLAR (87)

A range of N.S.F. components linked with the name Polar is shown this year. It includes dry electrolytic condensers of 4, 6 and 8 mfds. for 500 volt D.C. peak working, assembled in cylindrical aluminium cases and priced at 4s. 6d., 5s. and 5s. 6d. each respectively. A tubular pattern with wire ends is available in sizes from 0.0001 mfd. to 0.5 mfd., and there is a range of one- two- and three-watt resistors, all colour coded and made in the usual sizes up to 250,000 ohms. They cost 1s. per watt. Grid leaks and a series of volume controls with and without switches complete the range.

The most recent addition to Polar condensers is the Midget models shown in two-

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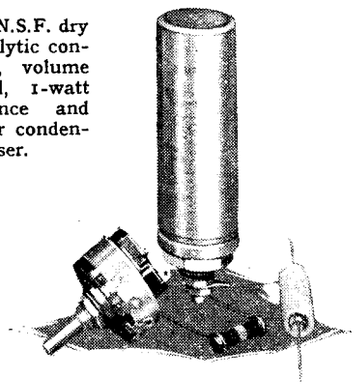
and three-gang types, a superhet three-gang for a 110 kc/s I.F. amplifier costing 16s. 6d.

The recently introduced type " E " short-wave condenser is shown as a single model



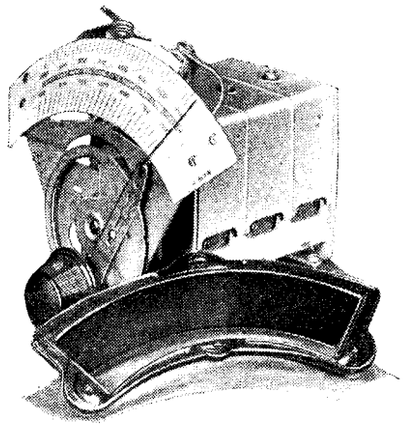
Polar-N.S.F. dry electrolytic condenser, volume control, 1-watt resistance and tubular condenser.

at 5s. and as a two-gang at 10s. 6d. The base of these is made of Steatite and the capacity of each section is 0.00016 mfd.

The V.P. Horizontal slow-motion drive is new, so also is the vertical C.K. drive. They cost 6s. 6d. each.

It is learnt that superhet. gang condensers can be supplied with tracking vanes for 465 kc/s I.F. amplifiers, though models are not shown.

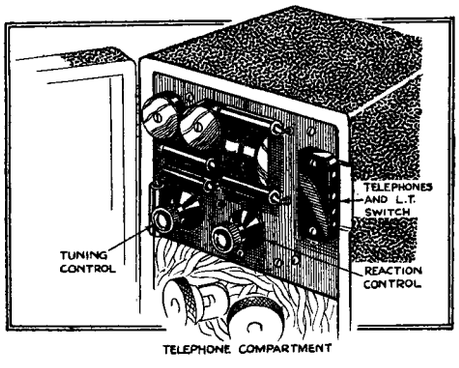
Wingrove and Rogers, Ltd., 188-189, *Strand, W.C.2.*



Polar Midget gang condenser and Arcuate slow-motion drive.

"PORTABOUT" (23)

The light-weight headphone portable exhibited here is of about the size and shape of a box camera, and weighs only 3lb. As the receiver was described at some length last week it is unnecessary to say more than that it includes two midget valves in a super-regenerative circuit and costs 4 guineas complete.



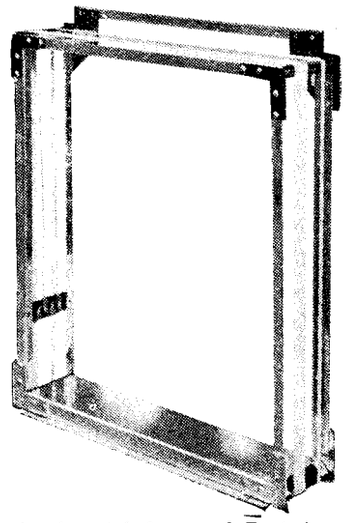
Panel of Portabout light-weight portable.

British "Portabout" Product, 2, Gray's Inn Road, W.C.1.

PORTADYNE (71)

A very interesting tendency noticeable at the present Show is the increased production of so-called mains transportable receivers complete with built-in frame aerials. Whatever opinion one may hold as to the desirability or otherwise of an outside aerial, it is certain that the attractions of such an arrangement, which necessitates no other external connection beyond a lead to the nearest electrical supply point, are bound to appeal to a great number of listeners.

This tendency is well exemplified in the Portadyne P.A. Six model, which is a five-valve superheterodyne with a signal-frequency H.F. stage and full delayed A.V.C.



Insulated metal frame of Portadyne self-contained receivers.

It is noticed that in order to retain perfect alignment of the ganged tuning system a metal former for the frame aerial has been found desirable; a former of any other material might be subject to warping.

A battery version of this set, the Model P.B.6, is basically similar, but includes Class " B " output.

There are also two up-to-date sets for use with open aerials. The Model A.37 is an A.C. superheterodyne with a very complete specification, and its battery counterpart is in the form of a superheterodyne with Class " B " output.

Portadyne Radio, Gorst Road, N. Acton, N.W.10.

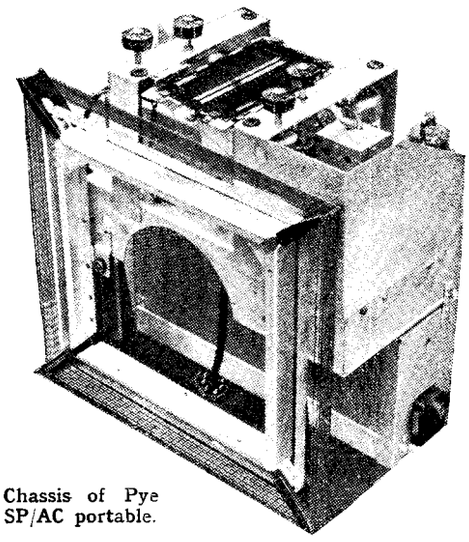
POWERTONE PRODUCTS (15)

Suitcase portables at competitive prices are again the main exhibit at this stand, but a universal A.C./D.C. receiver (S.G.-det.-power), including a Magnavox energised speaker at 7 guineas, was added at the last minute.

Powertone Products, 102, Cromer Street, W.C.1.

PYE (69)

Visitors to this stand cannot fail to be impressed by the beauty and simplicity of the cabinet design which is noticeable in the portables as well as in the "Cambridge" receivers and radiogramophones.

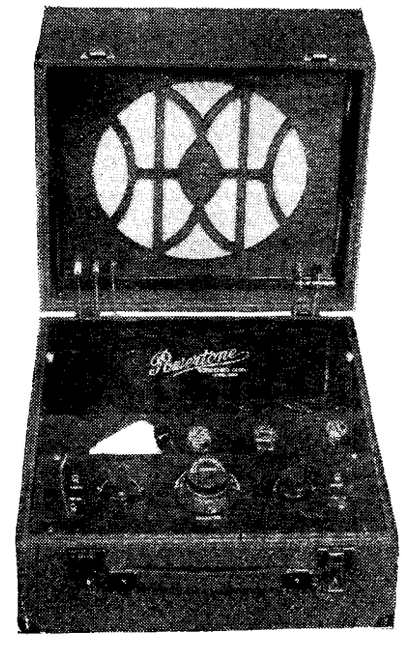


Chassis of Pye SP/AC portable.

The CR/AC and CR/DC chassis employed in the latter types are designed for use with an external aerial and include a signal-frequency H.F. stage. A.V.C. and a tuning indicator are features of both models, but whereas the A.C. model is fitted with a super-power triode output valve the D.C. model makes use of two pentodes in push-pull. The price of both models is 20 guineas or 22 guineas complete with stand. In radiogramophone form the prices range from 40 to 50 guineas according to specification.

Both the SP/B and SP/AC portables employ screened pentode H.F. stages, a triode-pentode frequency-changer and a screened pentode I.F. amplifier, but whereas the battery model has a double-diode-triode detector and Class " B " output stage, the A.C. model employs a double-diode pentode as a combined detector and output stage. Both models are provided with A.V.C. and tone control and the prices are 15 guineas and 16 guineas respectively. A less expensive battery portable is to be found in the Model S/Q. This employs a simple four-valve " straight " circuit with a single H.F. stage, and the price is £11.

Pye Radio, Ltd., Africa House, Kingsway, W.C.2.



Powertone A.G.4 suit-case portable.

Stand-to-Stand Report—

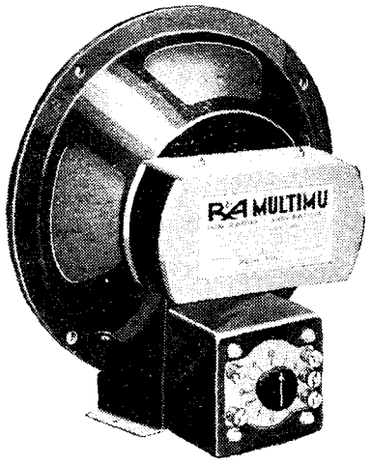
R. & A. (53)

The latest addition to the R. & A. range is the "Multima" unit, which employs the new magnetic alloy, and is fitted with an "impedance tuning" switching device providing a wide range of impedances from 1 to 40,000 ohms. The price is 42s. 6d.

The transformer (Type O.P.58) used in this model is available separately at 18s. 6d., and provides 58 alternative ratios. It is also fitted to the "Alpha" model, which is being continued at 55s. The "Victor" is sold at the same price but without transformer. The speech coil is, however, suitable for use with the O.P.58 transformer.

The range of models is completed by the "Multex" moving-coil extension loud speaker, the E.85 energised chassis, and the Type 60 differential armature reproducer.

Reproducers and Amplifiers, Ltd., Frederick Street, Wolverhampton.



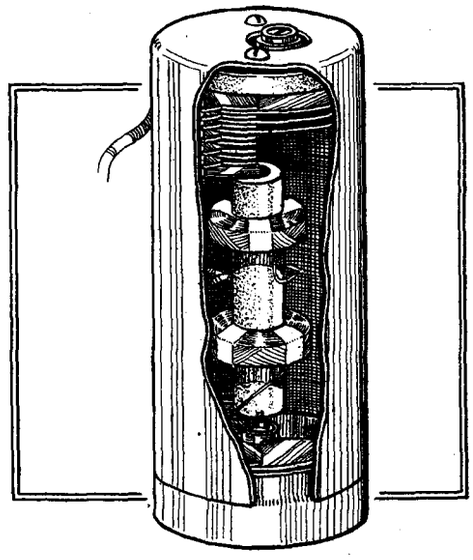
R. & A. "Multimu" loud speaker chassis.

R.G.D. (74)

One is almost inclined to shelve the task of compiling a brief description of the new R.G.D. sets by saying that they include every technical development that has come to light during the past year—and, in addition, a good many features that are exclusive. Indeed, if this statement be qualified by saying that those features which are of real merit and usefulness are included, it will not be far short of the mark.

The Model 1202 is a 12-valve superheterodyne with signal-frequency H.F. amplification, diode detection, real Q.A.V.C. with a separate valve for the purpose, a total of five tuned I.F. circuits, two-stage paraphase resistance-coupled amplifier, and no less than three loud speakers—a pair of cone speakers and a horn "tweeter" for reproducing extremely high notes and harmonics.

The most interesting feature of all is the provision of variable selectivity—and the method of attaining it. By turning the controlling switch to the least selective position (10 kc/s cut-off) the superheterodyne part of the set is entirely eliminated, and it becomes a "straight" circuit with suitable tone correction. In position 2, corresponding to a 4 kc/s cut-off, the superheterodyne circuits are restored, and tone correction is modified suitably. For reception under really difficult conditions the tone corrector is eliminated entirely, and the cut-off takes place at 3 kc/s. In addition, there is a 9 kc/s whistle filter. Of course, there is an automatic record-changer, and mechanical details and cabinet work are beyond criticism.

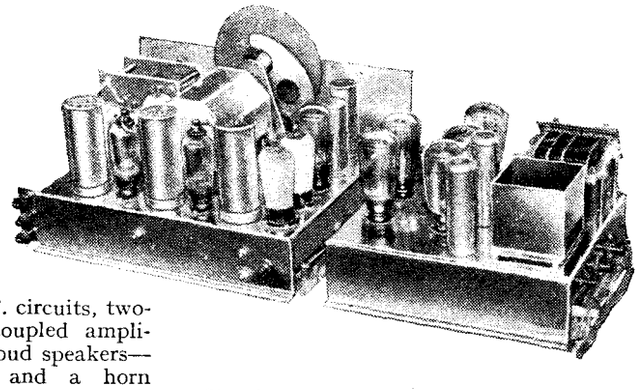


R.G.D. litz-wound I.F. transformer (456 kc/s) with air-dielectric trimmers.

In many respects, the Model 1203 all-wave set is even more interesting. Covering a wave-range of 15-2,000 metres, this instrument is in many ways comparable with the 1202, but does not embody variable selectivity. High-frequency amplification is effective on all wavebands, and the oscillator circuits are particularly ingeniously contrived. An intermediate frequency of 456 kc/s has been chosen, and to increase efficiency at this comparatively high frequency, litz-wound coils and air-dielectric trimmers are used.

Finally, it should be stated that the somewhat less ambitious Model 703 also includes the feature of variable selectivity.

Radio Gramophone Development Co., Ltd., 18-20, Frederick Street, Birmingham.



Chassis and power supply unit of the R.G.D. Model 1203 all-wave radiogramophone.

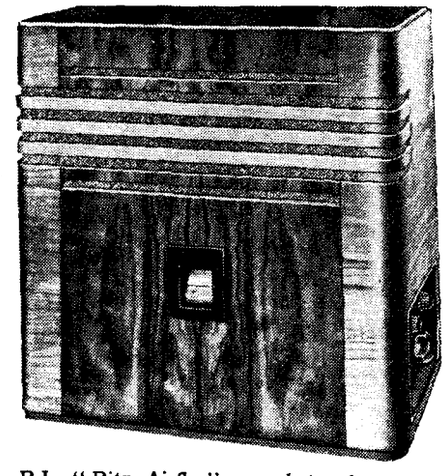
R.I. (80)

The "Ritz" series of battery and A.C. mains superheterodynes form the foundation of the exhibit on this stand. The five-valve circuit employs modern valves, and gives the equivalent of eight and, in some cases, nine effective stages. Some striking examples of modern cabinet work are used to house these chassis, probably the most interesting being that of the "Ritz Airflo" receiver. Only the tuning scale is visible from the front, the control panel being sunk in a recess at the right-hand side of the cabinet. The loud-speaker grille consists of a number of narrow parallel slots which are carried for a short distance round the corners of the cabinet. The loud-speaker baffle is set back several inches from the front of the cabinet, and it is claimed that the arrangement results in sound distribution over a much wider angle. The price of this receiver is 16 guineas. Equally unusual is the radiogramophone equivalent. This model, which is known as the "Ritz Moderne," is housed in a stepped cabinet on severely modern rectangular lines, and is notable for the large amount of space available for record storage. The price is 38 guineas.

The "Ritz Twin Speaker" receiver and the equivalent "Ritz Duotone" radiogramophone were examples of receivers with dual loud-speaker units.

Notable additions to the R.I. range of components are the "Micrion" H.F. choke, the "High Fidelity" intervalve transformer with bi-ferrous core, and the RI/PAC superheterodyne preselector and oscillator unit.

Radio Instruments, Ltd., Purley Way, Croydon.



R.I. "Ritz Airflo" superheterodyne receiver.

R.S.G.B. (204)

This stand is the rendezvous of the short-wave transmitting enthusiasts, and some very fine examples of amateur constructional work are to be seen in the transmitting sets lent for the occasion. Information on all amateur activities is available.

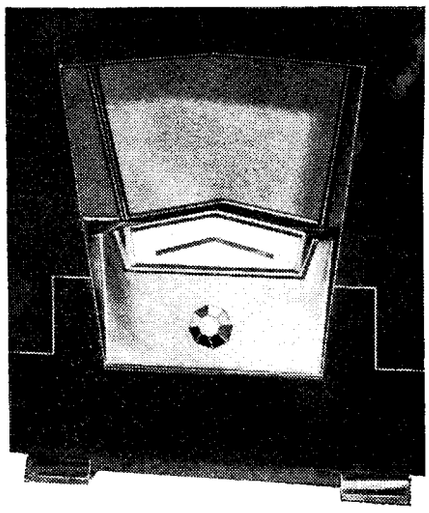
Radio Society of Gt. Britain, 53, Victoria Street, S.W.1.

REGENTONE (99)

The model AS/45 receiver shown on this stand is of the four-valve type, priced at 14 guineas. A signal-frequency H.F. amplifier is embodied, and the frequency-changer is a triode-pentode. There is a single I.F. stage feeding a duo-diode-output pentode; a neon tuning indicator is fitted, and a tone control. The only control to appear on the front of the cabinet is that for tuning, all the others being placed in a convenient position on the left-hand side. The model AS/35 employs a similar chassis, but no signal-frequency amplification is included, and the price is 12 guineas. Both sets are for A.C. operation, but in the case of the smaller receiver D.C. and battery models are available.

Stand-to-Stand Report—

In addition to receivers, a number of H.T. eliminators are on view, including models designed for operating Class "B" and Q.P.P. stages. An A.C. model of this type,



The Regentone Model AS/45 superheterodyne.

the CB/20, is rated for a peak current output of 40 mA., and priced at £3 19s. 6d.

Regentone, Ltd., Worton Road, Isleworth, Middlesex.

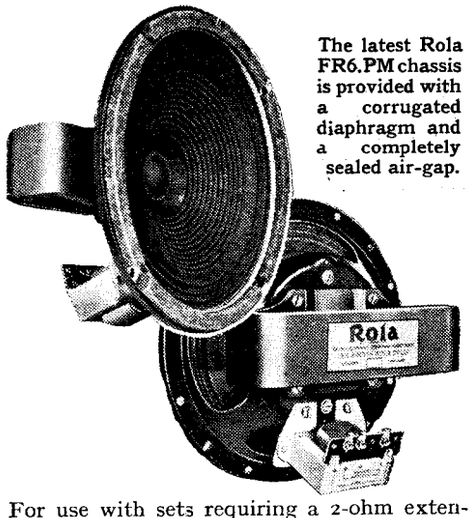
RIST (233)

This firm is showing a very wide range of instrument wires, battery cables, and many different types of aerial, earth and connecting wires, also a variety of bakelite parts and mouldings as supplied to the trade.

A. Rist (1927), *Ltd., Freemantle Road, Lowestoft.*

ROLA (48)

The latest additions to the very comprehensive range of Rola loud speakers are provided with corrugated diaphragms and a completely dustproof air gap. The FR6-PM is typical of this series, and is supplied in cabinet form for use as an extension loud speaker at £3 10s. with output transformer.



The latest Rola FR6.PM chassis is provided with a corrugated diaphragm and a completely sealed air-gap.

For use with sets requiring a 2-ohm extension loud speaker the price is £3 2s. 6d. The new cabinet is also supplied for use with any other type of unit for 30s.

British Rola Co., Ltd., Minerva Road, Park Royal, N.W.10.

SHALLESS RADIO (241)

The main feature of the Shalless exhibit is a straightforward H.F.-det.-L.F. A.C. mains receiver for A.C. operation. The set is a table model, and in the plinth on which it stands is a convenient drawer for accommodating a programme journal. The Unimains A.C.-D.C. mains set also has a straight circuit. There is also a portable universal mains public address equipment

Shalless and Evans, Havelock Street, S.E.23.

SIEMENS (77)

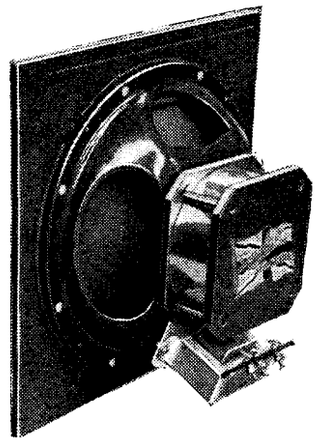
The batteries manufactured by this firm need no introduction, but each year there is generally something a little more interesting than the exterior of an H.T. battery to be found on this stand. This time it is a display of the raw materials used in the construction of dry cells, and a demonstration of the precautions taken to ensure long shelf life.

Among the numerous additions to the types now stocked, the 300-volt high-insulation dry battery for cathode-ray work is worth special note.

Siemens Electric Lamps and Supplies, Ltd., 38-39, Upper Thames Street, E.C.4.

SINCLAIR (232)

Extension loud speakers designed to fulfil the requirements of all the leading sets, and the "2 in 1 Dual," which in cabinet form



Sinclair "Flag" permanent-magnet moving-coil loud speaker.

sells at 5 guineas, are the principal exhibits on this stand. A new 7in. P.M. chassis incorporating a nickel-aluminium magnet is also shown. This model, which is known as the "Flag," sells at 29s. 6d.

Sinclair Speakers, Ltd., 13, Vale Royal, York Road, N.7.

SMITH'S (47)

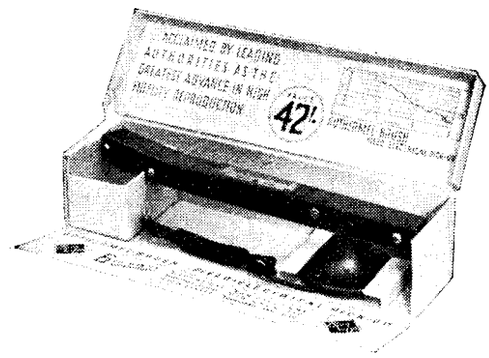
Anodex high-tension dry batteries in standard, extra power, and triple power capacities are exhibited, together with special batteries for Class "B" sets. There is also a series of L.T. accumulators, both of the "mass" and quick-discharge types. Batteries for all the well-known self-contained sets are also available.

S. Smith and Sons (Motor Accessories), Ltd., Cricklewood Works, N.W.2.

SONOCHORDE (43)

In addition to a wide range of moving-coil loud-speaker units the principal exhibits on this stand are the Rothermel-Brush piezo-electric pick-up and loud-speaker units.

The pick-up, which costs 2 guineas, has a remarkably high voltage output and very free needle movement. Its output in the upper register is also above the average.



Rothermel-Brush piezo-electric pick-up shown by Sonochorde.

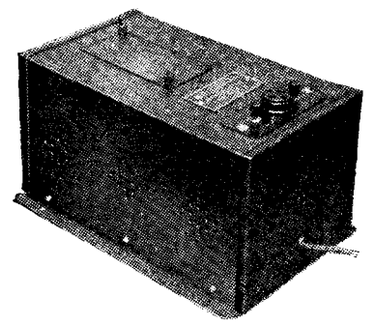
The piezo-electric loud-speaker units include a model at 50s. expressly designed to work in conjunction with an existing moving-coil loud speaker.

Sonochorde Reproducers, Ltd., 1, Willesden Lane, N.W.6.

SOUND SALES (203)

A very wide range of mains equipment, including transformers, smoothing chokes, and paper condensers, is shown on this stand. *The Wireless World* Push-Pull and Universal output transformers are shown at the prices of 32s. 6d. and 37s. 6d. respectively. A particular feature was being made of *The Wireless World* Push-Pull Quality Amplifier, which can be supplied in modified form for use with PP5/400 output valves at the price of £19 10s. A special mains transformer and filter condenser block are also available for this amplifier.

Dual loud speakers priced at £5, including a special output transformer, are on view. A new L.F. coupling unit—the Filtafeed transformer—has a primary inductance of 80H. and a ratio of 1-3.5. Its price is 4s. 6d., and it is noteworthy for its small physical dimensions.



Sound Sales car battery charger.

Equipment for cathode-ray television receivers is shown. A time-base unit capable of being used on either 30-line or 120-line television is priced at £12 10s., and an exciter unit for the Ediswan tube is listed at £7 15s.

Now that car radio is becoming more widely used, the car battery requires more frequent charging, and a special charger for this purpose is shown. It is simple to operate and to connect, and can be relied upon to make good the extra drain upon the

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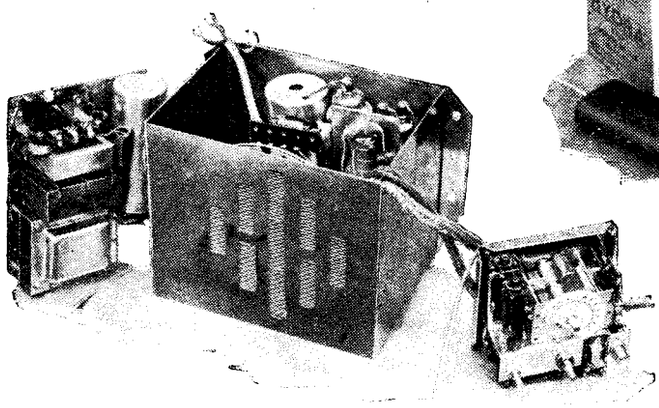
battery. The exhibit is completed by a range of chokes for use in interference eliminators.

Sound Sales, Ltd., Tremlett Grove Works, Junction Road, N.19.

SUNBEAM (35)

Probably the most interesting of the new Sunbeam receivers is the 14-guinea car radio set; it is in two units, control being effected through a tuner unit which comprises the input and frequency-changing circuits. This control unit is mounted on the dash, and measures only $4\frac{3}{4} \times 4\frac{1}{2} \times 2\frac{3}{4}$in. The output from the frequency changer is fed *via* a multiple screened cable to the main section of the receiver. Four valves and a self-rectifying vibratory H.T. generator are included in this unit.

The new universal superheterodyne embodies a basically conventional four-valve circuit, with the important exception that the second valve combines the functions of



Sunbeam car radio set ; dashboard control unit is on the right.

I.F. and L.F. amplification—a revival, in fact, of the reflex principle.

There is also a midget superheterodyne, and a very cheap universal superheterodyne in a cabinet of normal size.

Sunbeam Electric, Ltd., Park Royal Road, N. Acton, N.W.10.

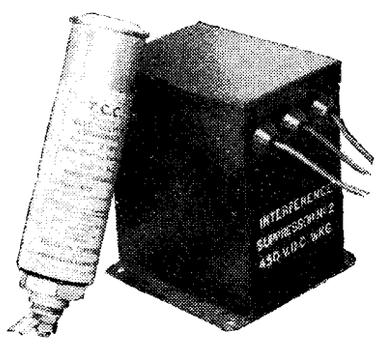
SWIFT LEVICK (118)

The new nickel-aluminium alloy magnets are shown in a very wide range of sizes and shapes, and special attention is directed to the question of finish.

Swift Levick and Sons, Ltd., Clarence Steel Works, Sheffield.

T.C.C. (37)

Very few additions have been made to the T.C.C. range of condensers for this season, as the existing models in all series adequately meet every present-day need. The latest product is an 8-mfd. wet electrolytic condenser for 500 volts D.C. working, assembled in a tubular case of the now familiar pattern and costing 6s. 6d.



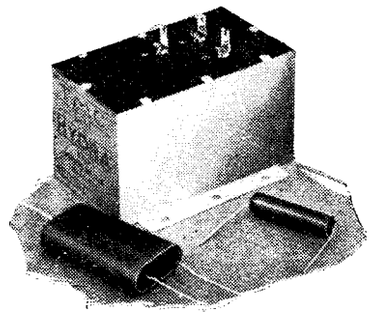
New T.C.C. electrolytic condenser and interference suppressor, Model No. 2.

One new model interference-suppressor unit is available. It incorporates two high-voltage test condensers and a pair of mains fuses, and is designated the type No. 2 to differentiate it from the earlier unit, which, however, is still retained at the same price.

Telegraph Condenser Co., Ltd., Wales Farm Road, N. Acton, W.3.

T.M.C. HYDRA (105)

Paper dielectric condensers made to the specification of the well-known Hydra products are shown by this firm. Known as the T.M.C.-Hydra range, there are now five types in metal cases for working voltages of from 250 to 750 D.C., and in all standard capacities up to 10 mfds. There are block-type condensers containing several capacities, a range of tubular models with wire ends in sizes from 0.0001 mfd. to 0.1 mfd., also an interesting dual pattern of 0.1+0.1 mfd. for 400 volts with one model for 600 volts D.C. working. The tubular type cost from 6d. to 1s. 3d. each, and the dual-style 2s. and 2s. 3d. each respectively.



(Above) Selection of T.M.C.-Hydra condensers.

Telephone Mfg. Co., Ltd., Hollingsworth Works, Martell Road, S.E.21.

TANNOY (95)

Although amplifiers form the chief exhibit on this stand, a radiogramophone occupies a prominent position. This set includes a signal-frequency amplifier, an octode frequency-changer, and a single I.F. stage feeding a duo-diode-pentode. An extra I.F. stage is included solely for Q.A.V.C. purposes, and a small triode L.F. amplifier feeds an output impedance of 600 ohms. The amplifiers marketed by this firm are designed for operating with an input impedance of 600 ohms, so that any desired amplifier may be used with this particular receiver.

One of the smallest amplifiers is the AC25; this is of the two-valve type with an output of 6-8 watts, and it is priced at 26 guineas, including loud speaker. The M25 portable model is of particular interest in that it can be operated from a 6-volt or 12-volt car battery. Three Class "B" valves are used in parallel in the output stage to give an output of some 8 watts, and a rotary converter is provided for the H.T. supply. A gramophone pick-up and turntable are included, together with a microphone and horn-type loud speaker, and the equipment is listed at 38 guineas.

Tannoy portable public address equipment for operation from a car battery.

Other amplifiers shown include models with outputs rated up to 50 watts, while various types of public address loud speakers are prominent.

Tannoy Products, Canterbury Grove, S.E.27.

TELEGRAPH CONSTRUCTION & MAINTENANCE CO. (112)

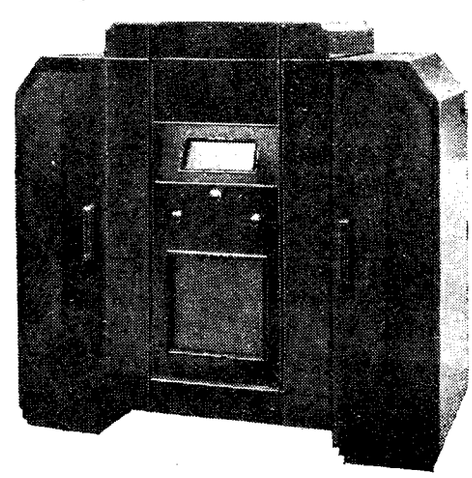
A model house occupying the centre of the stand demonstrates the application of "Telcon" broadcast relay cable. The insulation is impervious to moisture and atmospheric corrosion, and in multiple cables the lay of the wires and internal screening are arranged to prevent cross talk.

The applications of "Mumetal" for transformer cores and "2129" alloy for component screens are illustrated by examples.

Telegraph Construction and Maintenance Co., Ltd., Telcon Works, East Greenwich, S.E.10.

TELSEN (75 & 101)

It is perhaps rather a pity that the type of superheterodyne circuit embodied in the new Telsen A.V.C. model (which will probably be regarded as their most important production) is not more widely represented at the present show. Due to the inclusion of a signal-frequency H.F. stage, this set is raised above the class of the standard small superheterodyne, and becomes at once a much more interesting production. The sensitivity of the set is high, and due no doubt



Telsen de Luxe automatic radiogramophone.

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to the inclusion of iron-cored tuning coils, selectivity is extremely good; full data as to the performance of the receiver is published by the makers. In spite of these advantages, the price of the set is not high; it costs 14 guineas in either upright or horizontal cabinet.

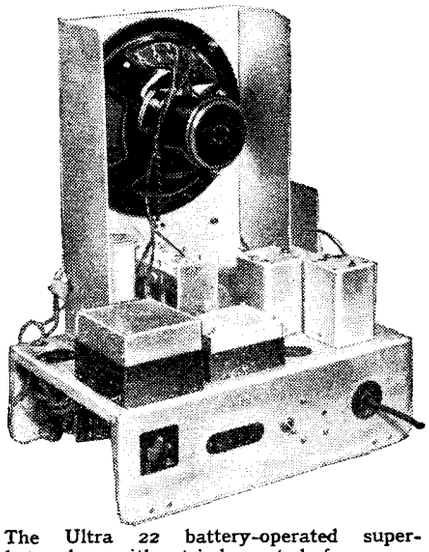
A somewhat similar chassis to that of the standard receiver described above is fitted in a *de luxe* automatic radiogramophone. There is, however, the addition of an intermediate L.F. valve, which feeds into a pair of push-pull valves giving an output of 6 watts.

Turning to the new components, attention should first be directed to the L.F. transformers, both for direct and parallel feed connection. Tests made by the N.P.L. show that characteristics are exceptionally good, although the prices are distinctly moderate. Comparable with these components are the new L.F. chokes, output chokes, and special transformers for push-pull, Class "B" and Q.P.P. circuits. The self-sealing paper condensers, with an exceptionally high insulation resistance, are also interesting, as are the new series of iron-cored coils available in matched sets of either two or three, mounted complete with wave-range switching.

Telsen Electric Co., Ltd., Aston, Birmingham.

ULTRA (67)

An unusual receiver is to be found on this stand. This is the Ultra 55, which is designed for universal operation, and is priced at £8 15s. A variable-mu H.F. pentode is preceded by a pair of coupled tuned circuits, and is coupled to the duo-diode-output pentode by an aperiodic transformer. An output of 3.9 watts is obtainable. The model 44 of this firm is a three-valve superheterodyne with a triode-pentode frequency-changer, an H.F. pentode I.F. stage, and a duo-diode-output pentode valve. The output is again 3.9 watts, and a neon tuning indicator is included; the set is designed for A.C. operation, and is priced at 15 guineas for the table model. The Ultra 22 is a similar receiver, but the detector is a duo-diode-triode, the triode portion of which feeds the Q.P.P. output stage through a transformer coupling. This set costs 12 guineas.



The Ultra 22 battery-operated superheterodyne with a triode-pentode frequency-changer.

Ultra Electric, Ltd., Erskine Road, N.W.3.

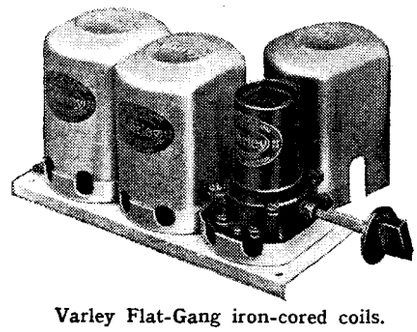
362 VALVES (244)

This stand is devoted to a display of the various types of valves manufactured by this firm. A complete range of battery valves is shown including a Class "B" type rated for 3 watts output. This valve is the BX2 at the price of 9s.; it requires an anode supply of 180 volts and is rated for a maximum anode current of 50 mA. A smaller valve, the BA2, is rated for an output of 1.5 watts at 150 volts. The triodes and screen-grid valves in the range are available in alternative styles, plain or Toledo, the latter being metal-sheathed. A number of indirectly heated A.C. types are also on view.

The 362 Radio Valve Co., Ltd., Stoneham Road, E.5.

VARLEY (103)

The chief feature of this exhibit is undoubtedly the permeability tuner. This is an assembly available in three- or four-gang types in which tuning is carried out by varying the inductance of the coils instead of in the customary manner with a variable condenser. Iron-cored coils are used, and the inductance variation is obtained by fitting movable cores. An improved performance is claimed, insomuch as both sensitivity and selectivity remain substantially constant over the whole tuning range. A three-gang unit is priced at 67s. 6d. and a padding coil for use in superheterodynes is listed at 3s. 6d. extra



Varley Flat-Gang iron-cored coils.

The well-known range of transformers, both mains and L.F., are shown together with a selection of smoothing chokes, and a wide variety of iron-cored coils. Nicore Flat-gang coils have been introduced and have similar electrical characteristics to the Nicore tuning coils, but are smaller physically. The Duo-Nicore coils are inexpensive models which do not include waveband switching. I.F. transformers are now listed at 8s. 6d. and are available for frequencies of either 110 kc/s or 465 kc/s; they are fitted with adjustable trimmers of the concentric type and variable coupling, for which it is claimed that a symmetrical resonance curve can be maintained.

Among the wide range of components the "Power Puncher" deserves mention; this is an H.T. economiser and permits a type of quiescent operation to be obtained with a single output valve. Resistances, both fixed and variable, are on view as well as a gramophone pick-up.

Varley (Oliver Pell Control, Ltd.), Bloomfield Road, S.E.18.

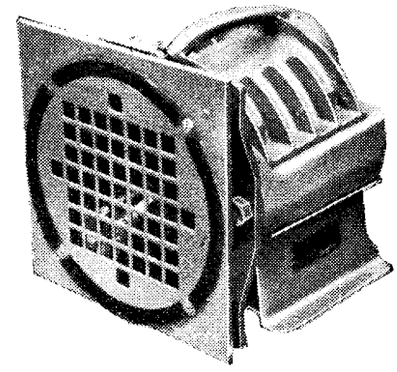
VIDOR (106)

This stand is devoted to a display of H.T. batteries of various types for wireless purposes. The 120-volts type is listed at 6s. 6d. or at 7s. with grid bias tappings included. Various bias batteries are also shown.

Vidor, Ltd., West Street, Erith, Kent.

VOIGT (255)

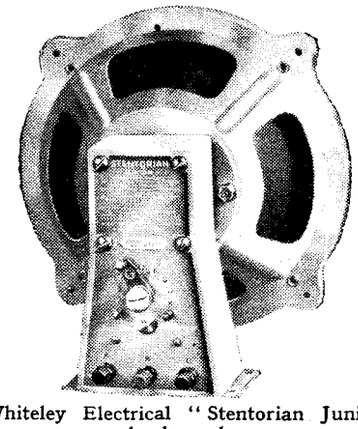
Loud speakers of high electro-acoustic efficiency and wide frequency response are the principal products of this firm. Hitherto their use has been confined mainly to public address work, but this year domestic models of the horn and reflector baffle type are shown. The latter type consists of a lower reflector of solid concrete, a half section of the standard 4ft. horn and a top reflector giving equal distribution through 180 degrees. The cabinet is finished in glazed black and chromium.



Voigt protected loud-speaker unit for outdoor use.

On the public address side a new type of protected unit under course of development is demonstrated. It is interesting to note that this unit is rated by the sound output radiated at maximum power, the figure being 4×10^7 ergs.

Voigt Patents, Ltd., The Courts, Silverdale, S.E.26.



Whiteley Electrical "Stentorian Junior" loud speaker.

W.B. (98)

The new "Stentorian" moving-coil loud speakers make use of an exclusive type of nickel aluminium alloy known as "Nital," and are provided with dust-proof air gaps. The "Senior" and "Standard" models at 2 guineas and £1 12s. 6d. respectively are fitted with the "Microlode" matching device which now incorporates a switch for use when the unit is to be used as an extension loud speaker. The "Stentorian Baby" at 22s. 6d. has a "Nital" magnet and a tapped output transformer.

The well-known W.B. range of valve-holders and components has been augmented

Stand-to-Stand Report—

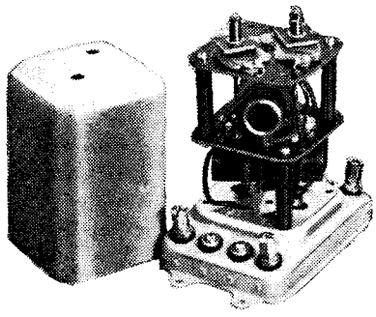
by a two-way tone control designed to emphasise either bass or treble, and priced at 7s. 6d.

Whiteley Electrical Radio Co., Ltd., Victoria Street, Mansfield, Notts.

WEARITE (1)

This firm is showing coils of both the iron- and air-cored types; the latter are obtainable in a number of different types to suit various circuits, and are uniformly priced at 7s. 6d. each. Waveband switching is included. Iron-cored coils are listed at 12s. 6d., and are also available in various models. A new iron-cored I.F. transformer for 110 kc/s has been introduced at the price of 7s. 6d.; adjustable trimmers are provided, and the coupling between the two circuits can be varied.

H.F. chokes of high current carrying capacity for use in the mains leads of receivers and other apparatus are shown, and include the H.F.8 with an inductance of



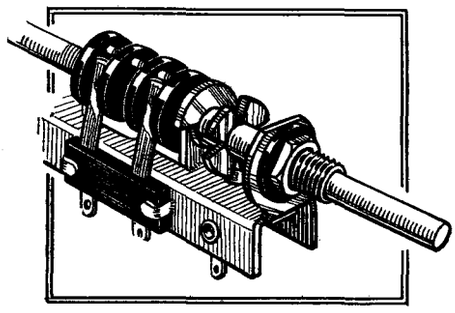
Wearite Nucleon I.F. transformer for 110 kc/s.

100,000 mH. and a current rating of 0.25 ampere, the H.F.10 with an inductance of 200 mH., and a current rating of 3 amperes, and the HF11 which has an inductance of 2,000 mH., and can carry a current of 0.75 ampere.

A series of short-wave coils wound on Mycalex skeleton formers in order to reduce losses to a minimum are shown, and these coils are listed at 5s. 6d. each. A low-loss valve-holder is priced at 1s. 3d., and a S.W. H.F. choke wound on a Mycalex former costs 1s. 9d.

This exhibit is completed by a wide range of mains transformers and smoothing chokes, while the well-known Class "B" and Q.P.P. components are also on view.

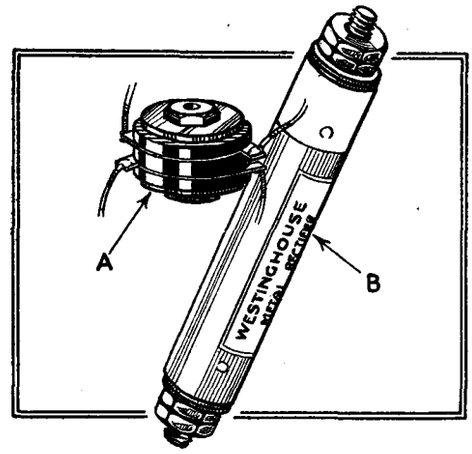
Wright and Weaire, Ltd., 740, High Road, Tottenham, N.17.



Wearite multi-contact switch.

WESTINGHOUSE (86)

Further progress has been made in the development of the metal-oxide rectifier for high-frequency work, and this year Westinghouse is showing the new WX6 Westector, claimed to give satisfactory operation up to 1,500 kc/s. The half-wave model as shown costs 7s. 6d.



Two new Westinghouse rectifiers: (A) 10 mA. instrument type; (B) high-voltage model for cathode-ray tube excitation.

Instrument rectifiers form another interesting section, as in their latest form they show no frequency error up to 100,000 cycles, and quite a small error only at the customary I.F. frequency of modern superhets.

The new type are made for 1, 5 and 10 mA. full-scale reading D.C. meters for conversion for A.C. measurements, and they cost 25s. each.

There is also a range of special low current rectifiers for cathode-ray tube excitation, models being shown capable of giving 750 volts output on half-wave or, with two in a voltage doubler circuit, 1,500 volts.

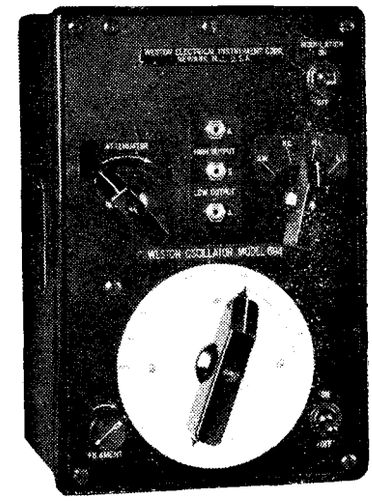
H.T. and L.T. rectifiers, also a wide range of commercial charging equipment, complete a most interesting display.

Westinghouse Brake and Saxby Signal Co., Ltd., 82, York Road, King's Cross, N.1.

WESTON (239)

The principal instruments shown on this stand are the Selective Analyser and the model 694 Oscillator. The Selective Analyser serves for all voltages and current measurements, both A.C and D.C., of valves under working conditions in the receiver to which it is joined by special plug adaptors inserted in the valve-holders of each stage in turn. It can be used also as an output meter, and the price, complete with all accessories, and in a carrying case, is £15 15s.

The other instrument is a modulated H.F.



Weston modulated oscillator, Model 694.

oscillator covering all the radio frequencies required for set testing and servicing of modern sets. The H.F. output is modulated to a depth of approximately 30 per cent. on all bands and very complete screening is adopted. Its price is £13 13s.

A wide selection of Weston meters is included also in this exhibit.

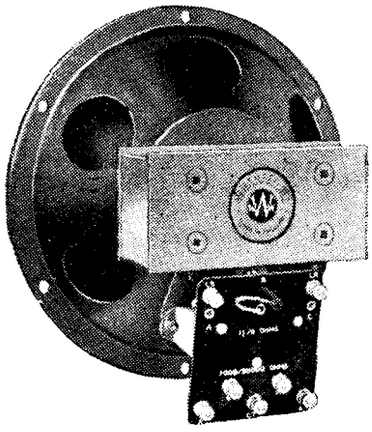
Weston Electrical Instrument Co., Ltd., Kingston By-Pass, Surbiton.

A general view of the hall at Olympia, showing the widely spaced stands and the neon lighting.

WHARFEDALE (205)

The well-known "Bronze" and "Golden" chassis are now fitted with nickel-aluminium magnets, and special credit

Stand-to-Stand Report—
is due to the makers for having published pressure response curves of the "Bronze" model, showing the improvement over last season's model. This loud speaker, incidentally, is available in a special black and



Wharfedale "Bronze" permanent-magnet moving-coil loud speaker.

chromium cabinet, and is known as the "Nubian" model, the price being 75s. 6d.

Wharfedale Wireless Works, 62, Leeds Road, Bradford.

WOLSEY (T15)

Apart from manufacturers' products representing the wholesale side of this firm's activities, there is shown on this stand the Wolsey Television Kit, which will cost less than £4, and contains all the essential parts for television reception with a broadcast set. There is a new design of gas-filled television lamp, the illumination from which is claimed to be high enough to permit the picture being projected on to a small screen.

Wolsey (Radio and Allied Trades) Wholesale, Ltd., 54, Lamb's Conduit Street, W.C.1.

Interference from Ignition Systems

THE problem of what has been termed "man-made static" is sufficiently before the public eye to require no special explanatory comments. One form of interference, namely, that from the ignition systems of aircraft or motor cars, has been peculiarly troublesome to eliminate, and straightforward methods of doing so by comprehensive screening of high-tension cables have been regarded unfavourably as being possible sources of breakdown or inferior performance of the engines.

It is interesting, therefore, to note a suggestion for attacking the problem from a different standpoint. It is known, of course, that the pulses from the ignition system of an internal-combustion engine are of exceedingly short duration, and that the tuned circuits of a radio receiver are excited by the shock of each pulse so as to continue in oscillation long after the pulse itself has died away. Mr. A. A. Linsell has proposed that the receiver should be made inoperative during the short interval of time when the pulse is sent out by increasing the damping on one of the high-frequency circuits. The radio-receiver, to put it colloquially, is "anæsthetised" immediately before each spark of the ignition system passes, and, when it "comes to," it is unaware of what has happened, and continues uninterruptedly in its business of receiving signals.

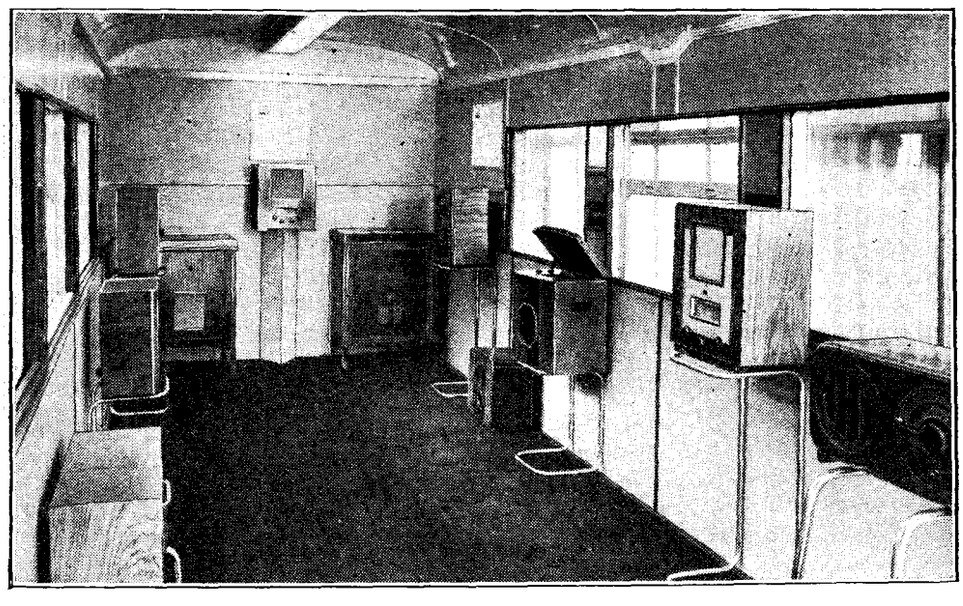
A further interesting development of this idea consists in adapting it to super-regenerative reception. According to the latter method in normal operation, a receiver is provided with a positive feedback coupling tending to generate oscillations, and arrangements are made for the intermittent quenching of these oscillations at some frequency preferably above the audible limit but lower than that of the radio frequency being received. Mr. Linsell's adaptation of this principle consists in making the quenching frequency an exact multiple of the spark frequency of the internal-combustion engine, so that, whenever the engine fires, the oscillations are being quenched for super-regenerative purposes.

Synchronising with Ignition System

It is proposed to generate the quenching or damping effects by means operated synchronously with the ignition system of the car; for example, by means of a magnetic device mounted so as to rotate on the shaft of the magneto. Impulses derived from this source can be used to introduce damping into a tuned circuit by flashing a neon tube connected across the circuit. It would appear necessary to time the quenching effect so as to be very slightly in advance of the spark, otherwise the receiver may not be entirely "unconscious" when the spark passes.

An arrangement of this kind, if successfully put into effect, would be of great use for the reception of commercial traffic messages and intelligence generally, though it might be liable to the same defects as super-generative receivers in normal operation, whereby interfering whistles are produced as a result of the modulation of the received carrier wave by the frequency of damping or quenching.

A RADIO SHOW TRAIN



An enterprising idea in selling radio sets is illustrated in this picture of a restaurant car purchased from the Southern Railway by Bon Marche, Ltd., of Brixton. The car has been reconstructed as a radio show room and is touring various London and suburban stations.

THE RADIO INDUSTRY

THE New Osram Valve Guide, issued this year as a handy pocket-book of 64 pages, is an exceptionally well-arranged and informative publication. In addition to technical data regarding Osram valves, it contains circuit diagrams, abacs, etc.

The sales and technical staffs of Everett, Edgcumbe and Co., Ltd., are now concentrated at Colindale Works, Hendon, London, N.W.9, where all communications should be addressed.

Having outgrown their present premises, Pifco, Ltd., have transferred their business to Pifco House, Shudehill, Manchester. Telephones, City 4044 and City 0831.

Ekco has taken time by the forelock, and the tuning scales of all new receivers bear the name of the new National Transmitter at Droitwich.

A full range of Goltone anti-interference devices is to be seen on the G.P.O. stand at the present Olympia Show: it will also be on view later at the Glasgow Exhibition.

The latest Wearite list is more than a catalogue; it contains technical data and information on the use of their products, and is illustrated by circuit diagrams, etc. Copies from Wright and Weaire, Ltd., 740, High Road, Tottenham, London, N.17.

The latest list received from Redfern's Rubber Works, Ltd., Hyde, Cheshire, shows slight increases of price of some products; this is due to increased cost of raw rubber.

C.A.C. STEP OUT OF THE RUT!

—and the critics applaud their initiative!

INTIMATE TECHNICAL TALKS (No. 2.)

By the DESIGNER

When they were first introduced some two years ago, iron-cored coils were hailed as the panacea of tuning troubles. Their substitution for the small air-wound type in a simple set did, indeed, improve the selectivity to quite a marked degree, and there was also the advantage of compactness. With the widespread introduction of the superhet, however, the iron-cored coil is, in our opinion, of doubtful benefit, as the distortion due to sideband attenuation is generally very marked and it is difficult to design a tone correction circuit which restores the weakened high notes in their correct proportion. With some iron-cored coils, ganging troubles arise. On the other hand, it is possible to design efficient air-cored coils to an exact predetermined value and their constants do not vary over the waveband . . . Therefore iron-cored coils do not enter into the construction of C.A.C. "AUSTIN" Superhets

ALL SETS DESIGNED AND BUILT UNDER THE PERSONAL SUPERVISION OF MAJOR W. I. G. PAGE, B.Sc. (late technical staff "The Wireless World.")

We would tell you all about the Austin sets—their excellent workmanship—their superlative cabinet work. . . . But why do that when we can quote the glowing words of the critics—the people who **know!**

"GRID LEAK" of the "Daily Sketch" (August 17th) says:—

"It is not the beautiful housing of any receiver which has the biggest attraction for me. First of all I want to know what the 'innards' are like. The City Accumulator Company, Ltd., however, have a way of always providing the best specimens of cabinet work at any exhibition, and I can truthfully say they are sorry to cover up the genius of their radio designer, Major Page, who for a considerable time designed sets for 'Wireless World.'

"Here will be found perfection in radio engineering, and no expense has been considered in the choosing of the best components. No wonder the reproduction is superb. Whether it is the Austin A.C. Mains set or the battery set, they throw *up* the quality of the B.B.C. transmissions instead of belittling them.

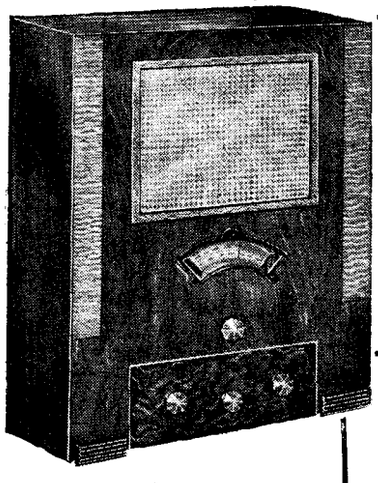
"C.A.C. provide two highspots in the show—best craftsmanship and Miss England, the Beauty Queen The Jacobean cabinet with its radio-gram and ingenious method of record receiving and rejection, or the combined wireless set and divan, on which, if you are lucky, you will find reclining England's Beauty Queen, are undoubtedly the finest examples of British workmanship in the show."

"WIRELESS WORLD" (August 17th) says:—

". . . there are many other sets with elaborations, amongst which may be mentioned the Marconiphone, H.M.V., and **C.A.C.** models. The two first-mentioned manufacturers also produce simpler sets. The C.A.C. receiver has the unusual feature, almost unique in its class, of twin loud speakers and a special circuit arrangement which helps to overcome the distortion normally produced by slightly inaccurate tuning, and is, therefore, likely to give better results than usual in unskilled hands"

"MUSIC TRADES REVIEW" (August Number) says:—

"There never has been, at any Radio Exhibition, a more exquisite display of cabinet craftsmanship and beauty than that shown by the C.A.C. Company . . . this is an exhibit which leaves one proud of British craft, and it will cause much comment. . . . Judging by the technical care which has been given by the radio engineer, Mr. Page, to the radio and gramophone side of this firm's activities, there is nothing better in the Show"

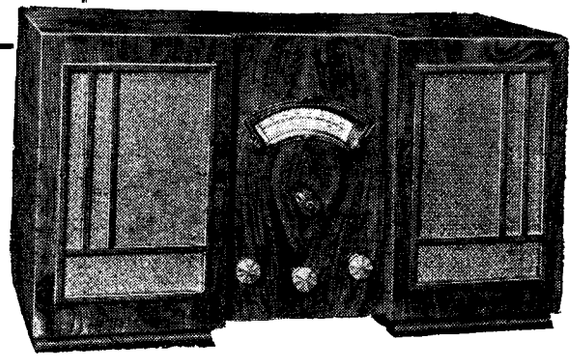


SPECIFICATION

Five-valve Superhet Receiver for Battery operation. 9 in P.M. Moving Coil Speaker. Provision for pick-up and external speaker. Band-pass tuning with link-coupling.

Price 16 Guineas

Or 12 equal monthly payments of 31/6. Fully guaranteed for 12 months.



SPECIFICATION

Table Model five-valve (including Rectifier) Superhet for A.C. Mains and Twin Matched 8 in. Energised Rola Speaker. Provision for pick-up External Speaker and Mains Aerial.

Price 18 Guineas

Or 12 equal payments of 35/5.

EXHIBITIONS

We are exhibiting at the following:

SCOTTISH RADIO EXHIBITION,
KELVIN HALL, GLASGOW.
August 31st to Sept. 8th.
STAND No. 82

NORTHERN RADIO EXHIBITION,
CITY HALL, MANCHESTER.
Sept. 14th to 22nd.
STAND No. 73

MISS ENGLAND—
The Beauty Queen will be present on our Stand at both Exhibitions.

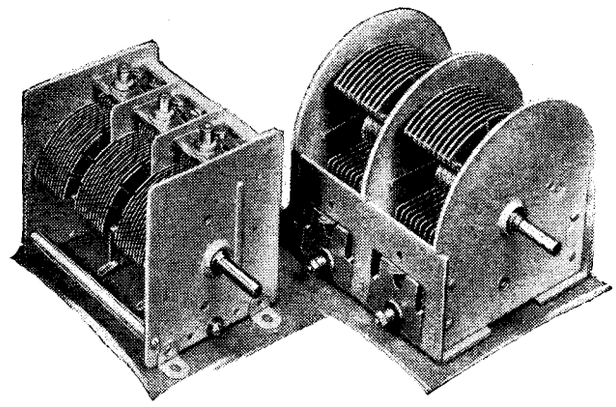
Austin

BE SURE TO SEE A C.A.C.

Advertisement of THE CITY ACCUMULATOR CO. LTD., 18-20, NORMAN'S BUILDINGS, CENTRAL STREET, LONDON, E.C.1. ***Telephone: Clerkenwell 6206 (3 lines.)***

HINTS AND TIPS

AIDS TO BETTER RECEPTION



The new three-gang condensers are sometimes smaller than their two-gang equivalents of two years ago.

Battery Economy Conversions

ONE of the most important developments of the past year in the field of battery economy is the introduction of "double pentode" valves for Q.P.P. circuits. In a single envelope there are contained all the electrodes of a pair of pentodes and a single filament common to both; it will be obvious that the use of one of these valves affords an easy and simple way of modernising the output stage of an out-of-date receiver. Not the least of the advantages is that the output required from the detector for full loading of the double push-pull pentode is comparatively modest, and so the existing detector circuit will probably not need modification.

The skeleton diagram given in Fig. 1 shows the essence of the conversion in question. Generally speaking, it will be necessary to do away with the existing output circuit entirely, and also to provide a new L.F. transformer, which should be of the special type designed for these circuits, with a step-up ratio in the neighbourhood of 8:1. Ordinary low-ratio push-pull transformers are suitable only when one is prepared to interpose an intermediate L.F. stage. A loud speaker with a suitable transformer will also be needed.

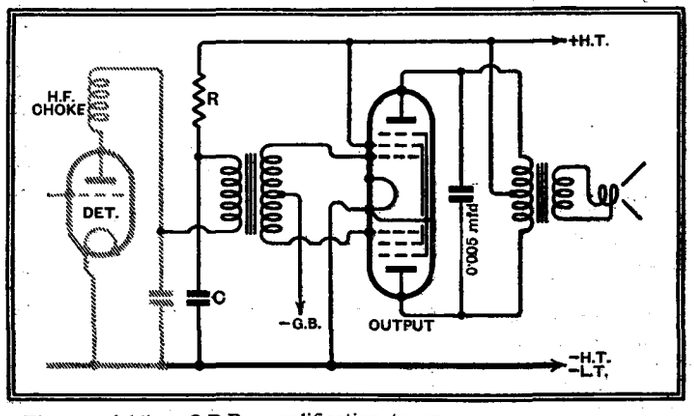


Fig. 1.—Adding Q.P.P. amplification to an existing set. The decoupling components C and R may have values, respectively, of 2 mfds. and about 10,000 ohms.

Replacing a Bias Resistor

WHEN a bias resistor burns out in a typical modern set it is worth while remembering that in many cases it may be replaced, as a temporary measure, by a battery of the appropriate voltage. Dry cells are sometimes easier to obtain on the spur of the moment than is a resistance of the correct value and current rating.

The battery is inserted in place of the burnt-out resistance, its positive pole being connected to the cathode of the valve, and its negative to the earth line. All this applies, of course, to "self-bias" circuits, where the valve normally derives its grid bias from the flow of its own anode current through a resistor.

Leaky Condensers

THE Olympia Show indicates a definite revival of interest in resistance-capacity-coupled L.F. amplification, and so it is perhaps opportune to warn those without previous practical acquaintance with this method of a minor risk of trouble connected with it.

It is highly important that the insulation of the coupling condenser used between adjacent valves should be beyond suspicion; this condenser has applied to it the full voltage of the source of H.T. supply, and if any appreciable leakage exists the grid bias of the succeeding valve will be upset. Bias voltage will, in effect, be reduced to an extent depending on various factors, such as the leakage resistance of the condenser and the value of the grid leak.

An indication of leakiness in a coupling condenser will be afforded by the fact that the anode current of the valve immediately succeeding it is excessively high.

The New Season's Components

VISITORS to Olympia will have noticed the extreme compactness of the ganged variable condensers produced this year by almost every manufacturer. It is perhaps a coincidence, but certainly a fortunate one, that a three-gang condenser of 1934-35 has almost exactly the same spindle length as a two-gang component of a couple of years ago, while its width is even less.

This at once suggests the possibility of modifying two-circuit sets of the H.F.-det.-L.F. type by fitting an input band-pass filter, bringing the total number of tuned circuits up to three. To do the job properly, and to derive full benefit from the alteration, it will probably be necessary to fit a new set of coils as well as a new condenser. Here, again, the modern tendency towards compactness is in our favour, as three modern iron-cored coils will probably occupy no more baseboard area than the two air-cored coils they replace.

At one time the form of coupling used between the two component circuits of a band-pass filter was a matter of acute controversy, but nowadays it is found that the necessary linkage between the circuits can be effected satisfactorily in a number of different ways. As a rule it will be best to be guided by the maker of the coils, and to use the arrangement that he recommends for his own particular products.

Result of an Overload

WHEN one is unfortunate enough to apply an accidental short-circuit across the output of a rectifying valve, there is a real risk that the valve itself will be damaged, especially if the short-circuit be of more but momentary duration. Even if the valve is not seriously damaged, it is quite possible that its emission may suffer, and so after an accident of this kind it is well to check the H.T. supply circuit with a milliammeter and/or a voltmeter.

An Improvised Portable

MODERN battery sets—not excepting those of the simpler H.F.-det.-L.F. type—are so sensitive that they are sometimes used on holidays and like occasions as improvised portables in conjunction with a few feet of wire as a makeshift aerial. It is worth while pointing out that under these conditions the range of the set can generally be improved to a worth-while extent by eliminating the existing aerial circuit of the input band-pass filter, if one be fitted.

In the circumstances we are considering (with a very short aerial) this extra circuit will no longer be needed as an aid to selectivity, and it will probably cause an unnecessary reduction in sensitivity. The

Hints and Tips—

plan, therefore, is to disconnect the existing input tuned circuit and to join the improvised aerial directly to the grid of the first valve. Reganging of the band-pass secondary circuit, which now becomes the input circuit, will be necessary.

Endangering the Milliammeter

WHEN nothing else happens to be available, there is a temptation to use a milliammeter in conjunction with a dry battery as an indicator of continuity. But such a procedure should be strongly discouraged, both for the beginner, who does not realise the possibility of damaging a comparatively expensive instrument, and for the more experienced enthusiast, who realises the danger but thinks he can adequately guard against it.

It will be fairly obvious that a milliammeter can only be used for this purpose when the circuit through which a test is to be made includes a high value of resistance—sufficiently high, in fact, to limit the current flowing to a value not exceeding the maximum rating of the instrument. But the danger is that in the process of testing a short-circuit may take place between the test leads, or, even more likely, they may be applied across a component which is thought to have a high internal resistance, but where a short-circuit actually exists.

Unless one has a special instrument for continuity tests, the safe plan is to use a voltmeter in conjunction with a testing battery of a lower voltage than the maximum reading of the instrument.

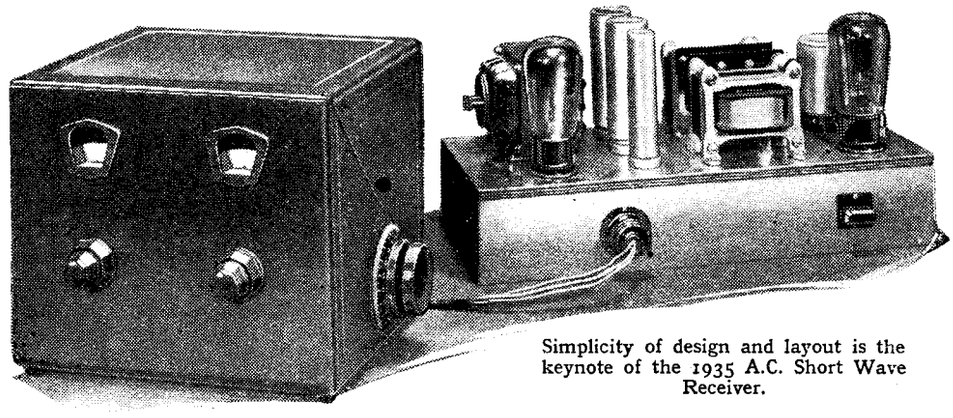
In Next Week's Issue:—

1935 A.C. Short-wave Receiver

A New Receiver for the 12—70-Metre Band

THE prospect of at least a minor "boom" in short-wave reception during the coming winter justifies the presentation of a suitable receiver which is up to date in every respect while being simple to construct and operate. In addition to well-tried features, *The Wireless World* 1935 A.C. Short-wave Receiver incorporates several novelties, including a system of "band-spread" tuning which brings to short-wave reception the simplicity of operation hitherto only associated with the normal broadcast wavelengths.

forward, and even the reaction control, being provided with slow motion, presents no great difficulty. Loud speaker reception is obtained with a very large number of short-wave broadcasting stations between 16 and 49 metres, while amateur stations can be picked up from all Continents.



Simplicity of design and layout is the keynote of the 1935 A.C. Short Wave Receiver.

The set is designed for loud speaker reception. The circuit used employs an aperiodic screened-grid H.F. stage transformer coupled to a leaky-grid detector. These first two valves are housed in a compact metal box. The output stage—a pentode—is coupled by a resistance-fed transformer to the detector, and is housed with the power pack in a separate chassis.

The wiring of the set has been cut down to a minimum, and, owing to the compact coil assembly, plenty of space remains.

Operation of the receiver is straightforward, and even the reaction control, being provided with slow motion, presents no great difficulty. Loud speaker reception is obtained with a very large number of short-wave broadcasting stations between 16 and 49 metres, while amateur stations can be picked up from all Continents.

LIST OF PARTS.

RECEIVER CHASSIS.

1 Variable condenser, 0.00016 mfd. **J.B. S.W. "Special" 2042**
1 Slow motion dial for above **J.B. 2-ratio 2092**
1 Variable condenser, 0.00016 mfd. **J.B. "Popular Log" 1049**
1 Slow motion dial for above **J.B. 2-ratio 2092**
1 Variable condenser, 15 mmfds. **Eddystone 900**
1 Fixed condenser, 1 mfd., 300 v. D.C. working **T.M.C. Hydra 30**
(Dubilier, Goltone, Peak, T.C.C., Telsen)
1 Fixed condenser, 0.0001 mfd., Tubular **T.M.C. Hydra T.3**
2 Fixed condensers, 0.01 mfd., Tubular **T.M.C. Hydra T.17**
(Dubilier, Ferranti, Graham-Farish, Peak, Polar-N.S.F., T.C.C., Telsen)
1 Resistance, 1,000 ohms 1 watt **Bryce**
1 Resistance, 10,000 ohms 1 watt **Bryce**
1 Resistance, 15,000 ohms 1 watt **Bryce**
1 Resistance, 50,000 ohms 1 watt **Bryce**
1 Grid Leak with wire ends, 5 megohms **Loewe FZ139**
(Dubilier, Erie, Graham-Farish, Claude Lyons, Polar-N.S.F., Seradex)
1 Skeleton short-wave choke **Bulgin H.F.14**
(Eddystone, Kinva, Wearite)
1 Coil base, 6-pin, baseboard type **Eddystone 969**
3 Plug-in coils, 6-pin **Eddystone 6 L.B., 6 Y. and 6 R. No. 932**
1 Coil (see text)
1 6-way Connector **Bryce**
1 5-way Cable, 30 ins. **Belling-Lee**
(Bulgin, Goltone, Harbros)
1 5-pin Plug **Bulgin P.3**
(British Radio Gramophone Co., Goltone)
2 Valve-holders, 5-pin, baseboard type **Benjamin**
(Bulgin, Ferranti, Lissen, Telsen, W.B.)
2 Ebonite shrouded terminals, A., E. **Belling-Lee Type "B"**
Metal screening cabinet, 9¾ x 8 x 8ins. undrilled **Eddystone 975**
2 ozs. No. 20 tinned copper wire, 3 lengths Systoflex, wood, etc.
Screws:—
2 ½in. No. 4 R/hd.; 2 ½in. No. 4 R/hd.; 9 ¾in. No. 4 R/hd.
Valves:—1 Mullard S4VA, 1 Mullard 904V metallised.

POWER UNIT.

1 Mains transformer, 350-0-350 volts, 4 volts, 2.5 amps., 4 volts, 3 amps. **Wearite Type "B"**
(B.S.R., Challis, Davenset, Claude Lyons, Parmeko, Sound Sales)
2 L.F. chokes, 30 henries **Sound sales 30V.**
(Bulgin, Davenset, Varley, Wearite)
1 L.F. coupling unit **Benjamin "Transfeeda"**
(Bulgin)
1 Electrolytic condenser, 4 mfds., 500 v. peak working **Dubilier 0283**
2 Electrolytic condensers, 8 mfds., 500 v. peak working **Dubilier 0281**
(Ferranti, Peak, Polar-N.S.F., T.C.C.)
1 Electrolytic condenser, 50 mfds., 50 volts **Dubilier 3003**
(Ferranti, T.C.C.)
1 Fixed condenser, 1 mfd., 300 volts D.C. working **T.M.C. Hydra 30**
1 Fixed condenser, 2 mfds., 800 volts D.C. working **T.M.C. Hydra 30**
(Dubilier, Goltone, Peak, T.C.C., Telsen)
1 Resistance, 350 ohms 1 watt **Bryce**
1 Resistance, 1,000 ohms 2 watts **Bryce**
1 Resistance, 1,500 ohms 2 watts **Bryce**
1 Resistance, 7,000 ohms 1 watt **Bryce**
(Dubilier, Erie, Graham-Farish, Claude Lyons, Polar-N.S.F., Seradex)
2 Valve holders, 5-pin, under baseboard type **Eddystone 954**
1 Valve holder, 4-pin, under baseboard type **Eddystone 953**
(Clix, Goltone)
1 3-pin Plug and socket panel **Belling-Lee 1119**
Plymax baseboard, 16 x 7 x ⅜ins. **Peto-Scott**
2 ozs. No. 22 tinned copper wire, 6 lengths Systoflex, wood, etc.
Screws:—
14 ½in. No. 4 R/hd.; 12 ½in. No. 4 R/hd.; 6 ¾in. No. 4 R/hd.; 2 4B.A. C/hd., with nuts and washers.
Valves:—1 Mullard Pen./4VA; 1 Mullard IW3.

The Wireless League

Diplomas for Approved Traders

WE learn that rapid progress has been made with the Wireless League Traders' scheme during the past year, and that there are now nearly 400 Wireless League approved traders throughout the country, whose premises are recognisable by the sign of official appointment, this being similar in appearance to those issued by the leading motoring organisations.

In future a script vellum diploma, signed by a committee of prominent officials, will be displayed by all Wireless League approved traders. This diploma is only issued after stringent examination.

Associate membership of the League is open to all listeners on payment of a minimum donation of 2s., which secures free insurance, a 36-page handbook of technical hints, and free technical and legal advice.

Particulars of either the traders' scheme or of associate membership can be obtained on application to the General Secretary, The Wireless League, 12, Grosvenor Crescent, London, S.W.1.

Report of the Radio Research Board for the period 1st January, 1932, to 30th September, 1933. Published by H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. Price 2s. 6d. net.

Detector Saturation

Why Some Receivers Give Less Volume Than They Should

By M. G. SCROGGIE, B.Sc., A.M.I.E.E.

SHORTCOMINGS in design, or sometimes incorrect working conditions result in many receivers being operated with a chronically overloaded detector valve. As a consequence, full volume cannot be obtained. In this article, the causes, symptoms, and cure of this prevalent trouble are described.

THOSE of us who peruse the patent medicine advertisements may have some grounds for suspecting that new ailments of the human race are being fabricated by vested interests. The advertisers appear to be banking on the assumption that everybody feels more or less unwell, or can be readily persuaded that he does; and this forms a good opening for introducing the one certain cure or preventive for which mankind has been blindly groping through the ages.

Something of the same tendency is sometimes apparent in the field of radio; but the intention of this article is not to impute ill-health where none exists, but to point out quite a common and often unsuspected cause of poor results. Before going any farther, and perhaps raising false alarms, a simple test can be prescribed that will give at least a *prima facie* indication whether the disease of detector saturation exists. Tune the receiver to the local station, assuming it to be so strong as to be receivable at comfortable volume with no reaction and the volume control well back from maximum. If a suitable milliammeter is available, connect it to read the current taken by the power valve. Wait for a period in the programme when relatively quiet music is being played—not speech or a military band *fortissimo*. Remove all nervous people, babies, and dogs to some distance. Now turn the volume control up to its full extent, supplemented by reaction. If an infernal row can be obtained, with the milliammeter needle beating time, then you are under no obligation to read more of this article, which will be merely of academic interest to you.

Intermediate L.F. Amplification

On the other hand, if considerable increases in volume control and reaction settings have no power to raise the volume beyond an easily tolerable level, then it may be worth while to read on.

At one time it was standard practice to employ a "first L.F." valve in between the detector and the power valve. As greater amplification prior to the detector became practicable, the power of transmitters was raised, and the sensitivity of power valves increased, a point was reached at which this valve was no longer deemed necessary. Output valves became available which required only two or three signal volts at the grid to give their full volume. As the grid-leak type of detector, which always was and is the commonest, itself amplifies quite considerably, the use of an extra amplifying valve in between clearly meant that the signal at the grid of the detector would be a very small fraction of a volt in order to give full output volume. At about the same time it was shown that the grid-leak type of detector should have a fairly large input—of the order of a volt or more—to work without distortion. Moreover, a large amount of L.F. amplification made it almost impossible to prevent hum becoming audible in mains-driven sets. Microphony was another trouble which increased with L.F. amplification. So the intermediate L.F. valve disappeared.

No regrets need reasonably be felt at this departure where a properly designed mains-driven receiver is concerned. But when batteries are used the omission of the valve may cause detector saturation unawares. There is a tendency for the difficulty to increase due to the use of various types of output stages, such as Q.P.P., that require a bigger driving voltage.

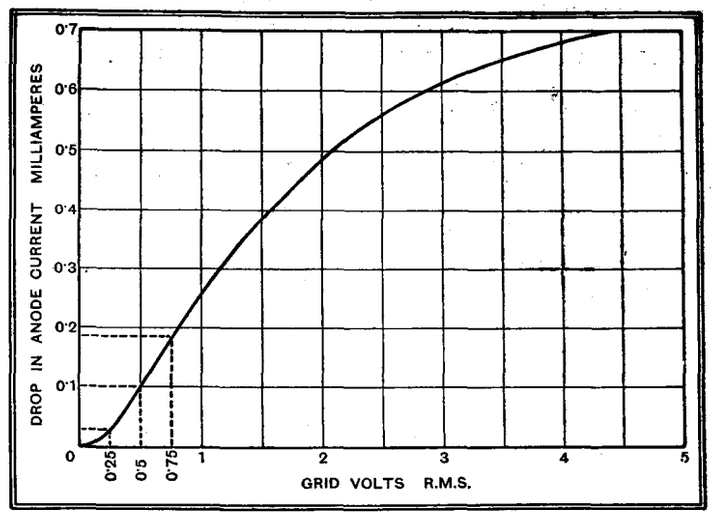


Fig. 1.—This typical curve shows that detector overloading begins with inputs greater than about 1 volt.

To understand the difficulty, and to provide against it, one must have a clear idea of the conditions under which the grid-leak detector works. In the case of an amplifying valve (either H.F. or L.F.) things are much simpler: if the valve amplifies twenty times and an output of 5 volts is required, the input to the grid must be 0.25 volt. A detector amplifies, too, so in the same conditions would require 0.25 volt L.F. But actually it is fed with a H.F. carrier voltage, and, in general, this is considerably larger than the L.F. voltage borne by it. Only if the detector were perfect, and the carrier modulated 100 per cent., could it be as low as 0.25 volt.

An Example of Saturation

The average modulation during a programme is more like 25 per cent., which would mean a carrier voltage of 1; and that does not allow for the fact that in practice the detector is not perfect. Actually, when the carrier voltage exceeds a certain amount the detector falls off very badly in efficiency, and fails to give the required output. Any attempt to increase the output by increasing the input to the detector just makes matters worse by reducing the detector efficiency still further. The detector is *saturated*.

Things are quite likely to be even worse in practice. The method of increasing the input to the detector is still very commonly that of reaction. Among other things, reaction increases the sharpness of tuning and reduces the percentage modulation. So here is another effect contributing to saturation. The result is that when one tries to get weaker programmes by pressing reaction to the limit, the maximum obtainable volume is very feeble. Naturally enough, the user thinks the set is not sensitive enough for these weak stations, whereas detector saturation is the real limiting factor. The only good thing about it is that it helps to reduce the effect of fading.

A picture of what happens can be got by looking at Fig. 1, which shows the results of applying a gradually increasing carrier voltage to the grid of a detector

Detector Saturation —

valve and noting the resulting drop in anode current (which is the means of passing the signal on to the next valve).

When the input voltage is low it has little effect, but as it becomes greater (from 0.4 to 1.0 volt in this example) the output is more nearly in proportion. After that the slope gradually falls off.

Such a curve itself suggests saturation, but to find the actual effect one must remember that the sound from the loud speaker is dependent on the *change* in anode current drop. If there is a constant unmodulated signal (during an interval in the programme, for example) which we may suppose to be 0.5 volt, then the anode current also remains steady at 0.1 milliamp. less than the amount when no carrier wave is being received. Now, suppose a steady modulation of 50 per cent. to commence, such as a tuning note. This means that the carrier wave fluctuates 50 per cent. above and below its previous ampli-

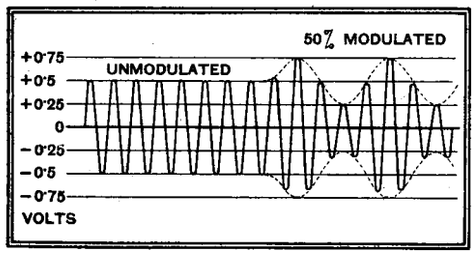


Fig. 2.—The effect of modulation on the voltage input to a detector.

tude (see Fig. 2), and so touches extremes of 0.25 and 0.75 volt. The corresponding extremes of anode current are 0.03 and 0.185 milliamp. Now, if it were a perfect detector these should also be 50 per cent. above and below the steady value, or 0.05 and 0.15. The fact that actually they are different means distortion.

Modulation and Output

As it happens, the above conditions are about as favourable as they could be for this particular detector, and the distortion is not very bad. But if the carrier wave were of a different amplitude, or modulated more deeply, the results would be worse; not only as regards distortion, but also the output for a given input.

The example given shows that it is quite easy to calculate the useful current change corresponding to any carrier amplitude and modulation. Fig. 3 shows the sort of thing one gets, taking 20 per cent. and 80 per cent. modulation as examples. At 0.5 volt carrier amplitude the output is fully up to, and, in fact, rather beyond, what it ought to be with a distortionless detector, and the 80 per cent. output is just about four times as great as the 20 per cent., which, of course, is as it should be.

If now the carrier amplitude is increased, the output corresponding to 80 per cent. modulation continues to be quite well maintained, until the carrier is over 1 volt. Beyond 2 volts there is very little further increase in output. But the case of 20 per cent. modulation is far worse. The increase in output falls off noticeably about 0.5 volt carrier. Then at 2 volts the output is actually on the down grade! In other words, a strengthened signal gives less volume. This explains why it is that sometimes a strong station tunes in at two points close together on the scale. Mistuning a little each side of the real tuning point decreases the amplitude at the detector and "unsaturates" it, giving *increased* volume.

When extreme reaction is used, the amplitude of the carrier wave is boosted out of all proportion to the sidebands; in other words, the percentage modulation is decreased. It may be brought far below 20 per cent. It is clear that the combination of big carrier amplitude and low percentage modulation is the worst possible, and may cause saturation when the output is still quite small.

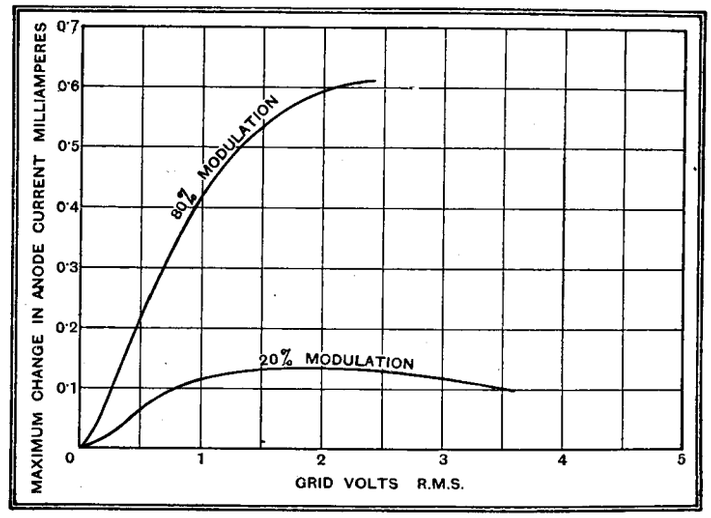


Fig. 3.—Showing that the incidence of overloading varies with depth of modulation.

This is demonstrated by the results of a test carried out on a typical low-power battery-driven detector circuit, as in Fig. 4. Here a source of modulated carrier wave, of a frequency of 175 kc/s (1,715 metres), is applied *via* a dummy aerial to a half-way tap on an efficient tuning coil. The detector valve is resistance-coupled to a power valve, and the input to the grid of this valve is measured by a valve voltmeter. It is true that the anode filter circuit is rather too severe for best quality, and is reducing the voltage somewhat; the object of this is to ensure that no radio-frequency voltage gets through to confuse the measurements. As all the voltage readings are reduced in the same proportion the shape of the curve is unaffected.

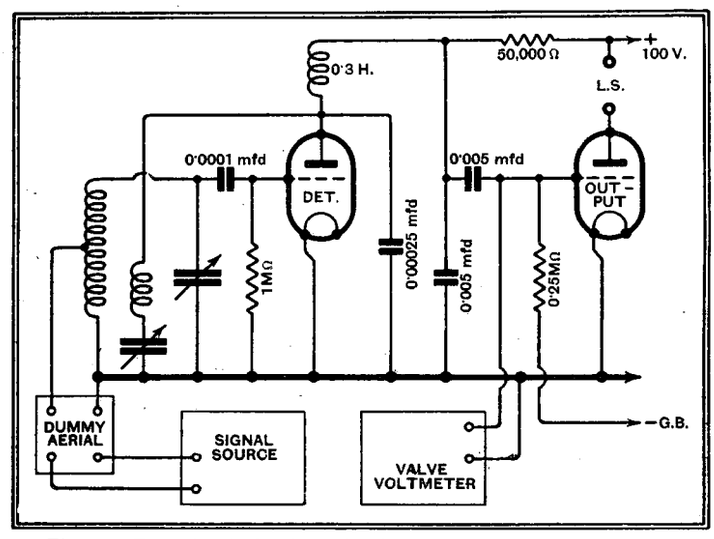


Fig. 4.—Test circuit for investigating the effects of reaction on detector overloading.

Two sets of readings were taken; one with reaction adjusted to the threshold of oscillation, and one with no reaction. The results are shown in Fig. 5. They indicate clearly the tremendous advantage of reaction in amplifying small signals by bringing the detector beyond the inefficient lower bend of its characteristic curve. But the modulation, although generated at the fairly deep figure of 50 per cent., is so much reduced that almost at the start signs of saturation appear, and the efficiency soon falls off very badly. In spite of the enormously greater amplitude produced by critically adjusted reaction, the output becomes actually less than that given with no reaction.

Now it is in low-power battery sets, in which the detector is so severely limited, that reaction is most relied upon. Even in a mains-driven receiver, where the detector can handle many times more power, one quite often experiences a drastic limitation in volume which can be traced to detector saturation. The reason is that sufficient allowance is not always made for the huge increase in carrier amplitude when reaction is used.

To come now to the methods of avoiding this trouble; some of these should be quite obvious. Either the detector itself may be made to handle an adequate output without saturating, or a limited output can be made to do the job if it is sufficiently amplified. The former of these courses is very definitely to be preferred if it is practicable. Excessive L.F. magnification runs one into all sorts of other

Detector Saturation—

troubles—microphony, hum, motor-boating, and distortion in both detector and amplifier. Unfortunately, in certain classes of receiver it is impracticable to do the right thing, which is to adopt the diode.

In normal receivers there is no possibility of saturating a diode, which can handle many volts—indeed, the more the merrier, for distortion only occurs when the input is too *small*. But of course, this in itself raises problems, and to get sufficient H.F. amplification without reaction, a superheterodyne is wellnigh compulsory. *Without reaction,* mark; because unless some rather unusual device is adopted, as in the "Single-Span" receivers, reaction cannot be effectively combined with a diode detector. The diode itself is quite incapable of providing reaction; and the whole point of using it is to withhold the H.F. currents from the following L.F. valve, which consequently has no reaction powers. Therefore this solution is no good for simple sets with one H.F. stage

A sort of compromise, which is tending to be largely superseded by the diode, is the power-grid detector. This is fed with so many volts and milliamps that it handles a fairly large output through sheer brute force. But this is such a wasteful method of only partly accomplishing the task that the only justification for it is the provision of reaction. It is really too extravagant for the poor battery set, which is the chief subject of our concern. Generally if there is enough power available to feed an effective power-grid detector there should be enough to put into a H.F. amplifier capable of working a diode (which, by the way, takes no H.T. current).

If a Q.P.P. stage is used with the object of getting good volume without an uneconomical flow of battery power, it should especially be noted that it requires a very large total grid swing. Even when the transformer has the highest possible step-up ratio, one must still be able to get more out of the preceding valve than an economical grid detector is likely to want. There is not much point in going to the trouble of installing a Q.P.P. stage if it is starved by the detector. One might just as well do the thing properly and include a resistance-coupled intermediate L.F. stage. The more elaborate sets are quite happy with their double-diode-triode valve.

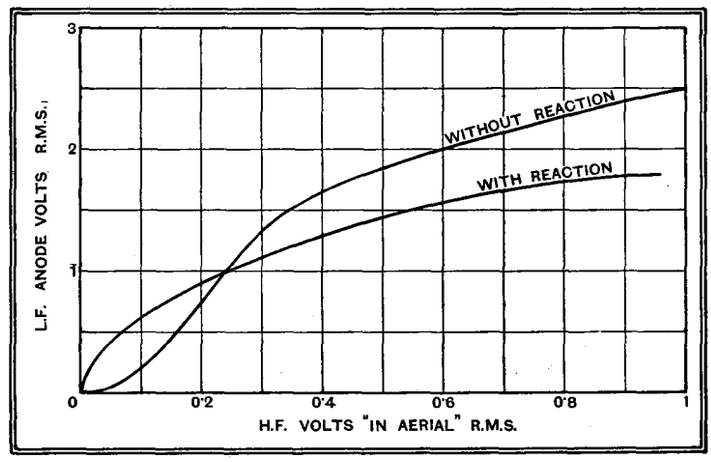


Fig. 5.—Reaction greatly increases the output on weak signals, but after a critical strength is reached actually causes a falling off.

A diode valve shares with the Westector the advantage of virtual immunity from overloading.

To summarise:

(1) The ordinary grid detector has a strictly limited output, and the use of reaction limits it still further; this is an often unsuspected cause of poor volume from distant stations.

(2) Owing to limited battery power for the detector, and dependence on reaction for range, the cheaper types of battery-driven set are particularly subject to detector saturation.

(3) The difficulty is further increased by the need for greater grid drive in Class "B" and Q.P.P. systems.

(4) Provision of a large amount of L.F. amplification is an undesirable solution, but hardly avoidable in simple battery sets.

(5) Power grid detection is generally an unjustifiable compromise.

(6) The correct solution is diode detection, but it requires sufficient preceding amplification to give at least a volt or two without reaction.

The Diary of an Ordinary Listener

THAT great tetralogy, "Der Ring des Nibelungen," was brought to a triumphant close at the Bayreuth Festival with a fine performance of "Siegfried" and "Die Götterdämmerung." I must frankly admit, however, that I do not share Wagner's evident admiration for the character of his hero, Siegfried. To me he appears simply as a blustering lump of brawn whose vaunted fearlessness was the result of profound ignorance and lack of imagination. When Wagner tries to make a hero out of this lout it arouses in me a feeling of irritation which even his thrilling music cannot entirely dispel, and for this reason I could only listen to selected portions of the two operas, including, of course, the "Sword Song" and the "Funeral Procession."

On Friday, August 10th, I found Bazin's light opera, "Le Voyage en Chine," broadcast from Radio Paris, an excellent antidote for the large gulps of Wagner's music which I had imbibed earlier that week, while the orchestral concert transmitted by Milan offered varied and more substantial fare, beginning with Brahms' masterly Symphony in E minor, which was followed by a Toccata, Bourrée and Gigue by Scarlatti, arranged and orchestrated by Casella, and finishing up with the "Blue Danube" waltz, all of which were finely interpreted by the well-balanced orchestra under the baton of Amfitheatrof.

Saturday's evening programmes were, as usual, of a light and cheerful nature, the most attractive being the concert by the orchestra of the Casino at Vichy, relayed by Sottens, which included the overture to Berlioz's "Beatrice et Benedict" and the ballet music from Gluck's "Alceste."

Sunday being a day of rest, I did not seek for any complex music, but contented myself with the selection of tuneful melodies played by the Residenz Orchestra at the Kurhaus, Scheveningen, and broadcast from Hilversum. These included a selection of Strauss' waltzes. Radio Toulouse also cheered up the evening with operatic songs in praise of wine.

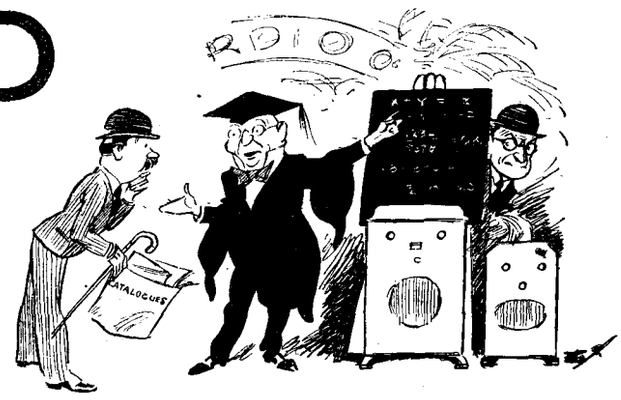
On Monday Juan-les-Pins transmitted a short selection of light music beginning with the "Turkish Patrol," followed by the overture to "Die Fledermaus," and Luigini's "Ballet Egyptien." I then switched over to a most attractive programme of operatic music by the A.V.R.O. orchestra and soloists, broadcast by Hilversum, which included the overture to Bellini's "Norma" and the well-known quartet from "La Bohême."

With advancing years I find Mozart's formal and straightforward compositions more and more satisfying as a change from Wagner's tempestuous strains, in which even an impassioned love duet sounds to the uninitiated more like a violent quarrel, or the restlessness and unhomogeneity of contemporary music; I therefore devoted most of the evening to the enjoyment of a delightful concert by the Mozart orchestra conducted by Bernhard Baumgartner at Salzburg, which was relayed from Vienna, Beromunster, Huizen, and Radio Paris. The programme comprised a march in D major, the "Haffner" serenade in the same key, and the Nocturne in G major, all of which proved most comforting after a rather arduous day's work.

CALIBAN.

UNBIASED

By FREE GRID



Nightmare of mathematical miasmata.

My A.S.C.

AS a result of suffering much from the continuously functioning wireless set next door, I formed the opinion many years ago that all sets should be compelled by law to be fitted with a time switch which automatically turned off the juice every ten minutes or so, thus compelling listeners to go to the trouble of switching on again if they really *were* listening intelligently to the programme. The daily drooler would, however, in my opinion, soon get fed up with continuously switching on again, and we should get a little peace.

There is only one objection to such a scheme, and that is that in many cases the set would automatically switch itself off in the middle of a musical selection, and, according to a friend of mine whose name is notorious in the musical world, the hiatus would spoil the æsthetic enjoyment of the item for people of his kidney.

I have, therefore, for a long time been working on a device of my own for overcoming this difficulty by delaying the switching-off process until after the conclusion of the item being broadcast. The apparatus consists of a spring-loaded relay

Unnecessarily irritated.

which keeps the juice switched on as long as the carrier wave is modulated. When modulation ceases, however, the relay releases its armature, which breaks the circuit.

Unfortunately, my system of A.S.C. (automatic switching control) has, in practice, been found to possess one serious drawback. It was first noticed the other evening during a trial run which I gave it before my musical friend. The number being churned out was the Hallelujah Chorus, and, as most people know, there is a foolish and quite unnecessary "rest" just before the concluding 2.35 bars of this particular number. The result was that the set took advantage of the pause to switch itself off, and my friend was, in my opinion, unnecessarily irritated because he did not hear the final portion. Since he knew what it sounded like, having heard the piece times without number, I failed to see the cause of his annoyance.

However, he was adamant about it, and furthermore he informs me that since there are many similar numbers with these unnecessary rests, my A.S.C. system will not do. I have, therefore, been cudgelling my brains for a delayed A.S.C. system which will meet the case, but so far without success.

Lingolympia

IF you think that I am going to waste my time and space by describing the Olympia Exhibition for you, then you are considerably mistaken. In any case, I do not feel competent to describe it, as I have never laid any claim to be a reliable theatre or music-hall critic.

There is one very strong protest concerning a certain feature of the Exhibition, however, which I must voice here and now. It so happened that I was not present at the opening of the Exhibition, but a report of a scandalous state of affairs existing there which was telephoned to me by a non-technical friend speedily brought me on the spot.

My friend had gone there with the express intention of buying a new set, and, being non-technical, but, nevertheless, intelligent, he had approached the salesmen on various stands for some useful information concerning their wares. You can therefore judge of his dismay when, in every case, he was met with nothing but an outpouring of technical jargon mingled with a nightmare of mathematical miasmata which was as meaningless to him as the hieroglyphics of Thotmes III on the Embankment.

I came as fast as a taxi could bring me, and a rapid rush round of the various stands fully confirmed my friend's report. The whole place was simply alive with technical men of all sorts and breeds who babbled ceaselessly of such things as magnetostriction and other factors calculated to put the ordinary set-buying citizen completely out of his stride.

What on earth is the good of using all this wretched Lingolympia to the average man, who merely wishes to be given a little common-sense information about the set he is purchasing? If the average patent-medicine merchant were to talk to his intending customers about what was in the concoction instead of what it was supposed to do, he wouldn't remain in business for five minutes.

Radio and the Drought

THE drought has been used as an excuse to cover up most evils this year ranging from the alleged evil temper of the Derby favourite to the shortcomings of the various water-controlling authorities in not taking advantage of wet years by building bigger reservoirs.

According to a very eminent American radio authority who ought to know better, the drought is causing severe fading owing, as he says, to the difficulties of wireless waves travelling over dry ground. I could have understood him if he had said that there was some falling-off in the efficiency of receiving installations owing to the fact that the majority of people do not, like myself, emulate the example of the wise virgins by siphoning their bath water on to their buried earth plates.

Unfortunately for him, real DX, even in America, is, of course, sponsored by old man Heaviside, and I cannot for the life of me see what ground waves have got to do with that. In any case, the dryness of the soil is more or less constant nowadays, and does not vary from minute to minute, so I cannot understand how it can cause fading anyway.

The Atlantic noticeably drier.

He puts the tin lid on the whole affair, however, by saying that the evil effects of the drought have been particularly noticeable in the case of the reception of British stations in America. I cannot say that I have heard of any reliable reports to the effect that the Atlantic ocean is noticeably drier as a result of the drought.

News of the Week

Current Events in Brief Review

Radiolympia

RADIOLYMPIA, 1934, bids fair to break all attendance records before the doors are closed to-morrow night (Saturday). More than 30,000 people passed through the turnstiles on the first two days.

The B.B.C. Theatre was filled to capacity at each performance.

Nearing 6½ Million

APPROXIMATELY 239,580 wireless licences were issued by the British Post Office during July. This is a net increase of 21,970 licence holders during the month. The total number in force at the end of July was 6,395,560, marking an increase of 70,660 since July, 1933.

Divine Gifts

OUR Italian contemporary, *Radio-Lux*, has a happy phrase concerning Signor Mussolini's broadcasting activities. "The Duce and the microphone," says the journal, "have rapidly come to understand each other since each of them is a divine gift."

French Radio Research

AFTER many delays France is to have a National Radio-Electricity Laboratory somewhat on the lines of the Radio Research Board in this country. M. Mallarmé, the French Postmaster-General, states that a site for the laboratory has been chosen at Bagneux.

What of the Others ?

"UNION Radio," the Spanish broadcasting company, announces on the occasion of its ninth anniversary that a quarter of a million listeners have now taken out licences. At the same time, the managing director confesses that this represents only one-tenth of the actual number of listeners.

German Licence Figures

THE monthly decline in the number of German broadcast licences was less in July than the previous two months. The total number of German licences on August 1st was 5,357,819, as compared with 5,359,480 a month earlier.

"The Wireless World" Index and Binding Cases

THE index for Vol. XXXIV, January to June, 1934, is now ready and may be obtained from the publishers at Dorset House, Stamford Street, London, S.E.1, price 4d. post free, or with binding case 3s. 1d. post free.

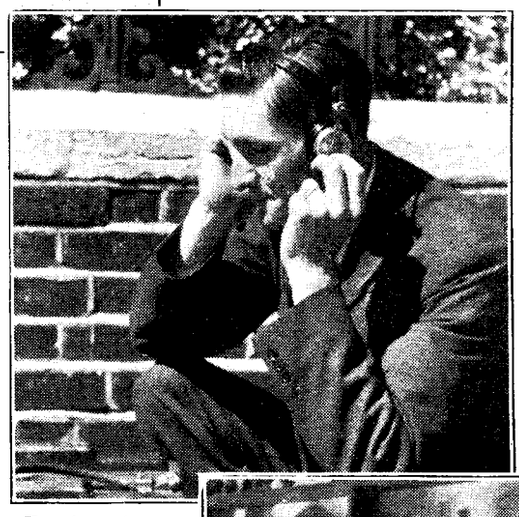
Who Pays ?

IN fining a wireless pirate at Birmingham Police Court a few days ago the Chairman remarked: "The difficulty is that we do not know whether this may not be coming out of the children's stomachs. I don't know who is the more to blame in a case of this kind—the buyer or the seller of the set."

Radio and the Drought

A SCIENTIFIC "show-down" (writes our Washington correspondent) has been called on accusations that radio is responsible for droughts and heat waves by, in some magical way, "choking off" the clouds or drying them up with bombardments of electricity. The answer should be known late this year.

To prove his claim that these contentions are "bunk," J. R. Poppele, chief engineer of Station WOR, Newark, has made arrangements with the New Jersey College of Agriculture to conduct practical experiments. WOR is now installing a super-power 50-kW. transmitter at Carteret, N.J., to be completed in time to begin operating December 1st. Many acres immediately adjacent to the new station will be planted, and the results of the energy upon the crop will be studied and reported.



THREE EPISODES in the Post Office anti-interference film shown at Olympia. John Citizen having lodged a complaint of static, the sleuths arrive (above), get on the trail (right) and, after some smart detective work, run to earth the offender — a refrigerating grocer.

France and the "Proms"

FRENCH listeners are showing keen interest in the British Promenade Concerts. The Liszt concert from the Queen's Hall will be relayed from Radio Paris on September 20th, and the concluding concert of the series on October 6th.

Television for £2

ACCORDING to the Vienna *Telegraf*, a young Austrian engineer has evolved a cathode-ray television receiver which gives not only head and shoulder views but crowd scenes in smallest detail. Not the least attractive aspect of the invention is its low price; receivers, it is stated, will be available at approximately £2 sterling.

Concerts from Ostend

CONCERTS from the Ostend Kursaal and the Knocke Casino will soon be heard again on the broadcast ether. We learn that the misunderstanding between the Belgian radio authorities and the Casino managements has been satisfactorily cleared up. The Belgian National Radio Institute is to pay a lump sum for the broadcasting of twenty concerts.

Wind Up

A STRANGE stoppage occurred in the Copenhagen programme on Sunday, August 12th. The Twelfth Copenhagen Community Concert was being relayed from the Odense Municipal Park when, without warning, a gale sprang up. In a few moments sheets of music from the playing stands were caught up and wafted over the trees. The musicians tore after them, but in the meantime the conductor concluded the programme with a few explanatory, but restrained, remarks. Broadcasting was continued from Copenhagen.

Norwegian Regional Scheme

A LIVELY debate on broadcasting recently took place in the Norwegian Parliament, members of which showed a surprising acquaintance with the technicalities of radio in discussing the future of the "Store Landsplan"—the new broadcasting scheme which provides for covering the whole country with a network of low-power stations.

During the debate it was also decided that the Broadcasting Corporation and the Telegraphs Bureau should begin laboratory experiments to devise a "People's Receiver" on the lines of the Hitler set in Germany.

Germany's Radio Sets

THE total turnover in German radio receiving sets during the first half of the year was 474,554, according to an announcement by the German Radio Manufacturers Association. Of these, 240,659 were "People's Receivers," which, it is interesting to note, are sold at a largely reduced profit to all concerned. 45,798 German receivers were exported.

Wireless on Fire Engines

RADIO sets have been installed on all fire engines and ambulances operated by the Stockport police.

BROADCAST BREVITIES

By Our Special Correspondent

Big News Developments ?

FLEET STREET is watching with a good deal of interest the appointment of a News Editor at Broadcasting House.

The explanation that the former chief of the News Department, Mr. McGregor, had been transferred to the Empire service was rather disingenuous, because it would have been as easy to import someone else for the Empire programmes and leave Mr. McGregor in a job of which he has made a marked success.

The new appointment is, I believe, the precursor of big developments in news broadcasting, particularly in the direction of running commentaries sandwiched between the ordinary news items.

The Services at "B.H."

Professor John Coatman, the new editor, was formerly a member of the Indian Police. Thus all the Services are now represented at Broadcasting House. Even the Marines are represented in the person of the Military Band maestro, Mr. Walton O'Donnell.

Lucky Empire Listeners

EVERYONE should own a short-wave set, if only for the reason that even in this country there is an opportunity to pick up short-wave programmes from Daventry.

It seems to me that Empire listeners are getting some good things which are altogether missed by the home listener. For example, in the near future the Daventry short-wave transmitters will broadcast a series of talks entitled "Meet the Detective," in which famous exponents of sleuth fiction will describe how their tales were evolved and how the principal actors first took shape in the minds of their creators.

Sleuths and Their Creators

The list includes "Sapper," who will deal with Bulldog Drummond; A. E. W. Mason (Hanaud); Baroness Orczy (The Scarlet Pimpernel); Freeman Wills Crofts (Inspector French); Austin Freeman (Dr. Thorndyke) and Andrew Soutar (Phineas Spinet).

Empire Gossip Hours

These talks will, of course, be electrically recorded. Is it too much to hope that they may find their way into the home programmes?

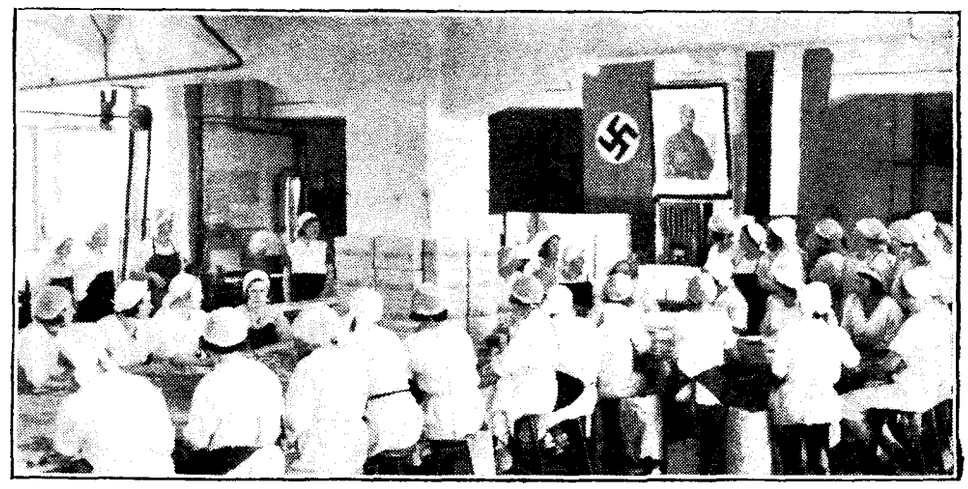
Mr. C. Madden, the Empire production chief, has other series in view, including "Living Dangerously" and "Nightmare." The very titles are satisfying.

Also there are to be Gossip Hours and other touches calculated to bring an informality to the Empire programmes which is missing in those we have to put up with at home.

An Invitation from America

SIR JOHN REITH has received an invitation from America, but, owing to his forthcoming trip to Cape Town, will be unable to accept it.

The invitation has come from the American National Advisory Council on Radio in Education, which is to hold its fourth annual assembly in Chicago on October 8th and 9th. Sir John was invited to address the convention on "The Usefulness of Broadcasting in a Changing Social Order."



THE FUHRER BROADCASTS. A typical scene in Germany last week—girls in a chocolate factory assembled to hear a national broadcast by Herr Hitler. The receiver is a Telefunken with a special power stage for public address work.

Studios Everywhere

ONE wonders when the B.B.C. will have enough studios. I hear that Henry Hall may continue to use Studio No. 10—the warehouse—for another year despite the fact that the refurbished skating rink in Maida Vale is very near completion. This means that, excluding Broadcasting House and the Queen's Hall, the B.B.C. will be running three external studios in London alone.

Tap Dancing

There is no truth in the rumour that the Royal Albert Hall is to be engaged for the sixteen tap-dancing Radiolympia girls, eight of whom, by the way, are to figure regularly in the variety programmes during the coming winter.

The Need of the Hour

Miss Rosalind Wade, who has organised the troupe at Olympia, is convinced that there is a real demand for tap-dancing in broadcasting to-day and refuses to be disconcerted by those irreverent people who suggest that the same effects could be obtained with wooden laths banged on pasteboards.

"Harry" Hall

The opening of Droitwich will see promotion for Henry Hall and the B.B.C. Dance Orchestra. Hitherto, Henry and his boys have been heard on the London Regional wavelength during the 5.15-6.0 period, the Children's Hour being broadcast on Daventry National. In October, however, the band will give us tea-time broadcasts from Droitwich.

The B.B.C. Dance Band's appearances at the Palladium have still further enhanced Henry Hall's popularity. Last week an evening journal went so far as to call him "Harry."

Toscanini

ARTURO TOSCANINI, most celebrated of living conductors, will come to London next May to conduct four concerts for the B.B.C. in the London Music Festival. On one previous occasion only has the maestro been featured in a broadcast in this country, namely, when he conducted the New York Philharmonic at Queen's Hall some months ago, a short relay being arranged by the B.B.C. On August 23 he conducted the Vienna Philharmonic Orchestra, whose concert was relayed from the Festspielhaus, Salzburg.

It is worthy of note that Toscanini's son-in-law, Horowitz, gave a brilliant performance of the Tchaikovsky No. 1 Concerto for the B.B.C. last May.

Another Eddie Pola Programme

"AMERICA Calling" runs into a third edition on the National wavelength on September 13th, and on the Regional wavelength on September 14th. Eddie Pola will again present the programme. Jack Hylton, who took part in the two previous editions and thoroughly enjoyed the experience, has accepted the B.B.C.'s invitation to him to assist, with his band, in the third edition.

A New Dunsany Play

"GOLDEN Dragon City," which will be broadcast on September 17th in the National programme, is a fantasy typical of the manner of the author, Lord Dunsany. It has been written specially for broadcasting, as were his previous plays, "The Use of Men" and "Bureau de Change." As there are only three characters in the production, it will be an all-star cast.

"Golden Dragon City" will be produced by Lance Sieveking, who adapted for the microphone Dunsany's stage play "If," and in which Henry Ainley played his original part in the broadcast version.

Lord Dunsany, who has written many plays for the theatre, has in recent years paid special attention to radio drama, and has been responsible for several very successful plays specially written for the microphone.

Ways of Escape

THE silly season approaches. Last week's tale concerned a secret tunnel which, it was said, was being scooped out below Broadcasting House as a means of escape. Who was to escape, and why, was not stated. Presumably, some of the variety comedians.

Not a Tunnel

The truth is that the tunnel is not a tunnel but a bridge which, at fourth floor level, will serve as a main artery between headquarters and the string of residential houses which are to be converted to broadcasting purposes in Portland Place.

Sidelights on Olympia

Novelty Appeal: The Scientific Side: A Post Office Film

By A SPECIAL CORRESPONDENT

WHETHER or not the presence of the "cap and bells" section of the B.B.C. at Olympia is for the ultimate good of the Radio Exhibition is still an open question, but it is significant that as I write the Main Hall is thronged, although a B.B.C. show is in progress. Probably the B.B.C. efforts have put the manufacturers on their mettle; at all events, the stands and their contents provide a well-balanced counter-attraction to the broadcasting theatre.

The exhibitors this year have enlarged the novelty appeal. A case in point is the ingenious H.M.V. idea—receivers, mounted on revolving rollers, which pass in panorama before the visitor, who, for a fragrant minute, can stand at ease. Perhaps the R.M.A. will arrange for the entire exhibition to be conducted on these lines next year!

Other novelties include animated circuit diagrams—coloured oil globules passing through glass tubes—on the Marconiphone stand; a model train on the Philips stand which, emulating the famous receiver, finds any chosen station; and the visual and aural demonstration of interference suppression on the Belling-Lee stand.

Good Showmanship

There is the divan receiver, so effectively demonstrated by Miss Angela Ward on the C.A.C. stand. There are loud speaker baffles in glass; car radio sets operated from dashboards with a view of the open road through the windscreen; dissected loud speakers; gigantic model receivers built to ten times actual size, and a host of other items of showmanship which put this year's Radiolympia well ahead of its predecessors.

The art of the cabinet designer has transformed the average wireless set into a thing of beauty, but this has not deterred manufacturers from exhibiting the "works"; receiver chassis are shown on nearly all stands, many of them mounted on mirrors so that the eye of the visitor need miss nothing.

Elsewhere in this issue is a description of the excellent demonstration with which the Radio Research Board makes its début at the National Radio Exhibition. A few years ago a mere mention of cathode rays would have sent the ordinary man to the other end of the hall; to-day, in the Radio Weather House, I found that the intricate details were being followed by eager audiences, thanks partly to the lucid descriptions given by Mr. Bainbridge-Bell and to the extremely vivid film portrayal of the cathode ray tube in action.

P.O. and Interference

Once again the Post Office "village" is lending valuable support to the Show. For the first time the visitor can see the Marconi-Stille magnetic tape equipment as used by the B.B.C. for its electrically recorded programmes. Micro waves are demonstrated, but perhaps the most significant display, so far as the ordinary man is concerned, is in the radio interference section, where various "nuisances"—a refrigerator, a vacuum cleaner, electric fan, coffee grinder, etc., etc.—are seen in action, and their ill-effects heard on loud speakers. On an accompanying stand are various anti-interference devices lent by the leading manufacturers. To crown the good work the Post Office shows an entertaining film explaining how John Citizen can rid his reception of interference without domestic distress. The Post Office anti-interference form is brought into use, the interference sleuths set to work, and in the course of a few hours the offender—a grocer's refrigerator—is run to earth and equipped with the necessary condenser. No one should miss this film.

Henry Hall and the Radiolympia girls "snapped" at a happy moment during a rehearsal in the B.B.C. Theatre.

An interesting corner of the Post Office "village," showing various anti-interference devices lent by the leading firms.

A B.B.C. Opinion

Taken as a whole, Radiolympia, 1934, impressed me as a triumph of presentation in light and sound. The illuminations are better than ever, and the same may be said of the sound reproduction delivered to more than 150 stands by the B.B.C.'s power amplifier giving an undistorted output of 400 watts.

I encountered a high official of the B.B.C. who had just entered Olympia and was gazing as one entranced at the huge neon-lighted clock and its immense silver gongs while great surges of music echoed and re-echoed along the Main Hall.

The official sought for words. Then, with an impressive nod of the head, he murmured: "Alec Moody (the organiser) has done it again."

Nothing more suitable could have been said, and this is one of the reasons why no one should miss a visit to Olympia, even at the eleventh hour.

READERS' PROBLEMS

THESE columns are reserved for the publication of matter of general interest arising out of problems submitted by our readers. Readers requiring an individual reply to their technical questions by post are referred to "The Wireless World" Information Bureau, of which brief particulars, with the fee charged, are to be found at the foot of this page

Fitting an Interference Suppressor

A CORRESPONDENT whose reception is marred by a slight, but, nevertheless, annoying background of mains interference has bought an "interference suppressor" of the type which consists of two condensers connected in series, with provision for earthing the junction point. Our advice is requested as to the best position for installing this device.

It can be stated quite definitely that the most beneficial results are likely to be attained by connecting the suppressor across the mains input to the building, as close as possible to the point of entry. For obvious reasons the mains leads are inaccessible on the input side of the meter, and so the anti-interference filter must be connected either to the main switch or to the consumer's main fuse box, in the manner shown in Fig. 1.

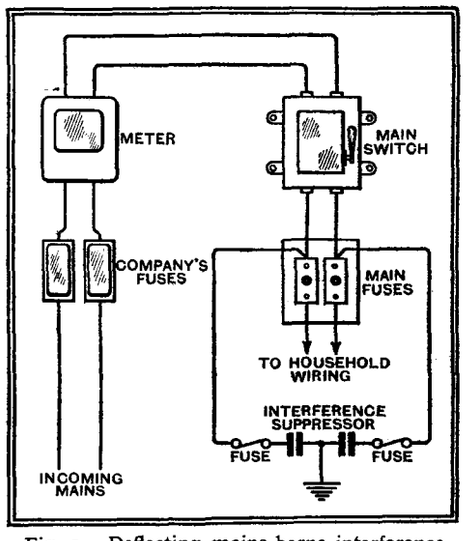


Fig. 1.—Deflecting mains-borne interference from the household electrical wiring by means of a condenser suppressor

A good earth will sometimes be found to make a great deal of difference to results, and so, if alternative earthing points are available they should be tried.

The beneficial effects or otherwise of an anti-interference filter connected in this way cannot be foretold with certainty, but they are usually so appreciable that everyone who suffers from mains-borne interference should give it a trial.

The New Station

ALTHOUGH the Droitwich station is not due to take over the transmission of the National programmes until October 7th, there is, to judge by our correspondence, already a good deal of anxiety as to its probable effect on the reception of other long-wave stations.

This is a difficult matter to discuss briefly and in general terms, but we do not think that many of our correspondents need anticipate any serious restriction in their choice of programmes. Over a fairly wide area, the reception of the Deutschlandsender will be rendered impossible, but with a modern selective set the transmissions of Radio-Paris should not be interfered with, except at very short range.

Even under present conditions, it is impossible to receive the German station with high quality in many parts of the country, and we think that few living in areas remote from Droitwich will notice any appreciable change in the interference position.

Remote Volume Control

IT is often an extremely difficult matter to devise a satisfactory system of volume control for operation at a considerable distance from the receiver. More often than not, operation of the control introduces appreciable distortion.

Probably the only remote control that is reasonably simple and free from complications is that which is effected by variation of the grid bias of a variable-mu valve. Our correspondent does not say whether his receiver includes that type of H.F. amplifier, but we believe that it does; if so, he will find it quite easy to mount the controlling potentiometer at the remote point merely by extending the existing leads. Occasionally certain precautions must be taken, but trouble need not be anticipated.

A Defective Coil

A READER whose set has developed a fault on the long waveband only, describes an unusual and rather puzzling effect. It has been found that signal strength, which has become abnormally weak on the long waveband, may be slightly improved by closing the short-circuiting switch which is connected across the long-wave section of the aerial coil; in other words, long-wave signals are better when the section of the multiple switch which controls the input circuit is in the "medium-wave" position.

It is logical to assume that there is a complete break, or at any rate, a very high resistance, in the long-wave section of the coil in question. Conditions would appear to be such that more signal energy reaches the grid of this first valve when the coil is short-circuited than when it is open-circuited; this, in spite of the fact that it cannot be tuned to anything approaching the wavelength to which the other circuits are adjusted.

The set in question is a small superheterodyne, and it works quite normally on the medium band.

The External Loud Speaker

THE user of a factory-built receiver has found that no results whatever are obtainable by connecting an external permanent-magnet moving-coil loud speaker to the appropriate terminals on the receiver. He is not altogether surprised at this, because the maker's instructions emphasise the point that a special type of loud speaker is required for external use, but he asks us to explain what type is needed.

In all probability the external terminals are wired in parallel with the secondary of the output transformer, as shown in Fig. 2 (a). This means that the second loud speaker should be of the low-resistance type,

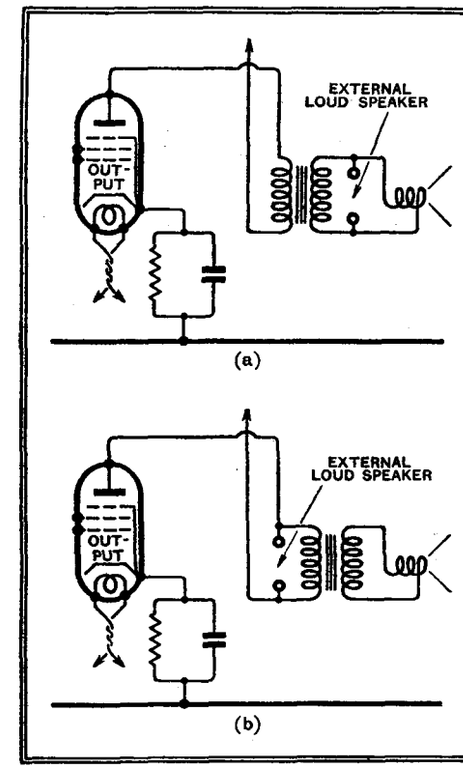


Fig. 2.—Alternative connections of external loud speaker terminals.

without a built-in transformer. The resistance of the coil should also be of, roughly, the right value, although there is a good deal of latitude in this matter.

Similar negative results will be obtained if one attempts to operate a low-resistance loud speaker (without transformer) in conjunction with a set in which the external loud speaker terminals are connected across the primary of the built-in output transformer, as in Fig. 2 (b).

The Wireless World
INFORMATION BUREAU

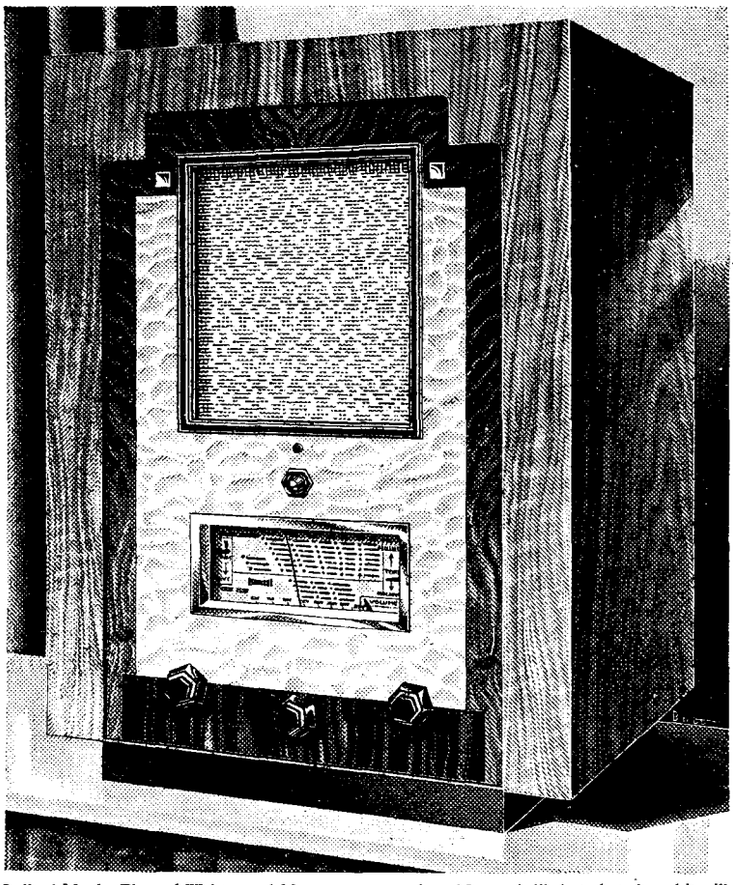
THE service is intended primarily for readers meeting with difficulties in connection with receivers described in *The Wireless World*, or those of commercial design which from time to time are reviewed in the pages of *The Wireless World*. Every endeavour will be made to deal with queries on all wireless matters, provided that they are of such a nature that they can be dealt with satisfactorily in a letter.

Communications should be by letter to *The Wireless World* Information Bureau, Dorset House, Stamford Street, London, S.E.1, and must be accompanied by a remittance of 5s. to cover the cost of the service.

Personal interviews are not given by the technical staff, nor can technical enquiries be dealt with by telephone.

THE NEW ARCADIA

LUXURY SUPERHET-15 gns!



Quilted Maple, Figured Walnut and Macassar Ebony . . . three rich woods of different colours and grains, make this new Ferranti the most beautiful set ever offered to the public at a price as low as 15 gns. The simple but elegant design of the cabinet is sure to be popular. No one is likely to hate it and it will harmonise with almost any scheme of modern or period decoration. You will not be saying in a year's time "It's out of date." A good design is never out of date! Note the recessed base for carrying. No unsightly projecting handles!

Full A.V.C...Electric Tuning ..."All-in" dial and the new exclusive Ferranti feature: HIGH NOTE UPLIFT

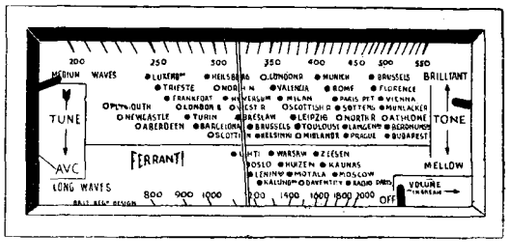
No other set at 15 gns. gives you so much for your money as the new Arcadia. Built by Ferranti, masters of power, whose huge electrical apparatus helps to supply light and power in your home. Not so very long ago a set of this calibre would have cost you 25 gns. Now, owing to their vast manufacturing resources, Ferranti can offer you this luxury superhet for 15 gns.! And in addition, the guarantee of a famous radio name: for which you pay nothing more.

HIGH NOTE UPLIFT

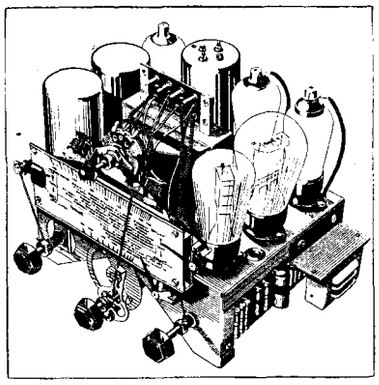
After prolonged experiment Ferranti engineers have managed to produce purity of reproduction never before attained in a Superhet. Briefly, all intruding harmonics and noises are eliminated on the radio frequency side, and the higher frequencies are specially amplified on the audio frequency side; bass and treble are properly balanced. The resulting reproduction is a revelation in its purity and beauty of tone.

SPECIFICATION

5 valve Superhet of advanced type for A.C. mains. Highly sensitive, with 2½ watt Triode Output. High-Note Uplift. Continuously variable tone control. Automatic volume control. Ferranti moving coil speaker. Floating chassis to obviate resonance. One knob tuning. 'All-in' dial, framed in chromium and brilliantly illuminated, showing station names and wavelengths, Electric Tuning, and visual indications of the waveband, degree of volume, and relative shade of tone. Mains aerial. Terminals for extra speaker. Cut-out switch for internal speaker. Lucerne selectivity on Lucerne station dial. Ferranti valves. Provision for gramophone pick-up. Large 3-tone cabinet with recessed panelling. Dimensions: 20½ in. high by 15½ in. wide by 9⅛ in. deep..15 gns. or 35/- deposit, and 12 monthly payments of 25/8d. Made throughout at Hollinwood, Lancs.



Wonderful Chromium Visible Control Dial which shows you everything you want to know. The new Ferranti Chromium frame dial on which station, wave length, volume and tone are all visibly indicated. No need to wonder what's happening as you turn the controls: you can see for yourself on the dial.



12 GN. SENSATION

If you can't quite afford 15 gns., ask your dealer—or write to Ferranti—for details of the new Lancastria Superhet at 12 gns. This amazing set has most of the technical features of the Arcadia (except High-Note Uplift) but the chassis is housed in a slightly smaller cabinet for the sake of economy.

FERRANTI

FERRANTI LTD., HOLLINWOOD, LANCS., or BUSH HOUSE, LONDON, W.C.2.
Please send me your Catalogue giving fullest particulars of the Ferranti 1934 range. W.W.

NAME:

ADDRESS:

MISCELLANEOUS ADVERTISEMENTS

NOTICES.

THE CHARGE FOR ADVERTISEMENTS in these columns is

12 words or less 3/- and 3d. for every additional word.

Each paragraph is charged separately and name and address must be counted.

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ADVERTISEMENTS for these columns are accepted up to **FIRST POST** on **MONDAY MORNING** (previous to date of issue) at the **Head Offices** of "The Wireless World," Dorset House, Stamford Street, London, S.E.1, or on **SATURDAY MORNING** at the Branch Offices, 19, Hertford Street, Coventry; Guildhall Buildings, Navigation Street, Birmingham, 2; 260, Deansgate, Manchester, 3; 26B, Renfield Street, Glasgow, C.2.

Advertisements that arrive too late for a particular issue will automatically be inserted in the following issue unless accompanied by instructions to the contrary. All advertisements in this section must be strictly prepaid.

The proprietors retain the right to refuse or withdraw advertisements at their discretion.

Postal Orders and Cheques sent in payment for advertisements should be made payable to **ILIFFE & SONS Ltd.**, and crossed **& Co.** Notes being untraceable if lost in transit should not be sent as remittances.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of private advertisers, letters may be addressed to numbers at "The Wireless World" Office. When this is desired the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge, which must include the words Box 000, c/o "The Wireless World." All replies should be addressed to the Box number shown in the advertisement, c/o "The Wireless World," Dorset House, Stamford Street, London, S.E.1. *Readers who reply to Box No. advertisements are warned against sending remittance through the post except in registered envelopes; in all such cases the use of the Deposit System is recommended, and the envelope should be clearly marked "Deposit Department."*

DEPOSIT SYSTEM.

Readers who hesitate to send money to advertisers in these columns may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Wireless World," both parties are advised of its receipt.

The time allowed for decision is three days, counting from receipt of goods, after which period, if buyer decides not to retain goods, they must be returned to sender. If a sale is effected, buyer instructs us to remit amount to seller, but if not, seller instructs us to return amount to depositor. Carriage is paid by the buyer, but in the event of no sale, and subject to there being no different arrangement between buyer and seller, each pays carriage one way. The seller takes the risk of loss or damage in transit, for which we take no responsibility. For all transactions up to £10, a deposit fee of 1/- is charged; on transactions over £10 and under £50, the fee is 2/6; over £50, 5/-. All deposit matters are dealt with at Dorset House, Stamford Street, London, S.E.1, and cheques and money orders should be made payable to Iliffe & Sons Limited.

SPECIAL NOTE.—**Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post. When sending remittances direct to an advertiser, stamp for return should also be included for use in the event of the application proving unsuccessful.**

Set Manufacturers' Surplus, Clearance and Bankrupt Stocks offered in any of these columns may not be Manufacturers' current lines. Radio components advertised at below the list price do not carry any manufacturer's guarantee.

RECEIVERS AND AMPLIFIERS, ETC.

G.E.C. Radiogram, 22 guinea model, as showing at Olympia; £20.—Box 1273, c/o *The Wireless World.* [6289

CROSSLEY Midgets and Car Radio.—Send for wholesale catalogue to importers.—Royal, 5, Buckingham Rd., London, E.18. [6270

1933-34 "Zetovox" 8v. A.C. A.V.C.; list 25 guineas, £7; all new; money-back guarantee.—A. Ralf, 447a, New Cross Rd., London, S.E.14. [6311

OUR Kit of Parts for "Wireless World" Quality Amplifier, complete in every detail, including valves; amplifier only, £8/10; feeder unit, 36/-.

OUR Kit of Parts for "Wireless World" Olympic S.S. Six, complete in every detail, including valves and loud-speaker; £14/10.

SEND for Detailed List of Components for Either of the above Kits.

WE Can Supply Kits for Any "Wireless World" receiver or amplifier; carriage paid, cash with order or c.o.d.

WARD, 45, Farringdon St., London, E.C.4. 'Phone: Holborn 9703. [6317

ARMSTRONG Chassis.—Six new 1935 superheterodyne models; prices from £6/10 complete: write for particulars.—Armstrong Manufacturing Co., 100, King's Rd., N.W.1. [6301

SPECIAL Clearance.—New 1933-34 models Ultra Tiger 4v. Superhets, list 14 guineas, £8/15; also Alba, Ekco, Cromwell and G.E.C. sets; list on application.—R. B., 34, Ardern Terrace, Leicester. [6170

ALL the Latest Receivers on Easy Terms without Interest. Snip! Ferranti Arcadia "Console," list £24/3, shop soiled, £12.—Particulars, Excel Battery Co., 151, Wellingborough Rd., Northampton. [6307

SPEAKERS, microphones, meters and all other gear appertaining to P.A. work at bargain prices; callers are invited; stamp for lists.—H. Franks, 23, Percy St., Tottenham Court Rd., W.1. Museum 8585. [6312

1935 Models.—4-valve superhet, A.C. or D.C., M.C. speaker, £3/19/6; 5-valve, £5/5; 6-valve, £6/10; car radio, £10/10, including valves; appro., "Wireless World" deposit; bargains.—30, Warren St., London, W.1. [6269

55/-.—Class "B" 3-valve band pass, in superb horizontal 2-colour walnut cabinet, Radiophone 2-gang in metres, Kola P.M. (without valves, batteries), listed £9/9; c.o.d., carriage forward.—Kay, 167, City Rd., London, E.C.1. [6197

PUBLIC Address Amplifiers.—A.C. mains, three stage, 21 watts, undistorted A.C. output, complete with valves, £15; universal A.C./D.C. three stage, 7 watts output, complete, £13; guaranteed 12 months; trade supplied; deferred terms.—D. E. Clarkson, B.Sc. (Eng.), 45, Manor Rd., Wallington, Surrey. 'Phone: Wallington 3953. [6280

Receivers and Amplifiers, Etc.—Contd.

MIDGET Receivers, every one brand new, working off A.C. and D.C. mains, 100-130 or 200-240 volts, by universal adaptor supplied, all incorporate moving coil speaker, complete with valves, etc.; Emerson 5-valve chassis (in sealed cartons), complete, £3/15; above chassis incorporated in handsome figured walnut cabinet (10×7½×5½), complete, £4/6/3; Belmont Midgets, specification as in Emerson's 4-valve, complete in cabinet, list 9 guineas, at £3/15; Belmont 5-valve superhet., A.V.C., operating from batteries as well as mains, list £15/15, complete in cabinet, £6 5, all carriage paid; cash with order or c.o.d.—Degallier's, 4-21, Upper Marylebone St., London, W.1. [6309

MAINS EQUIPMENT.

VORTEXION Leads Again.

VORTEXION Specified Olympic S.S. 6 transformer, S.S.352, 5 years' guarantee, 25/-; less terminals and guarantee, 21/-; power chassis, £3/17/6; choke, 12/6; single span model, 25/-; power chassis, £3/10.

VORTEXION.—Quality amplifier or super monodial, 425-0-425, 120 m.a., 4v. 6-8a., C.T. 4v. 3a. C.T., 4v. 1a., 4v. 1a, super shrouded, core size 2¼in.×1½in., 2½% regulation primary engraved insulated terminals, weight 14lb., 26/- carriage 2/-; normal shrouded, 22/-; open type, 20/-, post 1/3; speaker field replacement choke, 16/-; special output transformer, to "W. W." spec., 12/6.

VORTEXION 7.30h. 120 m.a. Choke, 215 ohms, in die cast shrouding to match; 12/6.

IMITATED, but unequalled. Good enough for a "Wireless World" specification is good enough for you.

VORTEXION Cost Little More than the Cheapest, but unequalled by the dearest.

VORTEXION Standards Despatched by Return.

VORTEXION A.C. 34, used by author in construction of A.V.C. Three, as illustrated; 18/-.

GUARANTEED 12 Months, and within 5% normal and 2½% super models, neat shrouding, with detachable feet, as used by Government Departments, etc., etc., any model guaranteed 5 years at extra cost of 2/-.

ALL Secondaries Centre Tapped.

VORTEXION.—250-0-250 60 m.a. 4v. 1 to 2a., 4v. 2 to 4a., open type, 10/-; shrouded, 12/6; post 9d.

VORTEXION.—Ferrocart III, 350-0-350, 60 m.a., 4v. 2.5 C.T. 4v. 3.5 C.T.; open type 13/6, shrouded 16/-; post 9d.

VORTEXION.—Super model for H.T.8 or 9 or 10, 4v. 1 to 2, 4v. 2 to 4; open type 14/6; shrouded 16/6; post 1/-.

VORTEXION.—350-0-350, 120 m.a., 4v. 2 to 5a, 4v. 2 to 4a., 4v. 2.5a.; open type, 14/6; shrouded, 16/6; super shrouded model, weight 11lb., 4 filaments to specification, 21/-; post 1/3.

VORTEXION.—400 or 450 or 500v. 120 m.a., 4v. 2 to 5, 4v. 2 to 5, 4v. 2. 5a.; open type, 19/-; shrouded, 23/-.

VORTEXION.—400 or 450 or 500, 150 m.a., 4v. 4a., 4v. 2.5, 4v. 2. 4v. 2, 4v. 2, 4v. 2, core size 2¼×1¼in., a super job, 2% regulation, 35/-; shrouded, with terminals; less terminals, 30/-; open type, 26/-; post 1/3.

(This advertisement continued on next page.)

Mains Equipment.—Contd.

(This advertisement continued from previous page.)

VORTEXION Auto Transformers to B.E.S.A. Specification, 100, 110, or 120v. to 200, 220, or 240 volts, 60 watts, 9/-; post 9d.; 120 watts, shrouded 12/6, open type 10/6, post 1/-; 200 watts, shrouded 16/6, post 1/-; 2,000 watts, £4/10.

VORTEXION 1,000-watt Transformers; £4/10, carriage free.

VORTEXION 30h. at 60 m.a. Chokes, 5/6; 40h. at 60 m.a., 8/6; 30h. at 150 m.a., 200 ohms, 10/6 open type, 12/6 shrouded.

VORTEXION Transformers Made to Your Specification; price according to wattage, 6v. filaments same price unless wattage grossly exceeded; special quotations by return.

VORTEXION (S. A. BROWN), 182, The Broadway, Wimbledon, S.W.19. Tel.: Liberty 2814. [6313

BATTERY Charging Plants.—The N.P. for service at low cost; trade lists.

BATTERY Charging Plants.—Special discounts to users; send for new lists.—N.P.

BATTERY Charging Plants.—3-circuit plant, 30 volts 6 amps; £7/12/6; will do 50-80 batteries.

BATTERY Charging Plants: 52/- to £20.—The N.P. Electrical Co., 514, Alum Rock Rd., Birmingham. [6322

UNIVERSAL Avometer, new, with leather case; £9 or nearest.—Box 1306, c/o *The Wireless World*. [6306

TANTALUM for A.C. Chargers H.T. and L.T.—Blackwell's Metallurgical Works, Ltd., Garston, Liverpool. [5039

PARAMOUNT Mains Transformers, equal to any, and better than most; try them once and you will always use them!

PARAMOUNT Auto Transformers, 100-120v. up to 200-250 volts, or vice versa, 60 watt, 8/6; 120 watt, 10/-; shrouded 2/- extra, post 9d.

PARAMOUNT.—250-0-250v. 60 m.a., 4 volt 1 to 2 amp., 4v. 2 to 4a., open type, 9/6; shrouded, 11/6; post 9d.

PARAMOUNT.—350-0-350v. 60 m.a., 4v. 2.5a., 4v. 3 to 5a., 13/-; shrouded, 15/-; post 9d.; 120 m.a., 4v. 5 amp., 4v. 4 amp., 4v. 2.5a., with screened primary, shrouded, 16/-; post 1/-.

PARAMOUNT.—Single span model, with 1½in.×1½in. core size, 350-0-350v. 100 m.a., 4v. 5a., 4v. 1a., 4v. 2.5a., shrouded, with screened primary, 2½% regulation, 20/-.

PARAMOUNT.—500v. or 450v. or 400v. 120 m.a., 4v. 5a., 4v. 4a., 4v. 2.5a., screened primary, 18/-; shrouded, 21/-, post 1/3; 150 m.a., 4v. 2.5a., 4v. 4a., three 4v. 2a., with 2¼in.×1½in. core size, shrouded, 28/-, post 1/3.

PARAMOUNT.—Westinghouse transformers, H.T.8, 9 or 10, with 4v. 2a., 4v. 4a., shrouded, 16/-, post 1/-.

PARAMOUNT.—Chokes, 30h. 60 m.a., 5/6; 20h. 120 m.a., 8/6, post 9d.

PARAMOUNT Mains Transformers are Guaranteed for 12 Months.

PARAMOUNT Products are Fitted with Neat Aluminium Frames or Shrouds, all filaments C.T., insulating paper 2½ mils thick between each layer, and tested thoroughly before leaving our works.

PARAMOUNT Transformers Made to Your Own Specifications; price according to wattage; quotations by return.

PARAMOUNT Guaranteed Electrolytic Condensers, 4+4 mfd., 500v. peak, 3/6, post 3d.

PARAMOUNT Mains Transformers, manufactured by Brock and Salter, 66, Hartfield Rd., Wimbledon, S.W.19 (one minute from Wimbledon Station). Tel.: Liberty 3226. [6315

HOYNE'S Transformers, fitted with tapped and screened primaries, filaments, all centre tapped, stout cast aluminium clamps and clearly marked terminal strips are fitted to all models, write for list.

HOYNE'S Components are Guaranteed for One Year; one type only manufactured, the best, as used by many well-known set manufacturers after testing all others.

HOYNE'S.—"W.W." transformers, wound strictly to specification of author: "W.W." test reports, June 22nd: "The insulation is particularly good throughout . . . the transformer is satisfactory in all respects."

HOYNE'S.—Push-pull quality amplifier transformer, 25/-, post 1/3; 7/30 henrys choke, 9/6, post 9d.; 20 henrys, 7/6, post 9d.

HOYNE'S.—Single span, 15/-, post 1/-; choke, 10 henrys, 7/6, post 9d.

HOYNE'S.—Everyman A.C. super transformer, 12/6, post 1/-; choke, 10 henrys, 7/6, post 9d.

HOYNE'S.—A.V.C. Straight Four transformer, 18/-, post 1/3; choke, 26 henrys, 12 m.a., 140 ohms, 9/6, post 9d.

HOYNE'S.—A.V.C. Three transformer, 12/6, post 1/-; choke, 30 henrys, 60 m.a., 7/6, post 9d.

HOYNE'S.—250-0-250v. 60 m.a. 4v. 1 to 2a., 4v. 2 to 4a., 10/-, post 9d.; with extra 4v. 1 to 2a. winding, 12/6, post 1/-.

HOYNE'S.—Ferrocart III, 350-0-350v. 60-70 m.a., 4v. 2 to 3a., 4v. 2 to 4a., 12/6, post 1/-; with extra 4v. 1 to 2a. winding, 13/6, post 1/-.

HOYNE'S.—500-450-0-450-500v. 140 m.a., 4v. 2 to 4a., 4v. 4 to 6a., 4v. 2a., 4v. 2a., 27/6, post 1/3; weight 11lb.

HOYNE'S Transformers, built to specifications up to 1 K.V.A., keenest prices, best materials and workmanship; quotation by return.

M. J. HOYNE, ALL-POWER TRANSFORMER, Ltd., Offices and Works, 8a, Gladstone Rd., Wimbledon, S.W.19. Tel.: Liberty 3303. [6079

Mains Equipment.—Contd.

OUR New Lists Now Ready; constructors of transformers, chokes and coils should apply immediately.—Lumen Electric Co., 9, Scarisbrick Av., Litherland, Liverpool, 21. [6248

CABINETS.

MANUFACTURERS' Clearance.

ULTRA "Panther," a modern cabinet, with contrasting figured walnut veneer panels, 20×17×11, 75/6; pedestal type, 35×22×12, 30/-, undrilled; photo sent on request.

SET and Speaker Cabinets; 5/- upwards

RADIOGRAM Cabinets; 37/6 upwards

SPEAKER Cabinets; 4/6 upwards

SEND Particulars of Your Requirements (giving size of set, etc.), or call and make your choice from our stocks of over 100 different types; from 3/6 to £4/10.

REFER to Previous Advts. for Detailed List of Bargains.

H. L. SMITH and Co., Ltd., 287-9, Edgware Rd., London, W.2. Tel.: Paddington 5891. [6052

GRAMOPHONES, PICK-UPS, RECORDERS.

GARRARD D.S. Motor, B.T.H. pick-up, complete, 45/.—Burrows, 4, Catherina Terrace, S.W.8. [6293

LOUD-SPEAKERS.

27/6!!!—Brand new B.T.H.-R.K. speakers, 6v. field, suitable for P.A. work, etc.

£2/7/6!!!—B.T.H. speakers, as above, for 100-250v. A.C., complete with field rectifier.

MAGNAVOX D.C.152 (9in. cone), 22/6; Magnavox 154 (6½in. cone), 16/3; all with hum-bucking coils, power or pentode transformers and 2,500 or 6,500-ohm fields; Magnavox P.M.254, 18/-.

ATTENTION to All Orders Within 24 Hours; carriage paid; cash with order or c.o.d.

WARD, 2nd Floor, 45, Farringdon St., London, E.C.4. Telephone; Holborn 9703. [5723

VAUXHALL.—Magnavox permanent magnets, universal, suitable for Class "B," power or pentode, 6in. cone 15/6, 7in. cone 17/6, 10in. cone 23/-; mains energised, 2,500 or 6,500, 10in. cone 23/-, 7in. cone 15/3; brand new, with humbucking coils; state power or pentode transformer; unused manufacturers' stock; immediate delivery, carriage paid, cash with order or c.o.d.—Vauxhall Utilities, 163a, Strand, W.C.2. Temple Bar 9338. [6277

FOR Experimenters Wanting Something Different.—Every one guaranteed brand new, all carriage paid; cash with order or c.o.d., supplies available for 12 weeks; Rola's (American) moving coil, 7¾ diameter, 6-10 V.D.C. (8 ohms); 100-150 V.D.C. (2,000 ohms); 110-175 V.D.C. (2,500 ohms); 150-200 V.D.C. (4,700 ohms); 200-250 V.D.C. (6,500 ohms), list 39/6, at 18/-; 9in. diameter, voltages as in 7¾, list 49/6, at 25/-; permanent magnets, 9% cobalt magnets, 7,400 lines per sq. cm., 7¾ diameter, list 49/6, at 28/-; 9in. diameter, list £3, at 33/-; all incorporate humbuckers and multi ratio transformer.—Degallier's, 4-21, Upper Marylebone St., London, W.1. [6310

VALVES.

FREE.—List of American and non-ring valves.—Epton, 93, New Rd., Chingford. E.4. [6086

ALL Types of Brand New American Valves in Stock; first-class makes, guaranteed for 6 months.

247, 235, 551, 89, 18, 19, 46, 59, 6A7, 15, 42, 41, 38, 39, 78, 75, 57, 58, 224, 44, 36, 235, 83, 43, 12/-; 25Z.5, 14/6; U.X.171A, U.X.199, U.X.280, U.X.245, U.X.226, U.Y.227, 7/6; U.X. 250, U.X.210, U.X.281, 17/6; U.X.867 photocells, 25/-; various transmitting valves in stock; post paid; cash with order or c.o.d.

WARD, 2nd Floor, 45, Farringdon St., London, E.C.4. 'Phone: Holborn 9703. [5722

METROPOLITAN RADIO SERVICE Co. for American Valves with a Guarantee; any type at keenest prices; trade supplied.—1021, Finchley Rd., Golders Green, N.W.11. Speedwell 3000. [0436

AMERICAN Valves Direct, 5/- each, three for 12/6, post paid, leading brands, factory fresh, guaranteed; 1A6, 2A7, 6A7, 25Z5, 5Z3, 37, 42, 43, 56, 57, 58, 75, 77, 78, 245, 280; all others at similar prices; send postal order; duty 5d. to 7d. each on delivery; send for lists.—Export Radio Co., 41, Union Square, New York City, U.S.A. [6297

SURPLUS Valves.—All brand new; battery types, 2-volt, H.F.2, L.F.2, L.P.2, 1/9; super power, P.P.2, 2/6; screens and pentodes, 3/9; A.C. mains, 4-volt 1 amp., general purpose, 3/3; power, 4/-; screens and pentodes, 4/6; full wave rectifiers, 3/6; postage paid, cash with order, or c.o.d. over 10/-.—Clarion Radio Valve Co., 885, Tyburn Rd., Erdington, Birmingham. [6295

PREMIER SUPPLY STORES Announce the Purchase of the Complete Stock of a World Famous Continental valve manufacturer; all the following standard main types fully guaranteed, 4/6 each: H., H.L., L. power, medium, high, low mag and variable mu screen grids, one, three and four Watt A.C. output, directly heated pentodes, 250v. 60 m.a. full wave rectifiers, D.C. types, 20v. 18 amp., filaments, screen grid H., H.L. power.

THE Following Types, 5/6 each: 350v. 120 m.a., full wave rectifier, 500v. 120 m.a. full wave rectifier, 2½ watt indirectly heated pentode.

THE Following American Types, 4/6: 250, 112, 171, 210, 245, 226, 47, 46, 24, 35, 51, 57, 58, 55, 37, 80.

THE Following Sizes, 6/6 each: 42, 77, 78, 25Z5, 36, 38, 83, 39, 44, 53, 6A7, 6B7, 2A5, 2A6, 2A7, 2B7, 5Z3, 6C6, 6A4, 6D6, 6F7; the following valve: 866, 25/-.

PREMIER SUPPLY STORES, 20 and 22, High St., Clapham, S.W.4. [6318

"Elementary Principles of Wireless Telegraphy and Telephony" Third Edition Post free 8/-

(This advertisement continued on next page.)

Components, Etc., for Sale.—Contd.

(This advertisement continued from previous page.)

H.M.V. Condensers, 400v. working, 4×4×1×1×1×1×0.1×0.1×0.1×0.1, 4/9; 4×2×1×1×1×0.5, 3/9.

VARLEY Constant Square Peak Coils, band pass type BP.7, brand new in maker's carton with instructions and diagram, 2/6.

VARLEY H.F. Intervalve Coils BP.8, band pass, complete with instructions in original cartons; 2/6.

SCREENED H.F. Chokes by One of the Largest Manufacturers in the Country; 1/6.

PREMIER British-made Meters, moving iron, flush mounting, accurate, 0-10, 0-15, 0-100, 0-250 m.a., 0-1, 0-5 amps; all at 6/-.

A LARGE Selection of Pedestal Table and Radiogram cabinets, by best manufacturers, at a fraction of original cost, for callers.

THE Following Lines 6d. each, or 5/- per dozen.—Chassis valve holders, 5-, 6-, or 7-pin, screened screen grid leads; any value 1-watt wire end resistances, wire end condensers, 0.0001 to 0.1 trimming condensers, Bulgin 3 amp. mains switches.

PLEASE Send for Fully Illustrated Catalogue.

PREMIER SUPPLY STORES, 20, High St., Clapham, S.W.4. Telephone: Macaulay 2188. Nearest Station, Clapham North Underground. [6241

UTILITY SALES Co. Bargains—all guaranteed new.

CELESTION P.M.M.W., 45/- model, 17/6; Ekco T.C.I ½ amp. L.T. charger, 17/6 (list £2/7/6).

REGENTONE A.C. Eliminator with L.T. Charger, S.G. and det. tappings, variable; 35/- (list £4/12/6).

RADIOGRAM Electric Motor, complete with turntable and accessories, works from 4v. accumulator or dry cell; 15/-.

MAINS Transformer by Standard Cable Co., primary 200-240, secondary 300-0-300 60 m.a. 4v. 3a. ct. 4v. 2a.; 8/6.

IGRANIC Band-pass Unit, comprising 3 iron core coils on base dual wavelength; 14/6 (list 33/-).

IRON Core Coils Dual Wave, matched for S.G. including diagrams for 3 circuits; 2/6 each.

MICROPHONES, Western Electric, hanging, 2/6; hand type, 3/6, including diagrams; transformers for ditto, 2/6 each.

BUTTONS, large tested model, 1/-; electric soldering iron, any voltage, fine value, 4/6.

G.E.C. 1934 Thirty-three, 3 valve receiver, complete with Osram valves and cabinet, sealed cartons; £4/10.

ELECTRIC Clock, bakelite case, battery model, complete and guaranteed; 12/6.

TIME Switch to turn off radio at pre-set time; 3/6.

SPECIAL Purchase of 4v. S.G. Receivers, chassis built, handsome cabinet, ring valves, large M.C. speaker, multitone control, built-in aerial, daylight Continental reception, complete with batteries; £4/19/6.

MARCONI 2v. Sets, ring valves, Marconi H.T., Exide L.T., speaker; (list £4/4) £2/12/6.

B.T.H. Universal A.C.-D.C. 100-250v. Gramophone Motor Complete, real bargain; 37/6.

CASH With Order, carriage paid, 24 hours service.

UTILITY SALES Co., 27a, Sale St., Paddington, London. [6325

1/6.—Cadmium plated chassis, 4-valve, pressed steel, 14×9; post 6d.

2/9.—Plew A.V.C. units for battery receivers, prevents fading, list 10/-, brand new.—Kay, 167, City Rd., London, E.C.1. [6159

MAINS RADIO DEVELOPMENT COMPANY, offer following new lines.

FERRANTI A.F.3, 9/6; A.F.4, 7/-; A.F.7, 10/6; OPM2, 8/-; B.1 choke, 4/6; B.8 choke, 5/6.

DUBILIER, new, metallised one watt resistances, all values, 7d., 6/6 per dozen.

FORMO two-gang Screened Coils, with switch, aerial and H.F., 7/6; Formo 2mfd. condensers, 400v., working, new, 1/3.

MAINS RADIO DEVELOPMENT COMPANY, 4-6, Muswell Hill Road, London, N.6. Tudor 4046. [6303

PEARL and PEARL Bargain List A Free.—190, Bishopsgate, London, E.C.2. [0421

THE Following Unused Set Manufacturers' Surplus, all goods guaranteed perfect; immediate delivery.

TRANSFORMERS, 350-0-350v., 75 m.a. 4v. 4a.-4v. 2a., 12/6; A.C. and D.C. eliminators, first class make, tappings S.G., detector, and power (150v., 25 m.a.), A.C. type, with Westinghouse rectifier, 25/-; D.C. type, 12/6.

DUBILIER Resistors, 1 watt type, 7d.; 2 watt type, 1/2; 3 watt type, 1/9; Dubilier or T.C.C. condensers, 8 mf. or 4 mf., 500v. working, 50v. 50 mf., 200 mf. 10v., 3/6; Mansbridge type, 4 mf. 400v., 4/-; 4 mf. 750v., 6/6.

MARCONI K19 Pickups, 22/6; B.T.H. pickup tone arms, 3/-; B.T.H. needle armature pickups, 29/-.

COLVERDYNES, 7/6; Clix 5-pin valve holders, 5d.; Rotorohm volume controls, with switch, 2/6.

WESTINGHOUSE Rectifiers, H.T.8, 9/6; H.T.9, H.T.10, L.T.4, L.T.5, 10/9; transformers (Regentone) for H.T.8 or H.T.9, with 4v. 4a. L.T., 7/-; carriage paid cash with order or c.o.d.; send for list.

WARD, 45, Farringdon St., London, E.C.4. Phone: Holborn 9703. [6165

SHORT-WAVE Adaptor, A.C.-D.C., 200-240, 12-170 metres, 3 valves, Ostar Ganz; £4.—May, 51, Graham Mansions, Hackney, E.8. [6288

FERRANTI Valve Tester, 50/-; other instruments, state wants; Londona loud speaker, £2.—Stott, Stargate, Carden Avenue, Brighton. [6286

Components, Etc., for Sale.—Contd.

SOUTHERN RADIO'S Bargains.—Set manufacturers' guaranteed surplus.

VARIABLE Condensers.—Lotus 3-gang 0.0005, 12/6; Lotus 2-gang, 0.0005, 8/6; Lotus Dyblock single, 0.0005, 4/9 (list 9/6); all these condensers are complete with dials, escutcheons, knobs, fully screened with trimmers, and boxed; Hydra block condensers, 16 mfd. (2+2+8+2+1+1), 1,000v. D.C., 7/- each; Dubilier 4 mfd. (2+1+1), 1,000v. D.C., 2/9; 4.5 mfd. (2.25+2.25), 1,000v., for mains noise suppression, 3/-; Utility Midget 2-gang variable condensers, 0.0005, with concentric trimmers, 3/5; T.C.C. 0.1+0.1, 1/3 each.

SPEAKERS.—Blue Spot permanent magnet, with universal transformer for power, super power, pentode and Class B; 23/- (list 39/6).

G.E.C. Stork Speaker in Cabinet; 19/6 (list £3/15).

BLUE Spot Genuine 100U Inductor Speaker on Chassis; 13/6 (list 39/6).

S.T.400 Kits, all specified proprietary components; £2/19/6 (list £4/17/6).

EKCO A.C. Eliminators, each new and boxed, in original sealed cartons, type K25, with trickle charger, 25 milliamps., 39/6 (list £5/7/6); type A.C.25, 33/6 (list £3/17/6); type K.12, with trickle charger, 37/- (list £3/17/6); Ekco trickle chargers, type T.C.1, for 2-, 4- and 6-volt accumulators, 20/- (list 42/-).

IGRANIC Superhet Coils, set of 4 (1 Osc., 2 I.F., with pigtails, 1 L.F. plain); 12/6 (list 50/-).

LISSEN Superhet 3 Coils Kit, screened, ganged on base with wave change and filament switches; type L.N.5181, for battery or mains; 12/6 (list 30/-).

VARLEY Constant Square Peak Coils, complete with all accessories, new, boxed, B.P.5; 2/4.

VARLEY H.F. Inter-valve Coils, B.P.6; 2/3.

FRAME Aerials.—Lewcos dual wave superhet; 9/- each (list 27/6).

PICK-UPS.—Marconi No. 19 (1934), 22/6 each (list 32/6); Celestion latest improved type W.8 (1934), 16/9 (list 35/-); all new and boxed.

READY Radio Instamat Transformers, for matching any valve to speaker: Junior model, ratios 1 : 2, 1 : 1, 1½ : 1, 2 : 1, 3 : 1, 7/6 (list 27/6); Senior model, ratios 10 : 1, 12½ : 1, 14 : 1, 16 : 1, 20 : 1, 25 : 1, 12/6 (list 37/6).

RECEIVERS.—3-valve screen-grid Elector Super, complete with valves, Exide batteries and accumulator, Celestion moving coil speaker, contained in magnificent walnut cabinet; £3/10 (list £10).

OSRAM Thirty-Three Music Magnet, complete with G.E.C. speaker, 2 Osram screen-grid and Osram power valves in moulded bakelite walnut cabinet; £3/12/6 (list £9/9); in original sealed cases.

BOTOLPH Lightweight Portable Receivers, complete with 5 Mullard valves, Exide batteries and accumulator, overall size 13in.×11in.×8in., £2/19/6 (list £8/8); a real suitcase portable.

READY Radio Meteor Screen-grid 3-valve Kits, all specified components new, in sealed cartons; 25/-, less valves; with 3 Mullard valves, 42/6 (list £5/7/6).

"A" Kit, as above, complete with magnificent walnut cabinet and Celestion perm. mag. speaker, less valves, £3/5; with 3 Mullard valves, £4/2/6 (list £8/17/6).

MULLARD Radio for the Million, "Station Master Three" battery kits, complete with cabinet and 3 Mullard valves (screen grid, H.L., power), brand new in original sealed cartons; £2/19/6 complete.

MISCELLANEOUS. — Westinghouse metal rectifiers, H.T. 6, 7, 8, 9/3 each; Ferranti chokes, 20 henry 60 m.a., 6/9 each; Lewcos superhet. 8-way bases, complete with valve holders, grid leak, fixed condenser type "48," 2/- each; Lissen base turntables, 1/6 (list 5/-); Lewcos coils, B.P.F./R., 4/-; T.B.F./C., 3/3; O.S.C./126 (Extensor), 3/3; T.O.S./R., 3/3; Morse tapping keys, with buzzer and flashlight signal, complete with battery and bulb, 2/- each; "Modula" remote set volume controls, 1/6 each.

ALL Goods Guaranteed and Sent Carriage Paid.

BRANCHES at 271-275, High Rd., Willesden Green, N.W.10, and at 46, Lisle St., W.C.2. Please send all post orders to 323, Euston Rd., N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren St. Tube). 'Phone: Museum 6324. [6314

TELEPHONES, magneto ringing, 12/6; pedestal, 7/6; microphones, 2/6 and 4/6; galvanometers, 4/-; tappers, 4/-; buzzers, 2/-.—Below.

FLEXIBLE Shafts Easily Transmit 1h.p., 2/6; mine exploders, 20/-; ships' prismatic rangefinder, 20/-; two valve transmitter, 17/6.

DYNAMOS, 20v. 8a., 32/6; 50v. 4a., 40/-; 50v. 15a., 75/-; 100v. 3a., 45/-; 2in. spark coils, 17/6; 10in., 60/-; 10in. portable, 80/-; mercury break, 35/-; large size, 75/-.

RADIO, car H.T. unit, 25/-; 12v. 2,000 mfd. condenser, 7/6; 2 mf. condenser, 1,300v. working, 4/6; 3v. mains amplifier, 4 watts outfit, 45/-; Jewell A.C. meters, 3½in. dial, 100 m/a.; 200 m/a.; 2 amp.; 10 amp. and 15 amp.; panel mounting, 15/- each; one watt resistors, 6d. each; ¼ watt resistors, 3d. each, any size; Heayberd transformers, various sizes, 6/6; twin-gang condensers, 6/6; 3-gang, 9/6; volume controls, 2/-; etc, etc.—Below.

GALPIN, 75, High Rd., Lee, London, S.E.13. Cash with order or c.o.d.; charges extra; close half day Thursday, visitors welcome. [6305

RADIO Exchanges.—Annual clearance sale, transformers, A.F.3 10/-, A.F.4 6/-, OPM3C 15/-, Multitone Toco and Potentiometer 10/-, Puchoke 5/-; condensers, J.B. Nugang three-gang 12/6, Radiophone four-gang and dial 8/6, Colvern KBLC2KGC 16/-, Ekco trickle charger, 2, 4, 6 volts, ½ amp., 17/6, Pifco De Luxe meter 21/-, Standard 7/6, Harlie and Blue Spot pickups 7/6, Philips 3005 D.C. eliminator 21/-.—Radio Exchanges, 114, Ramuz Drive, Westcliff-on-Sea. [6294

Components, Etc., for Sale.—Contd.

BIRMINGHAM RADIOMART Revised List Now Ready; more components than advised in whole these columns; stamp essential.

RADIOMART.—Utility fully screened 3-gang, with trimmers, list 22/-, almost identical Radiophone, 6/6; utility degree dials to match, 2/-.

RADIOMART.—Latest 2½in.×⅝in. visual tuning meter, illuminated, 6 ma., similar R.G.D.; 5/9.

RADIOMART.—Igranic smoothing chokes, 20-10hy., 260 ohms, 100 m.a Stalloy core impregnated interleaved windings; 2/9.

RADIOMART.—Single span formers, 1in.×2in., 7 for 10d.; 100 m-mfd. micros., 1/3.

RADIOMART.—Radiophone straight line dials, illuminated, ours have oxidised escutcheons, knob; 3/6.

RADIOMART.—Igranic boxed nickelcore 3-1, 5-1 transformers, list 10/6, 3/11; Igranic 8/6 parallel feed, 2/11.

RADIOMART.—Centralab 1-watt colour coded resistances, nearly all values; 6d.

RADIOMART.—Radiophone wire-wound logarithmic potentiometers, 5,000, 2/-; 15,000, with concentric independent main switch, 2/9.

RADIOMART.—New Met-Vick 110-volt "A" transformers, sold for laminations and clamps; 3/6.

RADIOMART.—Screened Caradio ignition cable, ideal screened downlead; list 4/6, 9d. yard.

RADIOMART.—3¼in. flush £3 moving coil milliammeters, 10, 25, 50 100 m.a.; 16/6.

RADIOMART.—Visual tuning meters, extremely neat, 5/9; 30-ohm potentiometers, for humdimming, 8d.

RADIOMART.—Sovereign 50,000 genuine wirewound potentiometers, 5-watt, 2/-; Electrad 50,000 potentiometers, 1/6.

RADIOMART.—T.C.C. 250v. A.C., equivalent 400v. D.C. working, 4×4×4 (12 mfd.), 3/9; T.C.C. 8 mfd. electrolytics, 3/-.

RADIOMART.—Aerovox 8×8 mfd. dry, the world's best electrolytic; 3/6; cheapest smoothing possible.

RADIOMART.—Non-inductive wire-enedd tubulars, 1,500v., 0.1, 0.01, 0.02, 6d.; Philips ditto, 0.0001, 0.001, 2d.

RADIOMART.—Utility 1934 bakelite condensers, 0.0005, 10d.; 0.0003, 8d.; 0.0002, 0.0001, 6d.; 0.0003 differentials, 1/6.

RADIOMART.—Cadmium 5-valve chassis, 1/6; 4-valve, 1/-; postage 6d. extra.

RADIOMART.—Utility screened 2-gang 0.0005 bakelite Uniknob, disc drive; 2/11.

RADIOMART.—Telsen boxed differential condensers with knob, 0.0001, 0.00015, 1/-; 0.0003, 0.00035, 1/3.

RADIOMART.—Met-Vick boxed H.F. chokes, really efficient, 1/-; Utility snap switches, 9d.

RADIOMART.—Colvern 5-watt wirewound potentiometers, 2,500, 15,000, 1/6; Magnum, 25,000, 1/9.

RADIOMART.—(G5NI), shortwave specialists, actually stock Hammarlund "Comet Pros," McMurdo single signal, National F.B.7.

RADIOMART.—Igranic ironcore dual-range shortwave coils, 3/3; with switch, 4/9; Raymart shortwave H.F.C., 9d.

RADIOMART.—Famous 0.0001 all brass shortwave variables, 1/9; Ormond 0.00025 loloss pigtail, 1/9.

RADIOMART.—Western Electric solidback guinea microphones, 2/9; Beehive standoff insulators, 8d.

RADIOMART.—Frequentive valve holders, 9d.; R.I. special 300hy. chokes, 7/6; second-hand 400 ohm potentiometers, 6d.

RADIOMART.—Orders over 6/- post free.—The Square Dealers, 19, John Bright St., Birmingham. [6243

P.P.5/400 Power Pack, choke output, valves, £4/10; 9in. Magnavox, pentode, 17/6; Epoch 66K, £1.—491, Footscray Rd., S.E.9. [6299

MANUFACTURERS' and Bankrupt Stock.—Marconi pick-up, 21/6; B.T.H. needle armature, 27/-; Celestion W.8, 16/-; Cosmocord, 12/-.

WESTINGHOUSE Rectifiers.—H.T., 6, 7, 8, 9/-; H.T., 9, 10, L.T. 4, 5, 10/-.

RESISTANCES.—Dubilier etc., 1 watt, all values, 6d.; electrolytic condensers, Dubilier and T.C.C., 8 mfd., 4 and 50 mfd.; 3/- each.

OUR Single Span Transformers and Coils to Specification; 19/- and 24/- per set; write for lists.

SPEAKERS.—Magnavox, 152 20/-, 154 15/-, 136 11/6; U.S.A. Rolas, all types, from 17/- to 30/-.

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VAUXHALL.—Pick-ups from 8/- to £2; state make for quotation; volume control, all values, with switch and knob, 3/6; gramophone switches, 3/6.

VAUXHALL.—Benjamin, Class B, transformers, 1-1½ to 1, 6/6; Radiophone, Class B, 10/-; L.F. transformers, 7/-.

VAUXHALL.—Westinghouse rectifiers; H.T.8 9/6, H.T.9 10/-; Westectors, W.4, W.X.6, 5/9; Clix valve holders, 7-pin, 7d.; W.B., 4-5-pin, 4½d.; send postcard for lists; post paid 2/6 or over or c.o.d.

VAUXHALL UTILITIES, 163a, Strand, W.C.2 (facing Bush House, S.E. Wing). Temple Bar 9338. [6278

MARVELLOUS Value in Microphones.—Western Electric transmitters, complete, 2/3 each; ditto hand microphones, diagrams and instructions, 3/6; microphone transformers, with terminals, 3/6; microphone buttons, 6d. each; ball bearings, A.C. and D.C. motors, 1-40h.p., adaptable for television, 200-240v., 7/6 each; all post free.—Electromicro, 34, Queen St., Hammersmith. [6291

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MISCELLANEOUS.

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HIGHEST Possible Allowance Made on Used Wireless Sets or Parts in Exchange for Any New Set, kit or parts; Peto-Scott kits supplied; goods bought for cash.—R. Wigfield, Furlong Rd., Goldthorpe, Yorks. [6320

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YOUTHS Trained for all Branches Wireless Profession; Britain's leading college; training fee payable after appointment; students boarded; London representative for interviews; prospectus free.—Wireless College, Colwyn Bay. [0388

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High-fidelity reproduction with Triple Speakers... Variable Selectivity.

STAND
74
OLYMPIA

a combination which ensures performance of unusual merit

The development of the High Frequency Horn Type Speaker and also the design of a special circuit which will pass on the very high frequencies to this speaker has made possible a degree of fidelity in reproduction far surpassing anything hitherto achieved.
In order to ensure reproduction of the complete musical scale with the overtones so essential to fidelity, and without sacrifice of efficiency or "balance," extensive tests have proved that three matched speakers are essential.

R·G·D MODEL 1202 AUTO 12 valve RADIO GRAMOPHONE

has, in addition, three degrees of selectivity, one of which is chosen according to widely varying conditions of reception. Thus the highest possible fidelity consistent with essential selectivity is assured—a fidelity which is truly amazing.
Model 1202 incorporates automatic record changer and new type Piezo Crystal Pick-up, which gives brilliant reproduction of gramophone records.
The undistorted output is 6 watts.
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Dimensions 40" high × 31" wide × 19" deep.

Complete specification is contained in Catalogue, sent free on request.

ONE HUNDRED AND SEVEN GUINEAS.

Model 1202 Non-Auto (Gramophone is not automatic) - - 100 GNS.

Triple Speakers incorporated in R.G.D. Model 1202.

Model 703 Auto 7 VALVE RADIO GRAMOPHONE has three degrees of selectivity,

Model 703 is a 7 Valve Superhet Radio Gramophone, with an undistorted output of 3 watts. The new type Piezo Crystal Pick-up and Automatic Record Changer are incorporated, and the dual matched speakers are specially designed for high fidelity.

Write for Catalogue, which fully illustrates R.G.D. Radio Gramophones from 50 to 130 gns., and also contains complete specifications.

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INDIA: Huge Engineering Co., Imperial Chambers, 32, Wilson Road, Ballard Estate, Bombay.

Haldens

1935 SHORT-WAVE RECEIVER

The Wireless World

4D

THE PRACTICAL RADIO JOURNAL

with

Complete Foreign Programmes

Friday, August 31st, 1934.

No. 783. Vol. XXXV. No. 9.

The Wireless World

THE PRACTICAL RADIO JOURNAL

24th Year of Publication

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EDITORIAL COMMENT

We Are Taken to Task

A Reply to Critics

"*THE WIRELESS WORLD* should take more care of its reputation as a technical journal of some authority, and should avoid making wild and obviously absurd statements."

In these unkind words we are taken to task in a recent issue of *To-day's Cinema* for comments which appeared in *The Wireless World* regarding recent "talkie" excerpts broadcast by the B.B.C. Our critics defend this attack upon us by saying "the amplifiers in use in the majority of cinemas are of the very finest that science can design. The weakest link in the chain of 'talkie' processes is the actual loss of quality caused by recording the sound and reproducing it on the film."

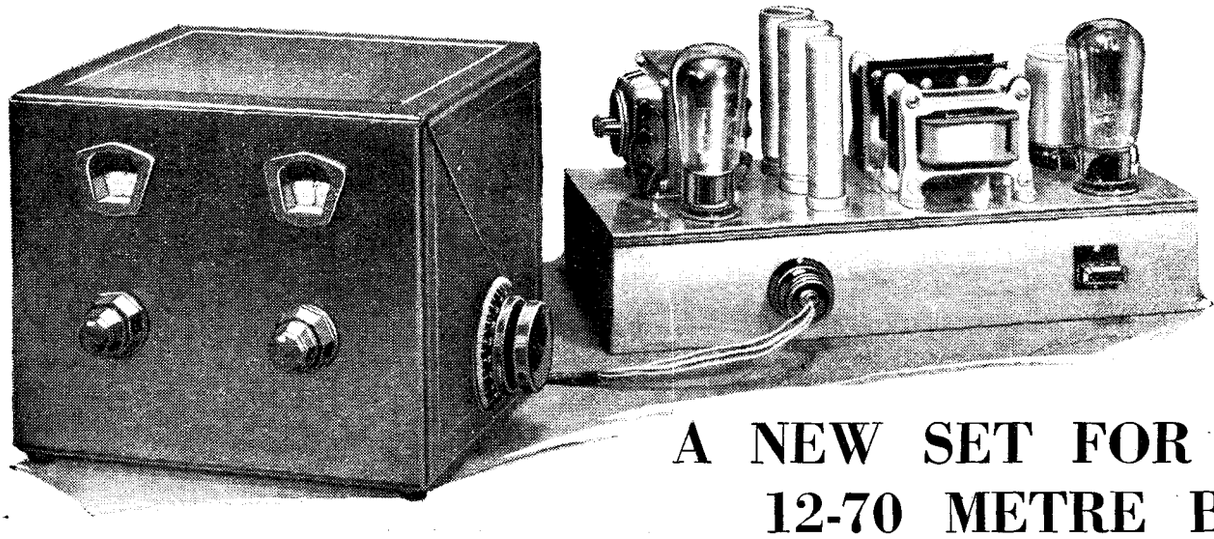
Our readers would not expect us to accept such a criticism without putting forward a defence, and although we should be ourselves the last to suggest that *The Wireless World* is infallible, we think that in this particular instance readers will be satisfied that if any "wild and obviously absurd statements" have been made they have not appeared in the pages of *The Wireless World*.

In our defence we propose to call only two witnesses, the Western Electric Company and the B.B.C. The Western Electric Company recently gave to a technical assembly a demonstration of improvements in "talkie" sound reproduction. And in the course of their description of the equipment a number of interesting statements were made, but we will quote only two. The first reads: "The effective frequency limits of the best reproducing equipments commercially available up to the present time are about 90–5,000," and the second "Hitherto, reproducing equipment of highest quality has proved adequate to deal with the best available quality of recording, but recent developments in recording on film have outstripped the possibilities of the reproducing system, and it has become necessary to improve reproduction to the point where it is capable of taking advantage of the improvement in recording."

And now to turn to our second witness, the B.B.C. We have but to refer to a letter from the Chief Engineer published in *The Wireless World* in June of this year. In this letter the statement appears "All the regional transmitters, as well as the associated apparatus in control rooms, are capable of reproducing a frequency range of from 50 to 9,000 cycles per second, with a loss of less than about 3 decibels."

As a further justification for our preference to broadcast transmission of film recording to the average cinema reproduction, it may not be out of place to draw attention to a letter appearing in the Correspondence columns of this issue, which we happen to have received at this time, from a reader who deplores the present average quality of cinema reproduction as failing to do justice, as a result of incompetent supervision, even to the possibilities of the standard cinematograph equipment.

In conclusion, we would like to point out that we welcome technical criticism and any sincere attempt to investigate statements which may appear in *The Wireless World*, but as a "technical journal of some authority" (to use the expression employed by *To-day's Cinema*) we feel that it is a part of our duty to put forward these technical facts in order to ensure that the public shall not be misled.



A NEW SET FOR THE 12-70 METRE BAND

1935 A.C. Short-wave Receiver

By "MEGACYCLE"

THIS set caters for all classes of short-wave listener—for A, who wants the more powerful short-wave stations with almost 100 *per cent. reliability; B, whose ambitions extend to weaker and more remote stations; C, whose aim is the reception of amateurs from the other side of the world, and D, the newcomer, who wishes to master the short waves and thus discover the secret of their appeal. The receiver incorporates a system of "band-spread" tuning giving exceptional ease of operation.*

SHORT waves are no longer to be regarded as a separate, and rather freakish, branch of radio technique. Although they are still treated with a certain amount of awe and distrust, we may truthfully say that they are beginning to come into their own.

Five years ago the design of a short-wave receiver, if it were to carry conviction, had to be essentially "freakish," notwithstanding the fact that straightforward arrangements probably gave the best results. The time has come, however, when a short-wave set can be built from standard components, with just as much certainty of reliable results as one would expect with a medium-wave broadcast receiver.

The chief difficulty that remains with the designer to-day is that there are several different classes of short-wave listener. It is almost impossible to please them *all* with one design, especially if it be a compromise which is not completely satisfactory for any particular requirement.

Let us consider the situation. Assuming that by "short waves" we mean that part of the radio spectrum between 60 and 10 metres, we know the following facts. First of all, there are roughly 180 broadcasting stations between those two extremes, if we include the numerous commercial stations which carry out telephony tests with a "programme value"—such as gramophone records.

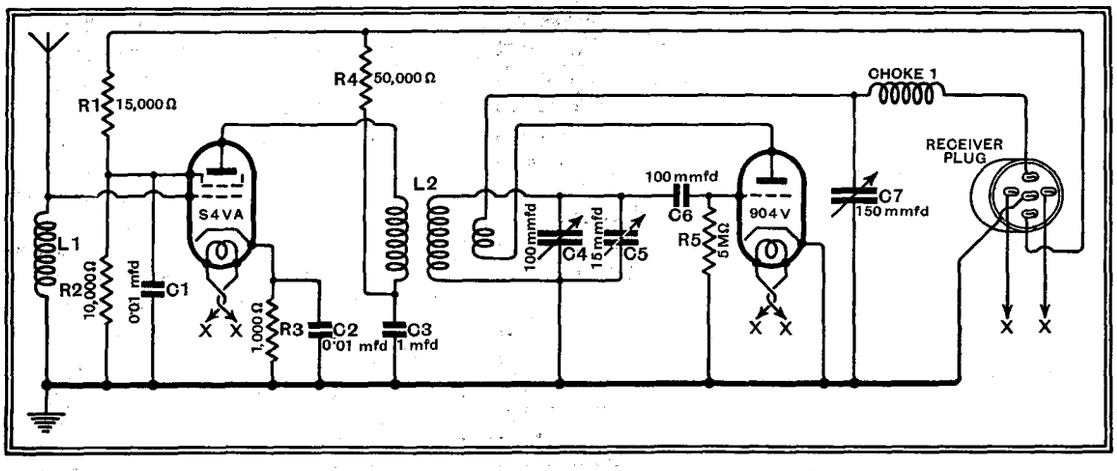
Secondly, disposed over two narrow wavebands in the regions of 20 and 40 metres, we have more than 50 per cent. of the world's amateur transmitters, who now total something not far short of 40,000.

Thirdly, we have a vast number of commercial stations using high-speed Morse code with tremendous power, which carry out work of great importance, but, frankly, are of no interest to the listener. These (unfortunately for the listener) are in the great majority, but that does not alter the fact that there are hundreds of stations that *are* worth listening to.

The official broadcast stations are disposed over the short-wave spectrum in six main "bands," in the regions of 49, 31, 25, 19, 16, and 14 metres, the average width of the bands being about 300 kc/s, somewhat greater than that of the two amateur bands with which we are concerned.

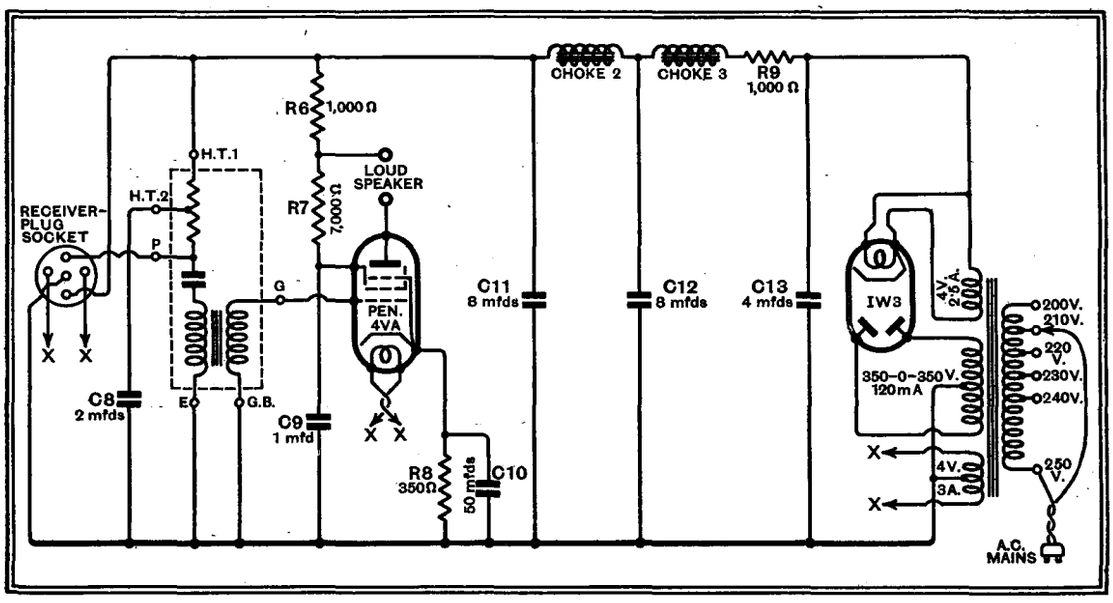
One would imagine, then, that the ideal short-wave set would be one which would cover these six broadcast bands and the two amateur bands, leaving the vast expanse of ear-shattering commercial Morse completely out of the operator's tuning range.

There is, indeed, something to be said for such a receiver. Unfortunately, however, its owner would still be missing quite a lot of interesting transmissions, because a kind of unofficial rebellion is going on. New short-wave broadcast stations are



The circuit of the receiver unit, comprising a periodic screened-grid H.F. and detector stages.

1935 A.C. Short-wave Receiver—



The output stage is combined with the mains rectifying equipment as a separate unit.

springing up wherever they can find a few "blank kilocycles" to occupy. The official broadcast bands are congested, and, in more than one case, occupied by "pirate" commercial stations, so that it is hardly surprising that broadcast stations are spreading themselves!

In cold fact, the position to day is this: the "49-metre" broadcast band extends from 50 metres down to 42 metres; the "31-metre" band is fairly self-contained, except for a few stragglers occupying pitches up as far as 38 metres; and the other bands are more or less correct. Isolated stations, however, are working practically wherever they like.

Band-spreading

Our ideal short-wave receiver, therefore, must give us fairly easy tuning over the complete range from 50 metres down to about 13 metres—a total expanse of about 16,000 kc/s.

We *must* cover this range, but within it there are certain narrow bands that require close scrutiny owing to the large number of interesting stations working within their limits.

If we use three separate coils to cover the entire range (as we can conveniently do with a tuning condenser of 100 $\mu\mu$F) we still have to cover 5,000 kc/s or more with each sweep of the condenser. This implies tuning about five times as difficult (i.e., as *sharp*) as that to which we are accustomed on the medium broadcast band.

In the receiver about to be described this particular problem has been overcome by the use of "band-spreading," long known by the amateur transmitter, to whom it has been a necessity for years.

The simplest possible scheme has been adopted; a variable condenser of 15 $\mu\mu$F is used in parallel with the main tuning condenser, and both are equipped with good, slow-motion dials. Thus, the 100 $\mu\mu$F condenser may be used purely as a "band-setter," and all tuning within the narrow amateur and broadcast bands may be carried out with the small condenser, which gives a delightful ease of operation, and does, in fact, cover a considerably smaller band-width than we are accustomed to with a broadcast receiver.

This point has been dealt with at some length because it is of vital importance that we should understand clearly the requirements that we have to meet in designing a modern short-wave receiver.

Now to deal with the general design of the set. The Editor has been receiving frequent letters from overseas readers on the subject, and they all stress the need for a good all-A.C. receiver. A few years ago we thought of an export model as essentially a battery receiver, but it now appears that the spread of A.C. mains (even in the most out-of-the-way parts) has altered things considerably.

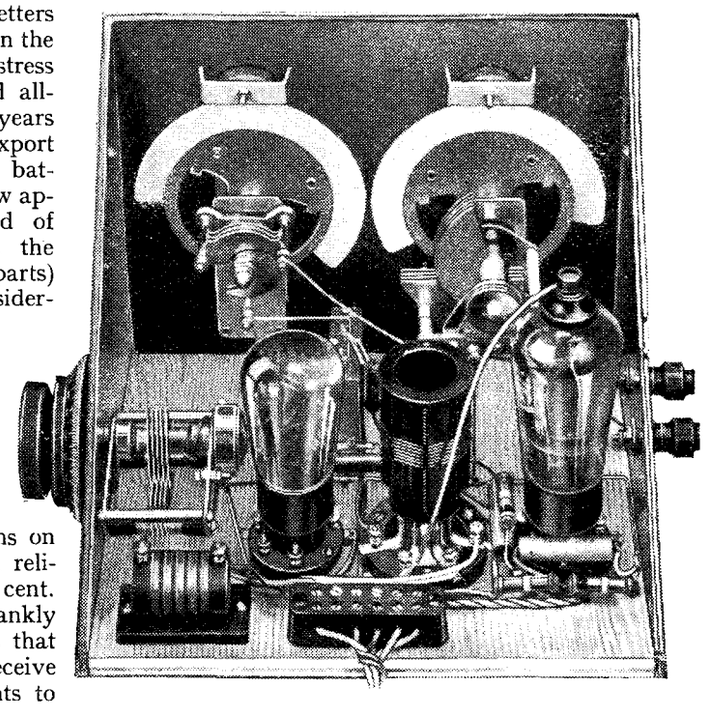
The classes of listener for whom we have to cater may be summarised as follows: "A" wants to receive some of the more powerful short-wave broadcast stations on the loud speaker with reliability as near 100 per cent. as possible. "B" is frankly bored by the stations that he knows he can receive every night, and wants to receive something that "A" can't get.

"C" is the real DX man, who is interested chiefly in amateur transmissions from the other side of the world. He may, or may not, possess a transmitter himself. Then we have "D," the "recruit," who is desperately anxious to master the short waves, and will be interested, for quite a long time, by anything that he is lucky enough to hear.

This receiver caters for them all, provided that they require loud-speaker reception. The circuit used employs an aperiodic screened-grid H.F. stage, transformer-coupled to a leaky-grid detector. These first two valves are housed in one of the new and compact metal boxes. The output stage—a pentode—is coupled by a resistance-fed transformer to the detector, and is housed with the power pack on a separate chassis. An external speaker is used.

Dealing first with the receiver proper, the following points arise: The untuned S.G. stage, although it may give little amplification below 25 metres, is almost indispensable. Known in the U.S.A. as an "aerial decoupling stage," it saves an enormous amount of trouble with the detector; it is, in fact, little short of a panacea for short-wave annoyances, such as hand-capacity effects, bad reaction control, "dead spots" from the aerial system, and other well-known faults.

A specially wound aerial coil, consisting of forty turns of No. 36 D.S.C. on a 1in. former is used in the grid circuit of this valve. The screen is provided with a fixed potential (three-fifths of the anode voltage) by means of resistances of 10,000 and 15,000 ohms, and the anode is fed from the



There is ample space inside the screened cabinet to house the necessary components of the first two stages

1935 A.C. Short-wave Receiver—

positive H.T. through a decoupling resistance of 30,000 ohms, by-passed by a 1 μF condenser.

The secondary of the H.F. transformer (the detector grid circuit) is tuned by two parallel condensers of 100 $\mu\mu$F and 15 $\mu\mu$F; the detector is provided with a grid condenser of 100 $\mu\mu$F and a leak of 5 megohms.

H.T. is series-fed to the detector, in series with the "Transfeeda" unit, an H.F. choke, and the reaction coil; and a reaction condenser of 150 $\mu\mu$F, also equipped with slow-motion drive, is provided at the side of the case, a position that gives very comfortable operating, and leaves the front panel clear for the two tuning condensers.

A five-wire cable, connecting to a terminal-block at the rear of the receiver proper, terminates in a five-pin plug, and a suitable socket is provided on the power-pack chassis; the only connections to the receiver box are the aerial and earth.

The power-pack consists of a 350-0-350V transformer, equipped also with a 4V winding for the valve rectifier and a 4V3A winding, centre-tapped, for the receiver filaments. Smoothing, about which one must be somewhat particular when short waves are concerned, is very thoroughly looked after by 4 μF after the rectifier, two chokes of 30 H. each, and two more 8 μF electrolytic condensers. Both chokes are in the positive lead, and a 100-ohm resistance (2 watts) is also provided before the first choke.

In practice this smoothing was found to be thoroughly adequate. There is never the slightest trace of hum when the receiver is below the oscillation point, and only the merest suspicion of it when the set is oscillating. This latter was completely disposed of by using metallised valves, and only occurred when certain house lights were switched on.

The output stage is a pentode of the Pen 4VA type, its H.T. supply being still further "dropped" by a 2-watt 1,000-ohm resistance in its anode circuit, giving an acute anode voltage of about 260 V. A 7,000 ohms resistance is used in the lead to the priming-grid, by-passed by 1 μF.

Automatic grid-bias is, of course, provided both for this valve and for the screened-grid valve.

(To be concluded.)

LIST OF PARTS.

RECEIVER CHASSIS.

1 Variable condenser, 0.0001 mfd., **C4**
J.B. S.W. "Special" 2042
1 Slow motion dial for above **J.B. 2-ratio 2092**
1 Variable condenser, 0.00015 mfd., **C7**
J.B. "Popular Log" 1049
1 Variable condenser, 15 mmfds., **C5** **Eddystone 900**
1 Slow motion dial for above **J.B. 2-ratio 2092**

1 Fixed condenser, 1 mfd., 300 v. D.C. working, **C3**
T.M.C. Hydra 30
(Dubilier, Goltone, Peak, T.C.C., Telsen)
1 Fixed condenser, 0.0001 mfd., Tubular, **C6**
T.M.C. Hydra T.3
2 Fixed condensers, 0.01 mfd., Tubular. **C1, C2**
T.M.C. Hydra T.17
(Dubilier, Ferranti, Graham-Farish, Peak, Polar-N.S.F., T.C.C., Telsen)

1 Resistance, 1,000 ohms 1 watt, **R3** **Bryce**
1 Resistance, 10,000 ohms 1 watt, **R2** **Bryce**
1 Resistance, 15,000 ohms 1 watt, **R1** **Bryce**
1 Resistance, 50,000 ohms 1 watt, **R4** **Bryce**
1 Grid Leak with wire ends, 5 megohms, **R5**
Loewe FZ130
(Dubilier, Erie, Graham-Farish, Polar-N.S.F., Claude Lyons, Seradex)

1 Skeleton short-wave choke, 1 **Bulgin H.F. 14**
(Eddystone, Kinva, Wearite)
1 Coil base, 6-pin, baseboard type **Eddystone 969**
3 Plug-in coils, 6-pin, **L2**
Eddystone 6 L.B., 6 Y. and 6 R. No. 959
1 Aerial coil (see text) **L1**

1 6-way Connector **Bryce**
1 5-way Cable, 30 ins. **Belling-Lee**
(Bulgin, Goltone, Harbros)
1 5-pin Plug **Bulgin P.3**
(British Radio Gramophone Co., Goltone)

2 Valve-holders, 5-pin, baseboard type **Benjamin**
(Bulgin, Ferranti, Lissen, Telsen, W.B.)
2 Ebonite shrouded terminals, A., E.
Belling-Lee Type "B"
Metal screening cabinet, 9¾ x 8 x 8ins. undrilled
Eddystone 975
2 ozs. No. 20 tinned copper wire, 3 lengths Systoflex, wood, etc.
Screws:—
2 ¼in. No. 4 R/hd.; 2 ¼in. No. 4 R/hd.; 9 ⅜in. No. 4 R/hd.
Valves:—1 Mullard S4VA, 1 Mullard 904V metallised.

POWER UNIT.

1 Mains transformer, 350-0-350 volts, 4 volts, 2.5 amps., 4 volts, 3 amps. **Wearite Type "B"**
(B.S.R., Challis, Davenset, Claude Lyons, Parmeko, Sound Sales)
2 L.F. chokes, 30 henries **Sound sales 30V.**
(Bulgin, Davenset, Varley, Wearite)
1 L.F. coupling unit **Benjamin "Transfeeda"**
(Bulgin)
1 Electrolytic condenser, 4 mfds., 500 v. peak working, **C13** **Dubilier 8283**
2 Electrolytic condensers, 8 mfds., 500 v. peak working, **C11, C12** **Dubilier 0281**
(Ferranti, Peak, Polar-N.S.F., T.C.C.)
1 Electrolytic condenser, 50 mfds., 50 volts, **C10**
Dubilier 3003
(Ferranti, T.C.C.)

1 Fixed Condenser, 1 mfd., 300 volts D.C. working, **C9**
T.M.C. Hydra 30
1 Fixed condenser, 2 mfds., 300 volts D.C. working, **C8**
T.M.C. Hydra 30
(Dubilier, Goltone, Peak, T.C.C., Telsen)

1 Resistance, 350 ohms 1 watt, **R8** **Bryce**
2 Resistances, 1,000 ohms, 2 watts. **R9, R6** **Bryce**
1 Resistance, 7,000 ohms 1 watt, **R7** **Bryce**
(Dubilier, Erie, Graham-Farish, Polar-N.S.F., Claude Lyons, Seradex)

2 **Valve holders,** 5-pin, under baseboard type
Eddystone 954
1 Valve holder, 4-pin, under baseboard type
Eddystone 953
(Clix, Goltone)

1 3-pin Plug and socket panel **Belling-Lee 1119**
Plymax baseboard, 16 x 7 x ⅜ins. **Peto-Scott**
2 ozs. No. 22 tinned copper wire, 6 lengths Systoflex, wood, etc.
Screws:—
14 ¼in. No. 4 R/hd.; 12 ¼in. No. 4 R/hd.; 6 ⅜in. No. 4 R/hd.; 2 4B.A. C/hd., complete with nuts and washers.
Valves:—1 Mullard Pen./4VA; 1 Mullard IW3.

NEW BOOK

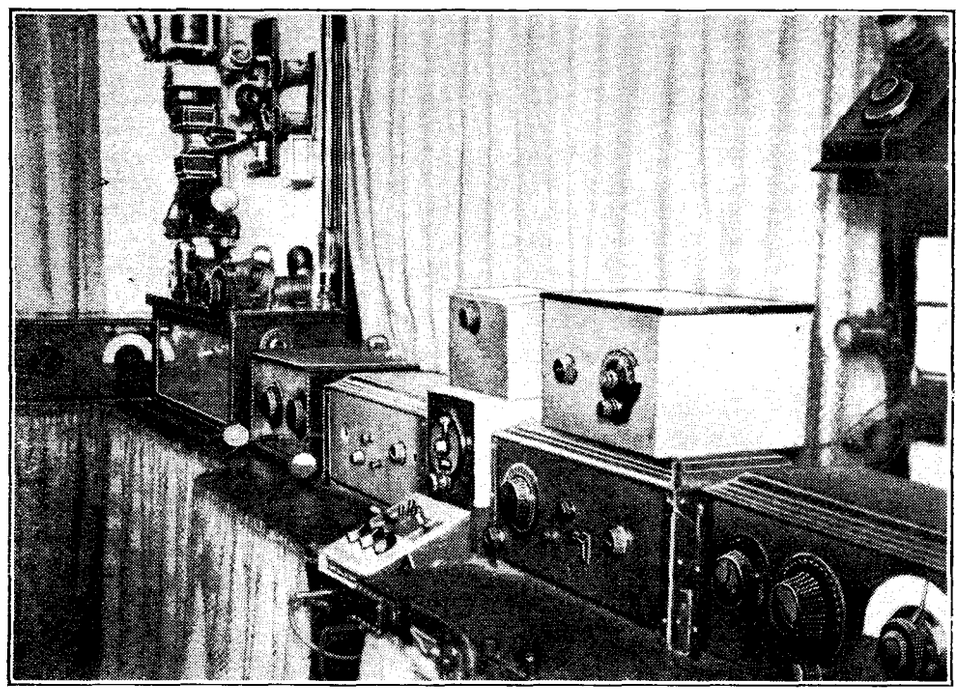
Earth, Radio and The Stars. By Harlan T. Stetson, Ph.D., Research Associate in Geophysics, Harvard University. Pp. 336+ xvii, with 88 diagrams. (McGraw-Hill Publishing Co., Ltd., Aldwych House, London, W.C.2.) Price 10s. 6d. net.

The relations between the propagation of radio waves and the broad subject of terrestrial physics are well known to be matters of increasing importance, and formed the subject of last year's Kelvin lecture at the I.E.E. by Sir Frank Smith, head of the Department of Scientific and Industrial Research. In this new book the author, primarily an astronomer, carries the subject still farther, and compares radio conditions with many other forms of cosmic data.

The first eight chapters are devoted to a general exposition of the earth and moon in relation to each other and to the sun. Starting then on sunspots and the earth's magnetic field, eight more chapters are devoted to subjects of interest in connection with radio propagation. This matter is oriented rather from the viewpoint of using radio to cast light on other cosmic phenomena than from the converse viewpoint to which the radio engineer perhaps more naturally inclines. This does not, however, make it any the less valuable, since, in the present stage of the subject, the wireless engineer has necessarily to consider all aspects of the matter for his own sake. The remaining chapters deal with cosmic clouds, cosmic rays, and the broad subject of cosmecology, referring particularly to the work of the Union Radiotelegraphique Scientifique Internationale (U.R.S.I.).

The radio data are for the most part taken from published works, the "Proceedings of the Institution of Radio Engineers" being liberally used for American data, although European sources are not overlooked.

The book is well illustrated, and the bibliography is particularly complete and helpful to those who wish to refer to original sources.



G2DQ. Wickford, Essex, owned and operated by Mr. H. G. Collin, winner in the R.S.G.B. 80-metre contest and both sections of the 160-metre contest. The station communicated with ZL 4AO, New Zealand on 40 metres with a power of only 2 watts.

Step-by-Step Waveband Coverage

Proposal for a Wide Tuning Range

A WELL-KNOWN research worker in Germany, Herr von Kramolin, has communicated to us some interesting views on a possible modification of the single-span tuning principle. An outline of his proposed scheme is given in this article.

SINCE the introduction of single-span tuning, many suggestions have been received with regard to modifications intended to improve the performance in some particular. Many of these, of course, have such great attendant disadvantages that they are unsuitable for general use, however valuable they may be for particular receiving conditions. One suggestion, however, due to von Kramolin, is worthy of detailed examination.

It will be remembered that a single-span receiver employs an intermediate frequency which is higher than any desired signal-frequency, and that the oscillator frequency is always higher than the intermediate frequency. Consequently, the aerial system can be aperiodic over the signal-frequency range of 150-1,500 kc/s, but attenuate frequencies outside this range so that second channel interference is avoided without the complication of signal-frequency tuning. Owing to the fact that the oscillator functions at high frequencies, the full waveband can be covered with a single small tuning condenser and with a single coil.

These advantages are very important, and experience has shown that the only disadvantages of the system are the lower efficiency of the aerial coupling and the increased difficulty of obtaining high selectivity at the high intermediate frequency employed. These disadvantages are not of great importance, and careful design readily permits a highly satisfactory performance to be obtained. The use of a lower intermediate frequency, however, would certainly make the design of a highly selective set easier. Many correspondents have pointed out that this could be arranged by a system embodying double frequency-changing, but as shown in a recent issue of *The Wireless World*[1] this is not as satisfactory as it would at first appear.

Von Kramolin's Proposal

Von Kramolin has suggested, however, that a low intermediate frequency could be used with the single-span system by dividing the tuning range into a number of smaller bands.

He envisages the use of an intermediate frequency of some 150 kc/s and dividing the receiving range into bands only 200 kc/s, in width. The first band would thus be 1,300-1,500 kc/s, and the oscillator would be variable over the range of 1,450-1,650 kc/s. Second channel interference would occur from stations in the 1,600-1,800 kc/s range and could be avoided by fitting an aerial filter passing frequencies of 1,300 kc/s to 1,500 kc/s only.

The second range, of course, would be 1,100-1,300 kc/s and second channel

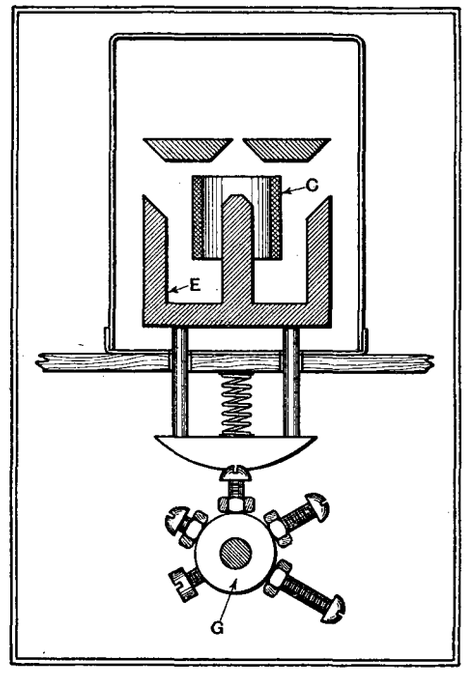


Fig. 1. Drawing to show the mechanism for wavechanging.

interference could be caused by stations in the 1,400-1,600 kc/s band, so that a different aerial filter would be needed for its avoidance. In all, something like seven ranges would be required to cover the full band of 150-1,500 kc/s, but these could probably be reduced to five or six if the shipping band were omitted.

A tapped oscillator coil with a multi-way selector switch would serve for range-changing as far as the tuning control itself is concerned, but a more complicated system of switching would be needed for changing the aerial filter appropriately. The author of this scheme, however, envisages an ingenious arrangement for wavechanging which does not embody switching. Briefly, he proposes that the oscillator coil should be fitted with a moveable iron-core as shown in Fig. 1, in which the coil is represented by C. The iron core E is held by a spring in such a manner that it presses against a screw-head fitted on the circumference of a rotatable rod G. This rod is provided with one screw for each range required, and each screw is of a different length so that the amount by which the core projects into the coil is determined by the particular screw engaging with the core. The inductance, therefore, is variable in steps and a similar arrangement could, no doubt, be applied to the aerial filter.

Accuracy of Calibration

It is obvious that the adjacent channel selectivity can be increased through the use of this scheme, for it permits the use of a low intermediate frequency. It is claimed also that increased efficiency results, for the aerial filter must be aperiodic over a smaller range of frequencies. The chief advantage claimed for the system, however, is that increased accuracy of calibration is possible, for the full length of the tuning scale corresponds to a band of 200 kc/s instead of some 1,350 kc/s. Against this, of course, must be set the fact that calibration adjustments are needed on five or more ranges instead of on only one, and there is no doubt that a large number of ranges tends to make searching a tedious business.

The sub-division of the tuning ranges is of particular advantage in increasing the accuracy of station calibration, for if each band is only 200 kc/s in width no more than some 20 station names need be included in the full scale length. One scale for each range must be provided, of course, but the switching mechanism can be linked with a shutter so that only the appropriate scale is at any time exposed.

[1] *The Wireless World*, July 27th, 1934.

THE RADIO INDUSTRY

UNDER the title of *Radio Contact*, Graham Farish is publishing a 3d. magazine containing articles dealing with the construction of receivers in which Graham Farish and Formo components are used. In addition, articles of general broadcast interest are included.

◇ ◇ ◇

The Philco programme of receivers for the present season includes an A.C. superheterodyne at ten guineas, a universal A.C.-D.C. set with a similar circuit, a three-valve battery receiver, and several additional models, including all-wave sets.

◇ ◇ ◇

Mr. T. F. Nicholson, late of the Majestic Electric Co., has been appointed sales manager to Midgley Harmer, Ltd., makers of receivers and loud speakers, of Duke's Road, Western Avenue, London, W.3.

◇ ◇ ◇

The latest Varley components catalogue deals with such recent developments as the Permeability Tuner and the Nicore flat-gang coils. Copies are obtainable from Bloomfield Road, Woolwich, London, S.E.18.

A Review of Germany's Premier Exhibition

Opening of the Show by Dr. Goebbels, who is seen speaking.

By A BERLIN CORRESPONDENT

THIS year's Exhibition yielded nothing in size to that of last year. Two hundred and thirty-five exhibitors were represented. This year, as before, the Exhibition consisted of two sections—a general exhibit of wireless interest, and a part in which the industry displayed its products.

In the general Show the first thing to meet the eye was a Signal Detachment of the Reichswehr in action in the grounds of the Exhibition. The Detachment was composed of various groups, including a fully equipped unit.

This year a section of the Exhibition dealt with statistical material concerning the extent and importance of German broadcasting.

A large amount of space in the general section was occupied by television apparatus which it is hoped to describe in a later article.

Perhaps the most remarkable section of the whole Show was that in which the process of manufacture of the German "People's Receiver" was shown. This section was intended not merely to give the public a chance to see how a broadcast receiver is built but also to emphasise the ingenuity and skill exercised in the production of equipment in daily use. The manufacture of this receiver in all its details has been selected because this particular receiver has, in actual fact, become the standard of the people. Within one year seven hundred thousand "People's Receivers" have been sold. The demand for the "People's Receiver" is now so great that several firms in the industry can hardly keep up with it. At the present moment the eighth and ninth series (800,000 and 900,000) have been put in commission.

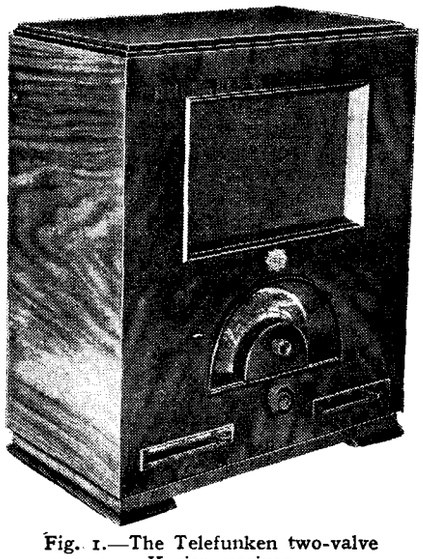


Fig. 1.—The Telefunken two-valve Kurier receiver.

So much for the general Exhibititon. We will now turn to those sections in which the German radio industry revealed its progress.

The Trend of Development in the New Receivers

There was a certain amount of discussion this year in the German radio industry as to whether new broadcast apparatus should be brought out, when quite a number of the more expensive types were still unsold in the warehouses. It was, however, decided that the public would demand new broadcast receivers, and that this wish must be gratified. In order to give the public a better comparison between the new sets and those of last year, in properties and price, the industry has divided last year's and this year's receivers into a number of classes, which are based upon sensitivity and selectivity. The sensitivity is assessed by the input required to give standard output in the loud speaker. The statement that a receiver has a sensitivity of 25 microvolts, therefore, means that it will give reproduction at a certain definite volume level from a signal which feeds 25 microvolts into the receiver with the particular aerial used. Another set may be rated at 100 microvolts, and would naturally need a signal four times as strong to provide the same output. The higher the sensitivity of a receiver, therefore, the smaller is the figure representing it, for this figure refers not to amplification but to the input required.

The rating for selectivity is the ratio of the input at resonance to that at a frequency different from resonance, both inputs being for standard output. Thus, a selectivity rating of 1 : 80 means that if an input of 10 microvolts is needed at resonance for standard output, 800 microvolts are necessary when the set is mistuned from the signal by a certain amount. A rating of this nature conveys useful information regarding the selectivity of a receiver, but it is necessarily incomplete and can, strictly speaking, be used only to compare receivers of the same general type. A full comparison is only possible when resonance curves are available. It should be noted that the degree of mistuning involved in the selectivity ratings given in this article is not specified, but it can be safely assumed that it is the same for all sets. The figures, however, cannot be used for comparisons with other receivers.

Class I includes the single-circuit receiver of last year (sub-class A) and the single-circuit receiver of this year (sub-class B). The average price given for the sub-class A type is 130 RM, and for the sub-class B type 170 RM. Sensitivity for sub-class A is given at 125-1,000 microvolts, selectivity as 1 : 35, while for the sub-class B the sensitivity is given as 100-1,000 microvolts and the selectivity as 1 : 40.

Class II includes in the sub-class A the three-valve two-circuit receiver (sensitivity 25-50 microvolts, selectivity 1 : 80, price 180 RM), and in the sub-class B the three-valve superhets of the previous year without reflex connection (sensitivity 75-125 microvolts, selectivity 1 : 175, price 195 RM to 220 RM): in the sub-class C, the new two-circuit receiver with reflex connection of this year (sensitivity 50-80 microvolts, selectivity 1 : 80 to 100, price 200 RM).

In Class III, sub-class A, are the three-circuit four-valve receivers of last year (sensitivity 25 microvolts, selectivity 1 : 130, price 230 RM): in sub-class B the three-valve reflex super (sensitivity 10-30 microvolts, selectivity 1 : 300, price 270 RM): in the sub-class C the new three-circuit four-valve receiver (sensitivity 20 microvolts, selectivity 1 : 175, price 275 RM).

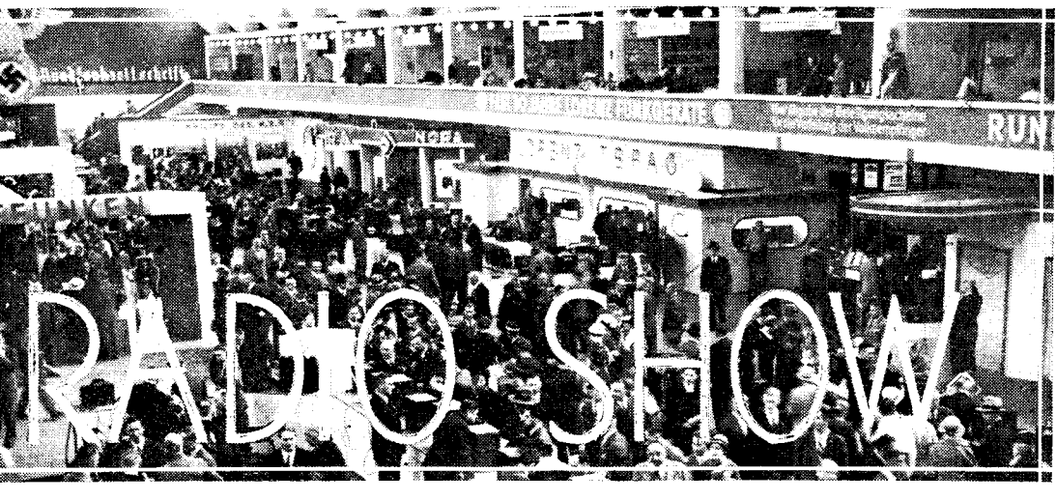
In Class IV are the four-valve three-circuit superhets with a sensitivity of 5 to 20 microvolts, a selectivity of 1 : 400 to 1,000, and a price of 300 Rm.

The big superhet with five valves forms Class V, with a sensitivity of 10 microvolts and a selectivity of 1 : 700 to 1,000, price about 400 Rm.

In the knowledge that the sensitivity of the four-valve superhet is only very little lower than that of the five-valve superhet, the latter has not been brought much to the fore in Germany this year, the four-valve superhet being offered in much greater numbers as the type of large receiver.

We may thus divide the receivers in this year's exhibition into the following types:—

Single-circuit with two valves, two-circuit



Inside one of the Exhibition Halls.

with two valves and a duo-diode (which is not included in the number of valves in Germany) in reflex connection, two-circuit types with three valves, types with three to five circuits in "straight" connection, three-valve superhets without reflex connection, three-valve superhets with reflex connection, four-valve superhets without reflex connection, and five-valve superhets.

Single Circuit Receivers

The "People's Receiver," a two-valve single-circuit type, is made in uniform design

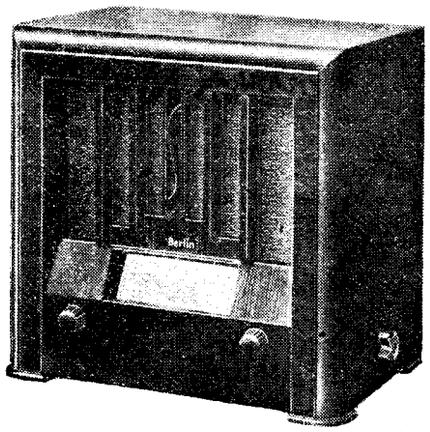


Fig. 2.—The Sachsenwerk three-valve reflex superheterodyne with "Cinema" scale.

by the whole German radio industry, but other two-valve single-circuit types, such as that shown in Fig. 1, are produced this year by some seventeen firms, and a number are provided with short-wave reception. The Loewe "Ratsherr" (Senator) is a receiver for universal A.C. or D.C. use.

A special point in this year's single-circuit receivers is the attention paid to the aerial coupling. A differential condenser is used for volume control arranged so as not to disturb either the tuning adjustment or the adjustment of reaction to any appreciable extent. In this way the adjustment of the set is simplified and the selectivity kept high. Most of these single-circuit receivers have an output pentode rated for 7 watts anode dissipation, and a high-quality moving-coil loud speaker; they also have a continuously variable tone control, a built-in mains aerial, and provision is made for a second loud speaker and for a pick-up.

Two-circuit Receivers

Some thirteen firms are producing two-circuit receivers, and most of these have two amplifier valves and a diode; either a high-frequency pentode or a hexode is used as the first valve, and great use is made of the reflex principle. As a rule, the output valve is a pentode rated for 9 watts anode dissipation. A special circuit is that of Korting (Dr. Dietz and Ritter), in which a special damping reduction is used with electron coupling by means of a hexode. In this way the damping of the lightly damped tuning circuit (with iron-cored coils) is still further diminished. The firm Nora also has a special damping reduction in their receiver so that the reaction knob is omitted, with consequent simplification of adjustment.

Multi-valve "Straight" Sets

Although this year's German receivers are chiefly superhets, there are various others which do not use this principle. These include a five-circuit set by Mende, a three-valve three-circuit set by Saba with a new type of band-pass filter circuit and a three-valve receiver with two high-frequency stages, and two double band-pass filters by Neufeldt and Kuhnke. In the latter set an arrangement for fading-in broadcast or gramophone reproduction is provided.

Some fourteen firms offer sets of the type shown in Fig. 2; more than half of them are reflex, and use iron-cored coils. Practically all are designed for short-wave reception. Special measures have been taken to cut out whistles; for example, high pre-selection using iron-cored coils, and a choice of the intermediate-frequency in such a way that harmonics do not coincide with important stations, and their image frequencies lie outside the broadcast band. A wavetrap is used to provide protection against direct interference on the intermediate frequency, while special stopping circuits are included to cut out image frequencies on the long waveband. For the rest, the various circuits used differ considerably in detail.

Four-valve Superheterodynes

Four-valve superheterodynes of the non-reflex type are made by some fifteen firms. They mostly include provision for the short waves, visual tuning adjustment, and tone control, and are arranged for the addition of a second loud speaker and pick-up.

Some seven firms produce five-valve superheterodynes of the type shown in Fig. 3. The "Imperial 64," by Stassfurt, has two loud speakers for different frequency ranges. This set and the five-valve superhet by Nora are also built in the style of radio-gramophones.

Battery and Special Receivers

Since 30 per cent. of households in Germany are still unprovided with electric light, we find in this year's Exhibition a number of good battery receivers. Thus, Nora produces a four-valve, two-circuit type with an anode current economising circuit; Owin has a two-circuit type with iron-cored coils and Class "B" amplification. Since it is now the rule in Germany that important political broadcasts should be widely distributed in work camps among the Reichswehr, and so on, the German radio industry has decided to produce special so-called "Gemeinschaft" receivers (for public address purposes) such as the "Kamerad" superhet (Telefunken), Fig. 4. These are portable, and have loud speakers with a particularly good output and a very powerful output valve. Another special set is the Telefunken car receiver.

Fading Compensation

The fact that in the new two-valve, two-circuit set with reflex connections the duo-diode is used in conjunction with a heptode or a high-frequency pentode gives these receivers a certain degree of A.V.C. The modern three-valve superhets with reflex connection, which have always either a Binode or a duo-diode, naturally have more complete fading compensation or A.V.C., which is also present in the four- and five-valve superhets. All receivers using the superheterodyne circuit have also, in Germany, a "limiting" device for atmospherics.

Valves

Germany in the course of this year has had a so-called valve holiday, lasting from last autumn up to the present Exhibition. In this period the German valve industry agreed to sell no new types of valve, since the German public, the German trade, and also the German radio industry, needed a

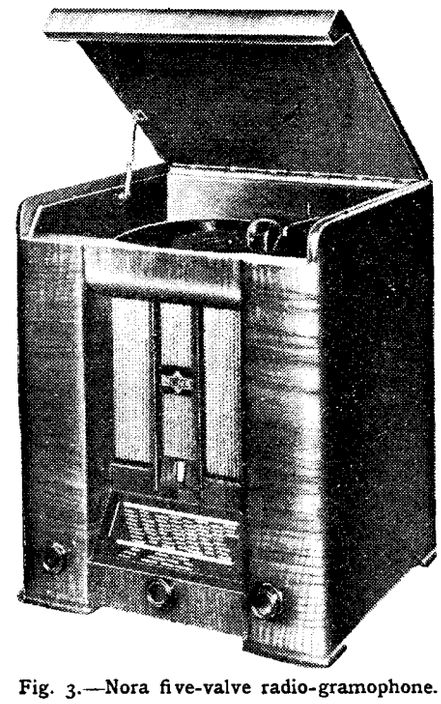


Fig. 3.—Nora five-valve radio-gramophone.

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rest. Such a limitation did not extend to foreign trade. The two German valve manufacturers, Telefunken and Valvo,

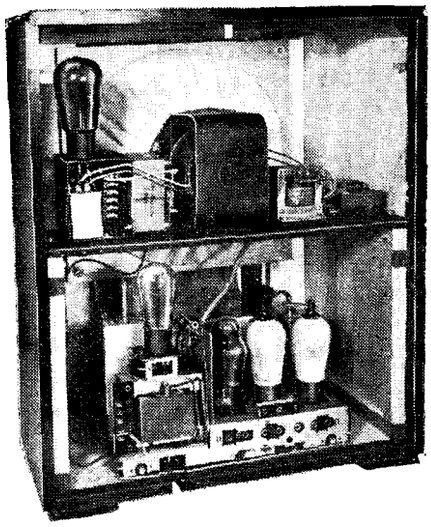

Fig. 4.—The Kamerad public demonstration receiver.

worked in agreement as regards the manufacture and distribution of valves for broadcast receivers. They have also agreed on a common system of valve nomenclature using several letters and one number.

The Elimination of Mains Noises

A great deal of attention has been paid this year in Germany to the subject of interference. All receivers possess a built-in arrangement for cutting out H.F. interference through the mains connecting cable. But, in addition to this, all mains components in the receiver itself are protected from the passage of H.F. interference by good screening of the components and also

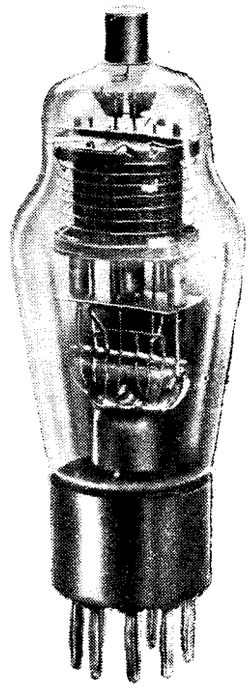

Fig. 5.—Telefunken-Valvo combined fading and mixing hexode.

by the construction of mains transformers of low capacity. Moreover, the so-called double hum suppressor has been introduced. This is a potentiometer connected in parallel with the heating current circuit, with its slider connected to the cathode of the valve. It has been found that it is not sufficient to provide merely one such potentiometer; several valves must be so equipped. In actual fact, hum is no longer present in German receivers, although the efficiency of the loud speaker and its frequency range downwards have both increased.

Chassis Construction

In all the new German receivers the chassis construction is particularly thorough, as shown in Figs. 6, 7 and 8. Above all, great care has been taken in screening all components and in using very low loss insulating material.

New Circuits in German Broadcast Receivers : Two-circuit Reflex Types with Diode Detectors

In the new German two-circuit reflex sets, the first valve is either a pentode or a hexode, the second a duo-diode, and the output valve an output pentode, usually with an anode dissipation of 9 watts. In principle, two methods of connection may be noted,

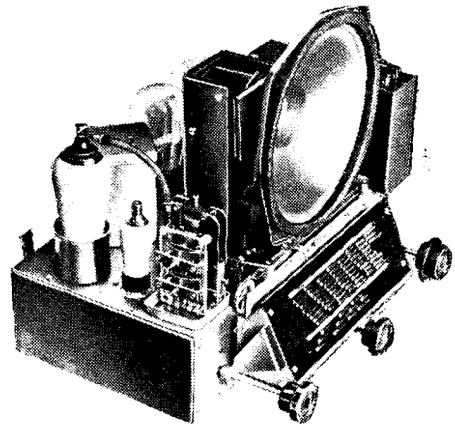

Fig. 6.—Chassis of the Nora three-valve receiver, model W.220.

the first of which is the more popular and is found in most of the new two-valve reflex sets. As input a double band-pass filter is employed. This circuit is connected to the aerial through a differential condenser in such a way that there is either a capacitive coupling to the aerial, for large volume and tight coupling, or with the earth for small volume and loose coupling. The anode circuit of the pentode is coupled to the duo-diode through a second double band-pass filter, both diodes being connected in parallel. The modulated frequency output is then led to the pentode, which acts as the first L.F. stage. The amplified audio-frequency voltage is then taken to the output pentode. Naturally, means are provided in the form of H.F. and L.F. blocking circuits to prevent interaction.

A special circuit is used by Körting in which a hexode is employed. Here, also, the input circuit is in the form of a band filter connected to the aerial through a differential condenser. The H.F. circuit includes a system of regeneration obtained through electron coupling. In this way, and with the aid of iron-cored coils and the best insulating materials, the whole receiver is given such high selectivity that no wave-trap circuit is introduced in the aerial, as is necessary with many of the other types of receiver.

Three-valve Superheterodyne

These superheterodynes with reflex circuits are not uniformly designed; some firms

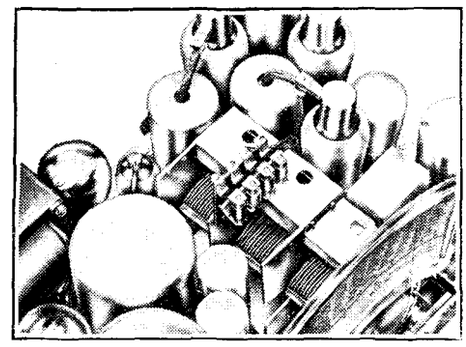

Fig. 7.—Chassis of the Saba 630WL superheterodyne.

use the octode as mixing valve, but most of them employ the new fading-mixing hexode, in which the oscillating system is on the cathode side, with the object of preventing wandering of the oscillator frequency with the A.V.C. bias.

In Fig. 9 the theoretical diagram of the Telefunken "Meistersuper" three-valve superheterodyne is given. The first valve is the new mixing hexode ACH1; this is preceded by a preliminary circuit. As may be seen, the coupling of this circuit is by a differential condenser, which also acts as a volume control. The diagram also shows the absorption wavetrap for the aerial circuit, which prevents interference from telegraph stations working on the wavelength of 641 metres, which is the intermediate frequency chosen for the receiver for all wavebands. The oscillator circuit is connected to the cathode side of the mixing hexode. It then goes on through two band filter circuits to the hexode RENS 1234. After this, which amplifies the intermediate frequency, there is yet another band filter circuit, the third band filter. The high-frequency is then led to the diodes in the RENS 1234, which carry out the rectification. The L.F. thus produced is taken over suitable blocking elements to the grid of the RENS 1234 once more, and finally reaches from here the output valve RENS 1374d.

It is worthy of note that between the differential condenser at the aerial and the first preliminary circuit an image frequency

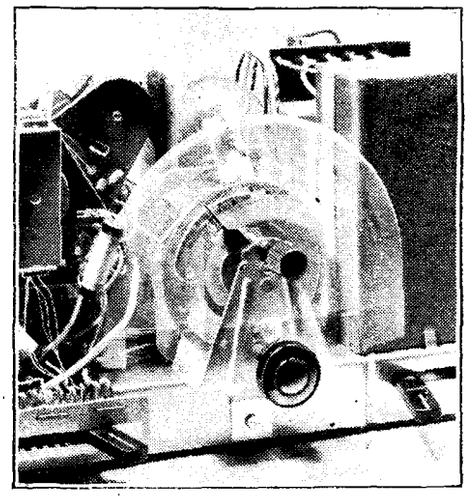

Fig. 8.—The Siemens 26 single-circuit receiver.

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suppressor is inserted, which is effective on the long-wave band.

Other circuit diagrams of three-valve superhets are shown in Figs. 11 and 12. Fig. 11 refers to the three-valve super Ideal "3W4." Here the high frequency coming from the aerial is led over a differential condenser, an image interference stopping circuit, and a preliminary circuit of the fading-mixing hexode, which is regulated, in conjunction with the aerial regulation, according to a special curve. The preliminary circuit coils are particularly low-loss, which is accomplished by Telefunken by the use of iron-cored coils (most of the other German superhets also use these iron-cored coils). After the mixing the intermediate frequency then leaves the valve, and is led over an I.F. band filter to a H.F. pentode, which simultaneously acts as audion for the intermediate frequency. The tone control is here, as usual, connected in front of the last valve. The low-frequency reaches the output valve through a special choke.

Fig. 12 shows the diagram of connections

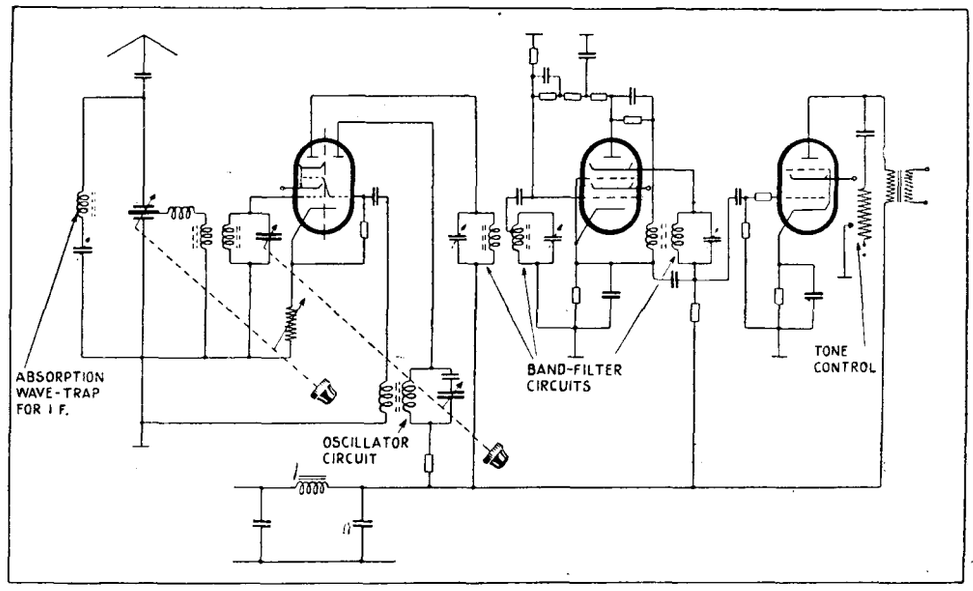


Fig. 9.—The fundamental circuit of the Telefunken "Meistersuper" reflex superheterodyne.

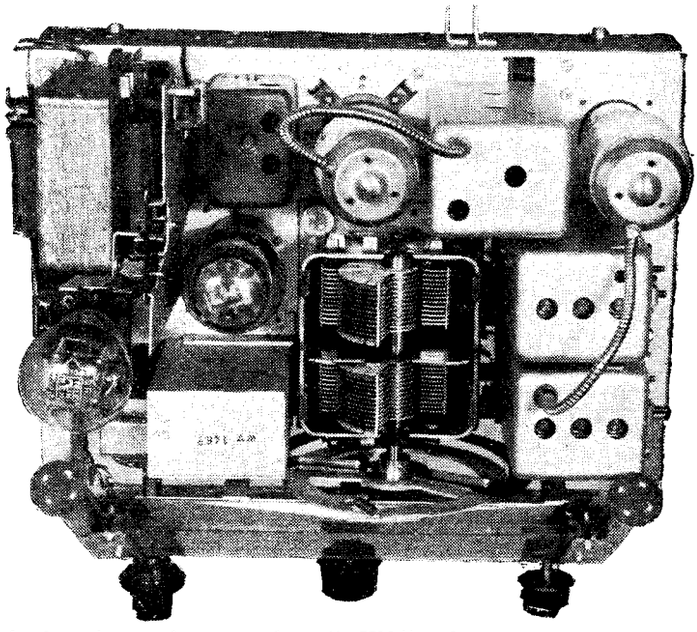


Fig. 10.—Chassis of the Telefunken Meistersuper.

of the three-valve superhet "3W6" of Ideal, with reflex connection. It will be of interest to describe the circuit in order to show the German method of setting out the circuit diagram. Here the high-frequency coming from the aerial is taken over an image-interference trap (which is also effective in the broadcast band), and a preliminary circuit of the new fading-mixing hexode. The I.F. can be changed for the various wavebands. Thus, the I.F. will not be the same for all wavebands as it is in the Telefunken set, and also in those of Siemens and A.E.G., which use the same circuit as Telefunken. After the mixing the I.F. arrives by way of a triple-band filter to a H.F. pentode. From this the intermediate frequency is led over another tuning circuit to a duo-diode. Here the intermediate frequency is rectified in one rectifier system. The D.C. potential of the other rectifier system of the duo-diode is used in the normal way for fading compensation in the mixing valve. The low frequency is then taken by way of a tone control to the H.F. pentode again, from which it reaches the output valve. The regulator for the low frequency, which also acts as volume control, acts also on the I.F. amplification of the mixing valve by altering the grid bias in this.

While in the case of the "Meistersuper" of Telefunken the volume control is accomplished by acting on the H.F. voltage by the differential condenser at the aerial, and by acting also with the same adjusting knob on the grid bias of the mixing valve, in the Ideal set there is a double volume control in so far as the strength of the L.F. voltage coming from the H.F. pentode, and simultaneously the grid bias of the I.F. amplifier (H.F. pentode) are both acted on.

(To be concluded.)

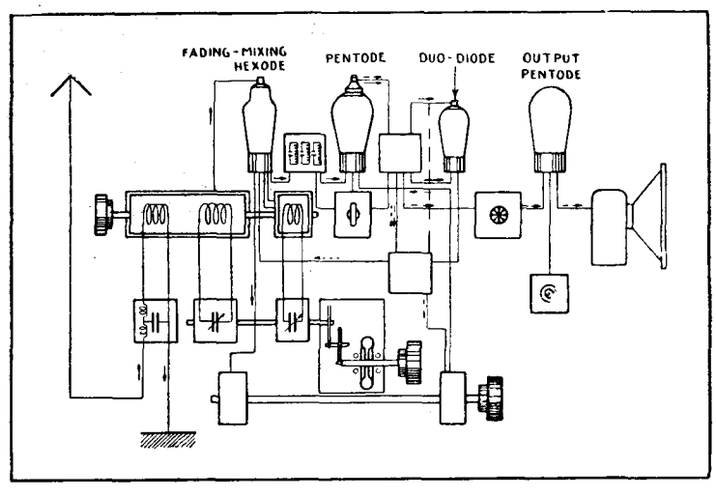


Fig. 12.—Ideal "3W6" reflex superheterodyne.

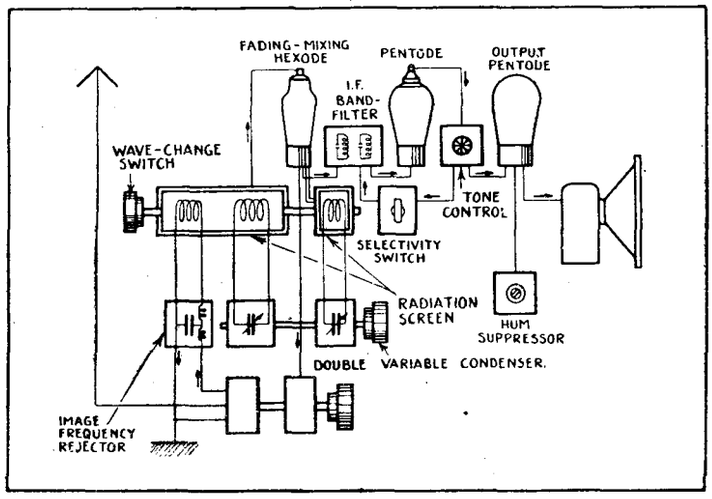


Fig. 11.—The Ideal "3W4" three-valve superheterodyne.

UNBIASED

By FREE GRID

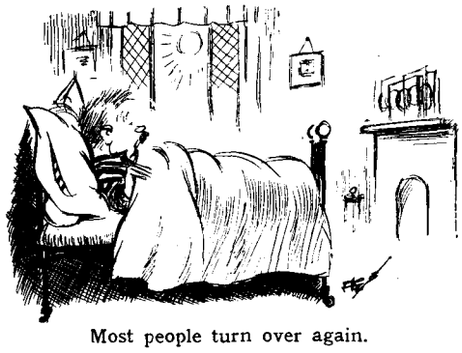
When the Clock Stops

SOME time ago, writing on the subject of 24-hour clocks, I mentioned the fact that I had been shown a new timepiece of the type in which the hands were replaced by actual figures such as "15.45" and so on throughout the whole 24 hours. This has resulted in my receiving a whole host of pamphlets and other literature from inventors and others who have devoted their time and money to the evolution of the perfect "wireless" clock. Why they describe them as "wireless" I do not know, as the connection is very slender, although some of them have the customary special contacts for switching the set on and off at certain predetermined times according to the nature of the programme desired.

For the most part these clocks are highly ingenious and consist of variations on the all-mains synchronous clock theme.

On a Winter's Morning

There was one in particular which displayed such ingenuity that I feel compelled to bring it to your notice. As most people know, the majority of these clocks stop dead even if there is an interruption in the power supply of only a few seconds. If this happens during the night one is apt not to notice that the clock has stopped when glancing at it on a dark winter's morning, the result being that most people turn over again in the comfortable, but misleading belief that they have several hours more sleep before them. Even the self-starting variety of clock with a red disc does not provide a full solution of the problem as a sleepy-eyed man can easily overlook it.



Most people turn over again.

In the case of the new clock you are absolutely compelled to notice that it has stopped, for the "hands" simply disappear and remain in this condition until the thing is restarted. The whole thing is wangled by providing the clock with a translucent ground-glass face, and by adopting the principle of our old friend the magic lantern. The hands, which are of very small size, are projected on to the back of the dial by a careful arrangement of mirrors and lenses in conjunction with a couple of flash light bulbs operated from the mains by means of a cheap step-down transformer. If the current fails the lights go out and, of course, the face becomes blank. Actually the figures are painted on the back of the face, but only show when the light is behind them.

No details are given as to the method of projection, but I gather that it is done episcopically. The light does not come on again until the clock is restarted, owing to the fact that the lamps are in series with a relay which holds the circuit closed against the tension of a spring. This relay is automatically reset when the starting lever is operated. Another model is to be made available in which the hands are to be replaced by figures such as I mentioned at the commencement of this note.

So far as I can see, this idea is absolutely fool-proof, even taking into consideration the most be-fuddled early morning sleeper such as myself.

Better than A.V.C.

ALTHOUGH not in time for this year's exhibition, I am pleased to be able to inform you that I am on the verge of perfecting a new invention which will take out a lot of the snags associated with existing A.V.C. systems.

It is well known that when the emanations of a distant station start to fade, as most of them do, A.V.C. seeks to remedy the defect by taking the brake off the receiver, and while this is all very well in its way, it does result in the bringing of a lot of noise as well. It is true that there are umpteen specialised A.V.C. systems which have been devised to obviate this, including the rather foolish one of cutting out altogether those stations which are below a certain signal-strength level, this arrangement being about on a par with cutting off your nose to spite your face.

The reasons why all these systems fail to satisfy is simply that they approach the problem from the wrong angle. The inventors of them foolishly delude themselves into the belief that all fading is due to the Heaviside layer, whereas, as I have conclusively proved in my researches, fully ninety per cent. of it is caused by nothing of the sort but is simply due to wavelength wobble. In short, most fading isn't true fading at all.

It is obvious that if a station persistently wobbles off its wavelength, the effect on the modern sharply-tuned receiver will be not only a falling off in signal-strength but also of distortion, and this is the true cause of most of the fading-cum-distortion complaints which we hear about to-day. Sets of bygone years were hopelessly unselective and so wavelength wobbles didn't bother them so much, but with increasing selectivity, trouble has commenced and the terrific growth of so-called fading during the past few years has been wrongly attributed to Heaviside instead of to the effects of sharper tuning.

The most commonsense way of curing the trouble would, obviously, be to provide all foreign broadcasting stations, both large and small, with crystal-controlled oscillators, but since common sense is not one of the attributes of certain foreign broadcasting authorities, I have had to do some research work in order to apply the remedy at the receiving end.

Merely a point of detail.

Waggling the Condensers

Briefly my invention consists of apparatus intended to cause the receiver-tuning to follow the vagaries of the transmitter just as A.V.C. is designed to cause the receiver to follow the vagaries of the Heaviside layer. A small electric motor is used to vary the setting of the tuning condensers and keep them waggling in step with the incoming signals.

The only part of the invention which is still lacking is the apparatus to detect the commencement of the wobble and cause it to switch on the motor, but this is, of course, merely a point of detail which I shall speedily dispose of when I have time to attend to it. I trust to be in a position to provide you with full constructional details before very long.

HINTS and TIPS

Practical Aids to Better Reception

ONE cannot be too careful with regard to the insulation of the A.V.C. circuits in a modern receiver. As resistances of quite a high value are often employed, it is necessary that the insulation of all by-pass condensers should be of a reasonably high order, and leakages between the connections, etc., and earth should be guarded against.

Good Insulation Needed

It is especially necessary to take these precautions in the more elaborate type of receiver; although poor insulation may not cause a complete failure, it will result in a distinct falling off in the effectiveness of the automatic control system.

HEADPHONES as an aid to broadcast listening are obsolete, except, perhaps, for short-wave work, but many of us retain a lingering affection for them as an aid to testing or for locating faults. In some undefinable way, one seems to be more closely *en rapport* with a refractory receiver when using 'phones instead of a loud speaker. As a consequence, 'phones that would normally have been consigned to the dustbin years ago are retained as cherished possessions even by those who realise the advantages of more strictly scientific methods of testing.

Stage-by-Stage Tests

Before pursuing this subject any further, it should be emphasised that a pair of phones should never be connected *directly* to a mains receiver. Even when dealing with a set in which there are no abnormally high voltages, to do so is distinctly dangerous, even if one is confident that the insulation of the 'phones is good throughout. The only safe plan is to employ a double-wound transformer or a choke-filter unit with a condenser on each side of the 'phones to provide complete isolation.

It may be news to many readers that, with the proviso contained in the preceding paragraph, 'phones may still be usefully employed for testing the circuits even of the last word in superheterodynes. The skeleton diagram given in Fig. 1 will suggest the course of procedure, although it may obviously have to be modified in individual cases. The idea is that the 'phones should be transferred from the anode circuit of one valve to the next in turn until the fault, etc., is found. Extra bias must be applied temporarily to the grids of those valves which normally operate as amplifiers, in order to convert them for the moment into anode bend detectors.

Referring to the circuit diagram, it will be fairly clear that by inserting the 'phones in position X one can make a rough test of the condition of the H.F. valve and all the circuits preceding it. With extra bias added, this valve should act as an anode bend detector, and it should be sensitive enough to allow signals from a powerful near-by station to be heard at fair strength. The next step is to move the 'phones to position Y, after having bridged the link at X and restored normal bias to the H.F. valve. The set should now work as an H.F.-det. combination (but not as a superheterodyne, of course), and distant stations should be audible.

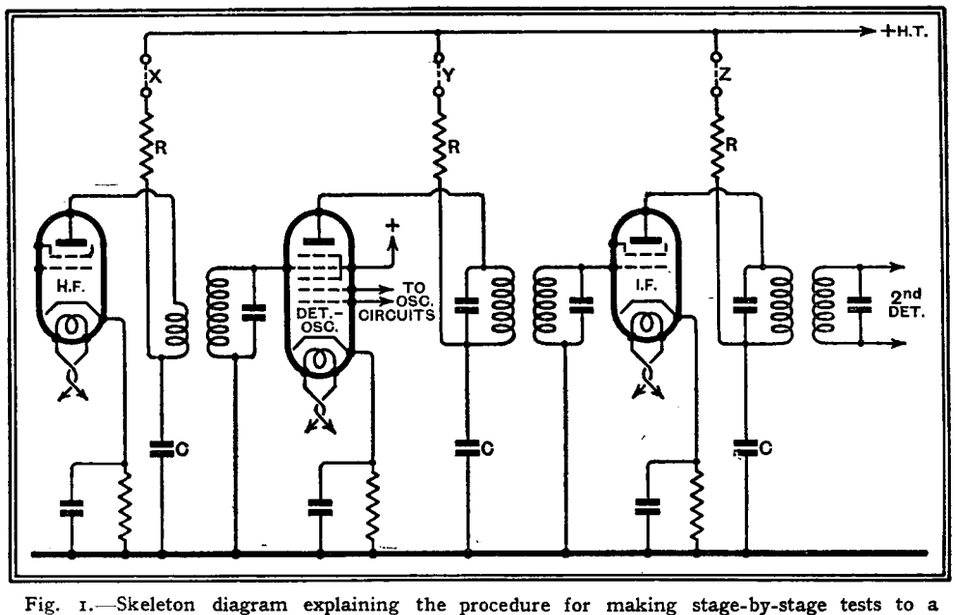


Fig. 1.—Skeleton diagram explaining the procedure for making stage-by-stage tests to a typical modern superheterodyne. Decoupling resistances and condensers are marked R and C.

On transferring the 'phones to position Z, the frequency-changer is put into operation, extra bias being added to the I.F. valve, and a great increase in selectivity should be noticeable. It is not to be expected, however, that the receiver will be appreciably more sensitive, as there is so far no I.F. amplification.

Enough has been said to show how, with a little ingenuity and thought, this method of testing may be applied to almost any receiver. The procedure described is often helpful when making initial adjustments.

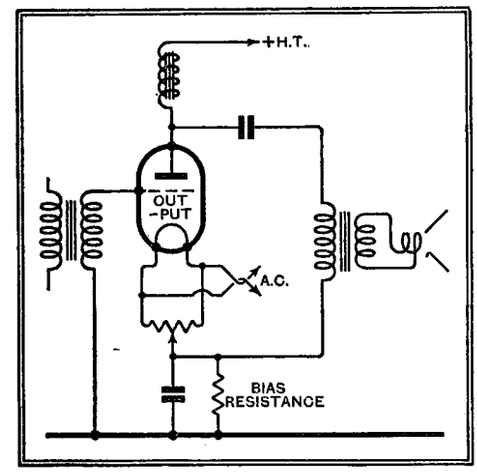


Fig. 2.—Output circuit with parallel-fed speaker: the bias resistor is not common to both grid and anode circuits.

WHEN considering the cost of decoupling the L.F. grid circuits in a home-designed mains receiver, a good rule to remember is that the thoroughness of decoupling or by-passing needed (and hence the cost) depends upon the bass response desired from each stage. The result of reducing decoupling to the bare minimum will not as a rule be instability, but merely loss of proportional amplification at the lower end of the frequency scale.

Simplifying Automatic Bias

Considerable economy can be effected, however, without a severe sacrifice of performance, if it is borne in mind that decoupling filters are only strictly necessary when both the A.C. and D.C. components of the anode current of the valve concerned pass through the cathode bias resistor. When the A.C. or signal component is led away from the anode by means of a parallel-feed circuit and returned directly to the cathode, as in Fig. 2, decoupling becomes superfluous.

As, in practice, a small fraction of the L.F. signals does manage to find its way round through the bias resistor, a certain amount of by-passing must be provided; for all normal requirements a shunt condenser of 1 mfd. gives negligible attenuation of bass frequencies.

News of the Week

Current Events in Brief Review

Glasgow and Manchester Radio Shows

AFTER Radiolympia—Glasgow and Manchester. The Glasgow Radio Exhibition opens today in the Kelvin Hall, and will run until September 8th. The annual Manchester Show opens on September 14th and will continue to the 22nd.

150 Kilowatts from Sweden

SWEDEN'S "Droitwich," the new long-wave station with 150 kilowatts aerial power, is expected to be completed by January next.

Tribute from Denmark

KAMMERSANGER Emil Holm, programme director of the Danish State broadcasting service, has just completed a European tour, in the course of which he visited the principal broadcasting organisations. To Press representatives on his return he declared that he was particularly impressed by Broadcasting House, London, and it is extremely likely that the new headquarters building in Copenhagen will follow the B.B.C. model.

Less Formality on U.S. Ether

UP till recently every American broadcasting station had to open and close its transmissions with the statement: "This station is broadcasting on a frequency of —— kilocycles under the authority of the Federal Communications Commission." The rule has now been waived.

N.B.C. Bans Records

THE American National Broadcasting Company has issued an order that no stations within its network may use gramophone records for broadcasting purposes. This is a revival of an old ban which was raised during the depression. Now that it is easier to sell "time on the air" gramophone records are again taboo. It is stated that the order does not apply to electrical recordings.

October 1st : Anti-static Day

THE French Post Office authorities have made it known that the days of grace allowed to persons in charge of static-producing apparatus will definitely come to an end on September 30th. From October 1st all offenders automatically become liable to penalties laid down by law.

Persons wishing to register a complaint have two courses open to them: they can take action by means of the ordinary police courts or apply to the Postal Department. In the first case the complaint is first investigated by experts, and if necessary a summons is issued.

In the second alternative the listener can complain directly to the Postal Radio Service without mentioning the names of possible offenders; the Post Office will then investigate the locality, and on discovering the culprit will "suppress" him, if possible, by persuasion, but by force of law should he prove recalcitrant.

Inventions Exhibition

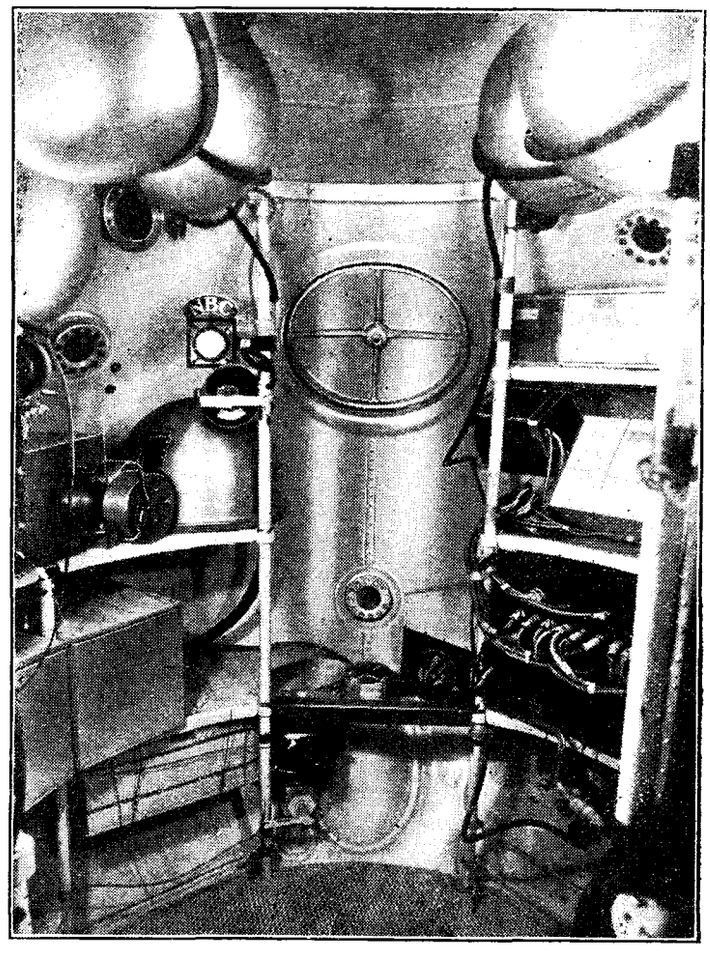
THE tenth International Exhibition of Inventions, organised by the Institute of Patentees, will be held in the Central Hall, Westminster, London, from October 3rd to 13th.

National Field Day

THE south-western district of the Radio Society of Great Britain has succeeded in winning the challenge shield in the National Field Day contest held in June last. This district amassed 361 points—38 ahead of the runners-up, the East Yorks district.

It will be recalled that each R.S.G.B. district put two portable transmitters in the field for this annual amateur transmitting contest, one working on 20 and 40 metres, and the other on 80 and 170 metres.

One of the portables of the winning district communicated with three New Zealand stations, a very commendable feat in view of the fact that no station was permitted to use more than 25 watts input.



BROADCASTING FROM THE STRATOSPHERE. The microphone and other radio equipment inside the U.S. Army stratosphere balloon from which three officers broadcast their experiences before jumping by parachute. The balloon was wrecked.

Five-Year Radio Plan

JAPAN'S five-year radio plan is proceeding apace. The management of the Japanese Broadcasting Commission proposes to spend ten million yens (£1,500,000) on the scheme, which includes a 150-kilowatt station for Tokio, two high-power stations at Osaka and Kiosho, and from 10 to 15 regional stations on lower power, all to be completed within eighteen months.

Meanwhile, the main streets of Tokio and Osaka resound with broadcast programmes relayed by public address equipment. This is no doubt a step towards popularising private ownership of sets.

Wide Band Transmission in U.S.

RECENT comments in *The Wireless World* on high quality broadcast transmission give added point to the announcement that WTMJ, the station owned by the *Milwaukee Journal*, is completely redesigning its transmitting equipment in order to give "wide band" high fidelity transmission.

The United States Radio Commission has granted a special licence in addition for "wide band" transmission on ultra high frequencies and for facsimile transmission on the special channel of 1,600 k.c. reserved for such purposes.

Belgium Takes Action

JULY saw a broadcast campaign against man-made static in Belgium. Numerous talks were given at the microphone, and stirring Press appeals were made to listeners.

Low Signal Strength?

A MOTORIST summoned at Willesden for passing traffic signals said: "I was so absorbed by the broadcast on the wireless fitted in my car that I failed to notice the lights were against me."

Breslau on Low Power

THE Breslau high-power broadcasting station has closed down temporarily pending an increase in power from 60 to 100 kilowatts. Until about the end of September an auxiliary transmitter of approximately 17 kilowatts aerial output is being used.

British Programmes in Sweden

TWO interesting British events figure in the Swedish programmes next week. On Sunday evening A. A. Milne's "Mr. Pim Passes By" will be broadcast in a Swedish version from Stockholm. On Wednesday, September 5th, at 8 p.m., the Chalk Farm Band of the Salvation Army will be heard in a Stockholm relay from the "Konserthuset."

"Putting Over" Car Radio

IN order to give the maximum publicity to automobile radio, radio trade associations in Cleveland and Rochester, U.S.A., recently organised giant processions of motor cars through the main streets of those cities. Every car was playing the same programme broadcast from local stations, and each vehicle was decorated with placards calling attention to the value of car radio.

Pope's Radio Blessing

THE Pope recently made use for the first time of the microwave installation presented to him by Marchese Marconi. By turning a switch, says a *Daily Telegraph* correspondent, the Pope lighted a large statue of the Virgin erected in Messina Harbour as a beacon for ships. The Pope was assisted at the ceremony by Father Soccorsi, successor to the late Father Gianfranceschi as Director of the Vatican Broadcasting Station. The Apostolic Benediction was clearly heard by waiting crowds in Messina.

BROADCAST BREVITIES

By Our Special Correspondent

Sir John Reith

A PARAGRAPH in a Swiss journal has started rumours on the Continent that Sir John Reith will not return from South Africa as Director-General of the B.B.C.

Stories of this kind grow in snowball fashion, and there is no saying when the tale will reappear in, say, Scandinavia or Yugoslavia, in a much heightened version. The possibilities are infinite.

At Broadcasting House I was assured that the story is untrue. Let all foreign journals take note accordingly.

Good Old 5GB

THE strange thing about the complaints now rife concerning the weak signals from Midland Regional is that these complaints have been deferred so long. The existing Midland Regional is still the old "5GB Experimental," and it says something for the resourcefulness and skill of the B.B.C. engineers that they have contrived to keep the hoary old transmitter in fighting trim for eight years.

5GB will soon make "positively its final appearance," as the prima donnas say, and then I suppose people will grumble because the new Midland Regional at Droitwich is too powerful.

Energy

NO tap dancer at Olympia came within miles of Eric Maschwitz in the matter of energy. I watched him in his shirtsleeves as he darted hither and thither during rehearsals and made a mental note that the end of the Show would see him exhausted. What folly to think such a thing!

Big Plans for Variety

The B.B.C. Variety Director has now prepared a most ambitious programme for the coming winter.

There is to be a weekly series of musical comedies and revues, beginning in October. They will include "Our Miss Gibbs," "Autumn Manœuvres," "Wonder Bar," "The Quaker Girl," and "Invitation to the Waltz."

Short Story to Music

A new idea in broadcast variety will be the preparation by Compton Mackenzie of a short story set to music.

"Songs from the Films," "Scenes from the Shows," and "Songs from the Radio Shows" are other features which promise rich material.

As I have already mentioned, that happy feature, "In Town To-night," will be resumed, as well as "Music Hall."

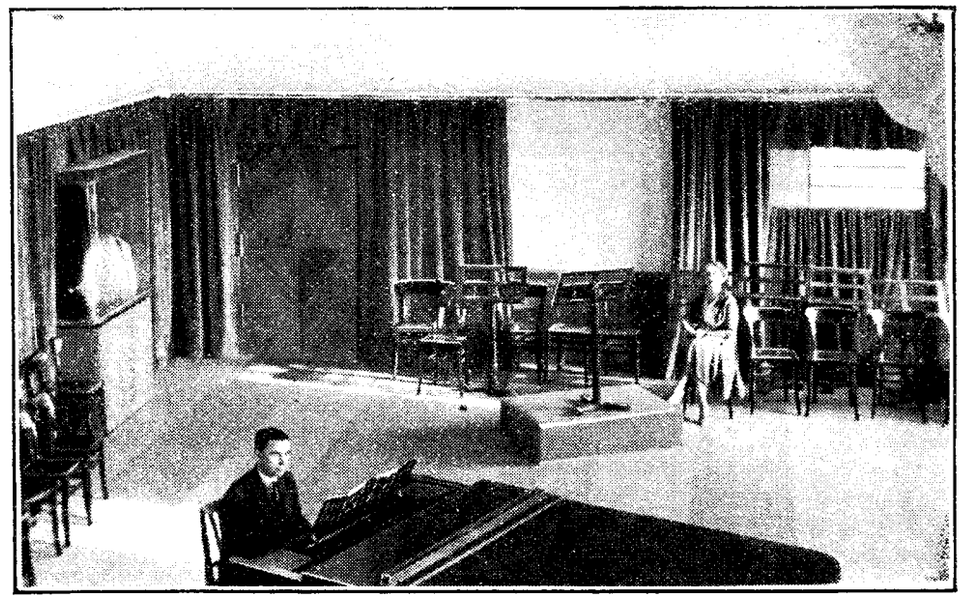
Ambassador of Empire

MALCOLM FROST, who won renown as the B.B.C.'s "Ambassador of Empire," and created records by selling records of B.B.C. programmes to Dominion and Colonial broadcasting concerns, is now head of the Empire Press section at Broadcasting House.

More Programme Recordings

This is a reminder that the B.B.C.'s service to the Empire does not stop at relaying programmes; a mass of publicity material apropos of forthcoming events is circulated weekly to English-speaking peoples all over the earth.

Soon the Corporation will record another batch of programmes for distribution. These recordings are carried out at the St. John's Wood studios of the Gramophone Company.



MODERN STUDIO DESIGN. Although only a 2 kW. station, Nürnberg possesses one of the most up-to-date studios in Europe. Note the engineer in the control cabinet, on the left. The white board on the right is an electric indicator to convey silent instructions to performers.

From Daventry to Droitwich

THE change-over from Daventry to Droitwich will occupy approximately one month, beginning with the late dance music on September 6th. Thereafter there will be a gradual increase in the amount of National programme time absorbed by the new transmitter until, at the end of September, Droitwich will be supplying at least four hours of the daily programme.

Daventry will give its last gasp on October 7th.

Thirty-line Television to Cease ?

THE following is the text of a B.B.C. statement issued last week: "The B.B.C. announced on March 21st last that thirty-line television transmissions would be radiated for two half-hourly periods each week until further notice. These transmissions are still being continued, but, in view of the fact that the whole subject of television is being examined by a committee appointed by the Postmaster-General, and in view of the development of high-definition television transmitted on ultra-short wavelengths, the B.B.C., after consultation with the Postmaster-General, thinks it right to remind the public that the present transmissions of low-definition television are experimental in character and are liable to be discontinued."

This statement may lead the public to think that higher-definition television will soon take the place of the thirty-line pictures. Such a view would, I think, be optimistic. There seems no good evidence yet to support the idea that higher-definition television can be a service, as distinct from experimental, for the present.

The Rhythm Symphony Orchestra

MUCH interest was created by the first broadcast last week of Harold Ramsay and his Rhythm Symphony Orchestra, and listeners have asked for particulars of the band. The orchestra consists of twenty-one musicians recruited from some of the finest orchestras in the world, including the London Symphony Orchestra and the Grenadier Guards Band. It is normally composed of three violins, 'cello, double bass, three trumpets, two drummers, but this combination gives little indication of the scope of the orchestra because most of the players "double" on several instruments. Listeners will have an opportunity to get better acquainted with the new orchestra, which will be heard in the programme each week during September.

Echo of Strauss Anniversary

THE Promenade Concert to-morrow (Saturday) will be an echo of the widespread celebrations in Germany of the seventieth anniversary of Richard Strauss's birth (born June 11, 1864). The symphonic poem, "Don Juan," with which the concert opens, was one of the earliest of Strauss's works to win acceptance, and it remains a favourite.

Lauri Kennedy, principal 'cello of the B.B.C. Orchestra, will play the solo part in "Don Quixote"; and Lamond is soloist in the composer's Burlesque for Piano and Orchestra. The scheme will be completed by the closing scene from "Salome," which will be sung by Oda Slobodskaya, and after the interval Klemovsky's arrangement for orchestra of Bach's Organ Toccata and Fugue in D Minor will be performed.

A Quiet Start

RADIO ALGIERS has just given its first running commentary. The subject was a bowls championship match.

Impressions of Olympia

By a Critic of Quality

IN the following article a wireless engineer visiting Olympia expresses his views on the Show with particular reference to the question of quality of reproduction. Some of his opinions will be regarded as controversial and are likely to provoke other readers to express their own personal views.

WITH the closing of yet another Radiolympia, I again record my impressions of the Show, considering it from a point of view that has always been to the fore in the pages of *The Wireless World*. How will we enthusiasts for quality of reproduction fare in the next twelve months? The Radio Show is our hunting ground, for it is inevitable that the best the industry can offer sooner or later finds its way to Olympia.

I think it is becoming evident that progress, not only in the public taste, but in the plans of the manufacturers, is being made, and that the time is not too far distant when broadcasting will come into its own. However much one may argue to the contrary, it cannot be denied that the broadcasting art implies, first, the securing of artistic talent to perform certain evolutions within a specially prepared room; secondly, the translation of the sounds resulting therefrom into electrical impulses which are propagated in all directions by means of a transmitting station over an area whose size is determined beforehand by the design of the station; and, thirdly, the reception of these impulses by a receiving set, and their final conversion into sounds in the listener's home. It must be obvious that any discrepancy between the original sounds and the reproduced sounds is interfering with the proper enjoyment of the original broadcast programme. By an accident of Nature, known as the Heaviside layer, the signals from a station can be received at greater distances than the design of the station will normally permit, and this is where "the fun begins."

Compromising with Quality

Although, probably, none of us has ever met a non-swimmer so eccentric or nervous as to wear a diving dress at all times in case he accidently falls into or wishes to enter the water, yet there are millions of otherwise quite sensible people who purchase radio sets whose designs completely destroy any inherent ability the sets might possess to reproduce a local station well, because they, the public and the designer, think that they will avail themselves of the accident of Nature already mentioned.

As is well known, the great majority of the public will buy a wireless set in much the same way as they would buy a cat or a parrot. One cat or parrot is enough for the average home, and, judging from the experiences of my friends as well as myself, one brace of regional stations is enough for the avarage home, too. I do not deny that foreign stations are received throughout the length and breadth of this country every night, but such procedure is limited.

If, therefore, the ability to receive large numbers of foreign stations means a reduction in the quality with which a local station's programme can be reproduced, then the purchase of such a set by the average man is an act of folly; these acts of folly are committed every day, to the gratification and profit of the mass-production set makers.

Vogue of Small Superhets

The multi-station set of low price now seems to be, almost exclusively, a superheterodyne receiver having three or four valves. The design of these sets has, in substance, been done by the valve makers whose initiative and versatility in producing compound valves of weirdly assorted "innards" is truly amazing. The layman probably does not realise how nearly identical are the electrical designs of these inexpensive receivers. The valve maker invents a new valve and sends out to the set maker a complete report accompanied by curves and suitable circuits. When a sufficient number of such reports have been received, it does not require much technical knowledge to be able to sit down and link three or four such valves together to make a complete set. Then a skilful production engineer repeats this, and, when the cheapest possible speaker has been added and the whole enclosed in the cheapest possible cabinet, you have your complete receiver. Differences in tuning dials and indicators are about the only differences throughout, and the set with the largest sale results from the efforts of the most persistent and enterprising sales and advertising departments.

Having thus dismissed the large majority of exhibits, I am able to turn to those of more personal appeal to me, and among the limited number of receivers designed for discriminating listeners I was pleased to find designs to receive the local British Regional station as well as they knew how, even if some of the Continental stations were lost in the process. It appeared, however, that these sets were capable of receiving quite a number of foreign stations really well, and as they were fitted with variable selectivity, it would seem that a receiver of this type ought to satisfy the majority of listeners unless they be inveterate "D.X. hounds." I was interested in a "straight" receiver with two H.F. stages with critically sharp tuning, followed by tone-correction; although two H.F. pentodes are used, with consequent enormous amplification, the set is primarly intended for regional station reception outside the service areas (A.V.C. being fitted to counteract fading) and not for reception of stations at the four corners of the earth. Many cheap sets are fitted with A.V.C., but I personally fail to see the value of this when there is insufficient H.F. amplification to receive a station at the "bottom" of its fade. I recollect attempting to listen to the West Regional programme when staying at Penzance last Easter, with a four-valve superhet, fitted with A.V.C. Whatever that A.V.C. may have done, it certainly did not stop fading to any noticeable extent. I noticed a radio-gramophone with the claim that the A.F. response (40 to 8,000 c/s) is the widest obtainable in any commercial set. As there were at least three other makers at the show with amplifiers claimed to have a response from 40 to 12,000 c/s, or better, it would seem that there is to be some competition. What a change, however, to find at least four manufacturers offering A.F. amplification up to 8,000 c/s. It is to be hoped that the associated loud speakers are equally good.

The B.B.C. Common Supply

It was noticeable that the reproduction of gramophone records by the B.B.C. was of a higher quality than in previous years, but it seems to me that, on the whole, this common supply of audio-frequencies is a practice to be deplored. While it does not give really good loud speakers a fair chance, it does mislead the public over the performance of the cheap sets. Poor as they sounded at the Show, they sound much worse in the home. An hour's relay of the B.B.C. orchestra from Broadcasting House gave me the opportunity I sought; I dashed from stand to stand to listen as carefully as possible to what I heard. I found few speakers which gave me real pleasure, and one of these was designed for public-address work. Curiously enough, the double and triple units sounded no more realistic than the average better-class single unit. The "tweeters" may not have been tweeting properly, and this is quite likely, for I have had some experience in the design of "splitting" circuits, and it is exces-

Impressions of Olympia—

sively difficult to make quite sure that each unit will be called upon to reproduce just its own particular band of frequences and nothing outside that band; it is absolutely useless to take an assortment of widely different units and simply connect them in parallel. One speaker was fitted in a baffle box of interesting design, and although this box was constructed of quite flimsy plywood I was able to detect neither box nor air column resonance.

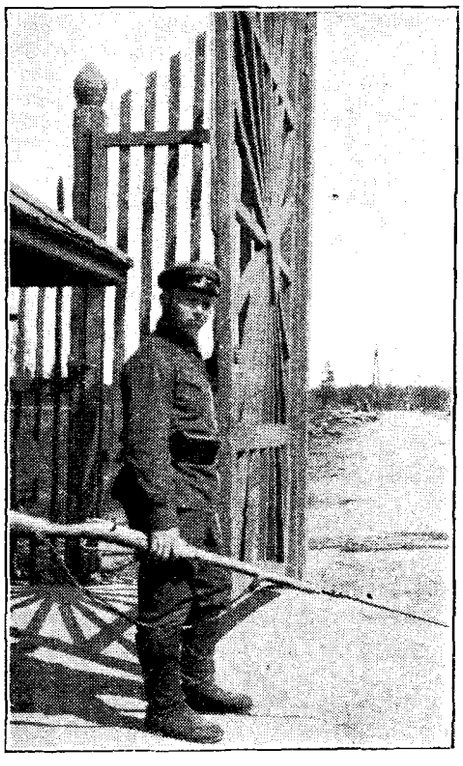
One always thinks of the loud speaker as the weakest link in the chain, and, in spite of the passage of time, loud speakers, with one or two notable exceptions, still sound very much the same, and they are far from being perfect. The same old cones and the same old permanent magnets have set up a tradition which seems unbreakable, for, when larger and more expensive models appear, they still sound very much the same, but with, perhaps, greater sensitivity.

There is quite a crop of speakers with output transformers possessing "accurate matching" properties. This is a snare and a delusion, for it is a physical impossibility to design an output transformer, except at very great cost, having ratios of, say, 50 to 1 and 10 to 1, without finding something very far wrong with the frequency-response of that transformer. If the response between 3,000 and 10,000 c/s be good on the 10 to 1 ratio, then it is nearly certain to be poor on the 50 to 1 ratio; if it is not, then primary inductance will be inadequate, with consequent loss of bass. It is conceivable that speakers having such transformers may be unable to reproduce the higher frequencies, when my objection will have no importance; it is possible that incorrect matching may be equally unimportant, I cannot help feeling that these "ideas" are closely allied to the pretty tuning indicators on the cheap sets.

Space does not permit me to deal with many interesting components and meters that were shown, and are hardly within the scope of these notes. The exhibition was, on the whole, much more interesting than last year, and there is a slow, but none the less steady, process of weeding out of duds, with a consequent increase in quality. One cannot help noticing the influence of *The Wireless World* in many directions. Even "Free Grid's" advice of August the 17th, to "'ware the Ultra Shorts," was heeded by the sixteen Radiolympia Girls. Theirs were the shortest I ever remember having seen on any English stage.

The Diary of an Ordinary Listener

AFTER the musical excitement of the Bayreuth and Salzburg Festivals the programmes of the last few days have seemed, by comparison, somewhat tame, and the search for music a little out of the ordinary was made more difficult on account of the German election. The Teutonic stations suffered so much interruption from electioneering propaganda that on tuning in for the expected music one often encountered a vehement outpouring of words, and even when an interesting programme seemed well under way it was occasionally broken into by powerful oratory.



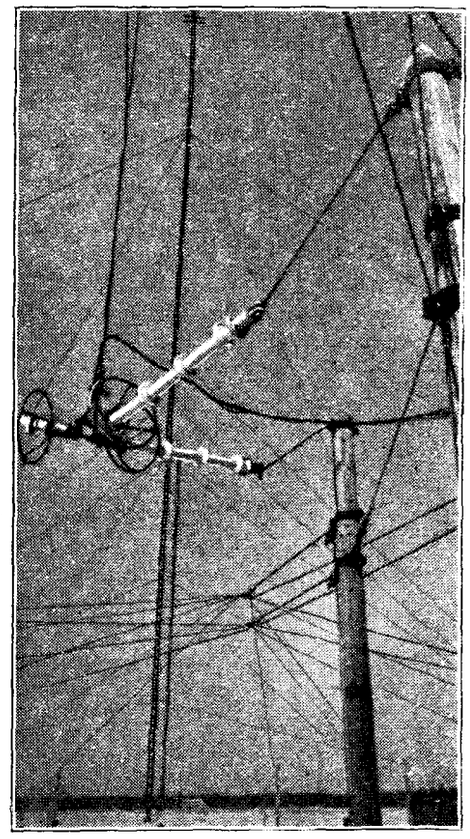
It is much easier to *tune in* Russia's most powerful station than *call in* to see how it works. An armed sentry at the gates to Moscow No. 1 Transmitter.

On Thursday, August 16th, Kalundborg transmitted a good selection of Viennese music played by the Station Orchestra, conducted by Mahler, which included Mozart's overture to "Il Seraglio" and Johann Strauss' "Kaiserwalzer."

Poste Parisien seemed to offer the greatest attraction on Friday in a concert by the Station Orchestra, in which Haydn's "Surprise" Symphony worked off its well-known jest of fortissimo drum-beats. This was followed by Mozart's Symphony in G Minor, and concluded with selections from "Figaro" and "The Magic Flute."

An excellent performance of "Rigoletto" was given on Sunday evening at Vichy, with Cesare Formichi as the jester, Lauri-Volpin as the Duke, and Eidé Noréna as Gilda. The orchestra was conducted by Francesco Satü, and the opera was relayed by Radio Paris, Rome and Strasbourg, coming in well from all these stations. I had not seen and heard this opera for many years, and found that the old familiar airs had lost none of their charm. The voices of the principals were splendid and blended well in duets and trios. After the second act the interval was filled up with some excellent 'cello solos.

On Monday of last week Berlin, Funkstunde and most of the German stations were transmitting a concert in connection with the competition for radio announcers. Afterwards I turned to Sottens, where the orchestra under Robert Echenard were giving a half-hour programme of ancient music, comprising a symphony by Vankali, a concerto for four violins by Vivaldi, and a Pavanne and Chaconne by Purcell, all of which proved intensely interesting. After this I went over to Radio Paris to hear the fine orchestra at the Casino at Vichy play Brahms' 4th Symphony, which was followed by a pianoforte concerto by Mozart. The intervals, while the orchestra was resting, were occupied by gramophone records,



The link between the 500 kW. transmitter and the aerial.

and, not finding these very interesting, I sought about for something else, and happened to get entangled in a very modern "tone-poem" of the "hence-loathed-melody" type, to which I listened awhile, wondering why the musical intelligentsia preferred this cacophony to the pleasing strains of Verdi's music, to which I had listened the previous evening. I know that among high-brows (and would-be high-brows) it is considered a sign of sad lack of intellect to admire anything with a haunting tune; indeed, it would seem as if a "modern" composer who happens to slip and write a few bars of melody which might emplant themselves in one's memory promptly pulls himself up with a glissade on the harp and a clash of cymbals and flings himself feverishly into the task of compounding new discords, fearing lest his music may share the fate of Schubert's Unfinished Symphony, and be whistled by the baker's boy on his morning rounds.

On Tuesday I was rather late in getting to my receiver, but managed to hear the popular waltz from "The Merry Widow" played by the Concordia Band and transmitted from Luxembourg, and then switched over to Huizen, where the excellent K.R.O. Orchestra were playing the Polortsian Dances from Borodin's "Prince Igor" and Strauss' "Tales from the Vienna Woods," finishing up the evening with dance music from Radio Paris.

CALIBAN.

Letters to the Editor:—

Empire Broadcasting

Cinema Quality : 'Phone and Key Transmissions : Orchestral Extravagance?

The Editor does not hold himself responsible for the opinions of his correspondents

Empire Broadcasting Receivers

WHEN you were urging upon the B.B.C. the necessity for an Empire broadcasting service some years ago, you published a letter from me supporting your views. On going abroad again I am very gratified to find that real progress has been made by the B.B.C. with Empire broadcastng. It is now a real service. Reception is possible here daily on one or more of the periods of transmission.

No really good receivers for short-wave reception are marketed out here by British manufacturers. The American all-wave sets give the best results of any sets obtainable in Singapore. The use of an adaptor with a high-grade British medium-wave set gives almost as good results.

The B.B.C. are doing their share, and it is now up to the manufacturers to do their part and make the reception of Empire broadcasting more satisfactory. Really good sets designed purely for short-wave reception, with medium-wave, perhaps, added as an afterthought, are required. If medium-wave reception is required by a Colonial listener he usually only requires to listen to a local station. In any case, he never requires selectivity of the European standard on medium waves.

Far more Colonial listeners have an electricity supply than seems to be imagined in England, but supplies are often of non-standard voltage. For this reason I would suggest a universal mains model and a battery model.

I rely very much upon your advertisements to keep in touch with the latest products of the manufacturers, and I am sure that many other readers must do so as well. Manufacturers should realise that the majority of the readers of the paper are technical men, and that not only is their custom lost but also that of their many non-technical friends who consult them about wireless matters. HEPTODE.

Singapore.

Empire Views on the B.B.C.

From the Chairman, Wireless Broadcasting Advisory Board and Controller of Broadcasting, Ceylon.

I HAVE the honour to state that my attention has been drawn to a paragraph by your special correspondent entitled "Empire Views on the B.B.C." under the heading "Broadcast Brevities" in your issue dated May 25th, 1934.

The paragraph referred to was considered at a meeting of the Wireless Broadcasting Advisory Board of Ceylon held on the 28th ult., and it was unanimously resolved by the Board that your correspondent be asked to exclude Ceylon from his generalised state ment that the attitude of the Empire broadcasting organisations is anything but complimentary to the B.B.C.

For your information it may be stated that since the installation of Colombo's short-wave receiver for relaying Empire station transmissions on January 20th, 1934, up to June 15th, 1934, Colombo has relayed Daventry's transmissions on 125 occasions, totalling a period of 195 hours 49 minutes.

Cinema Quality

DURING the last few years tremendous strides have been made in improving the quality of reproduction from high-power output audio-frequency amplifiers! Manufacturers of cinema reproducers and public address amplifiers have produced apparatus approaching a fine degree of perfection, yet, I regret to say, with such an excellent range of apparatus at their disposal the managements of cinemas are incapable of providing a clear undistorted output during cinema performances.

I can honestly say that in few cases have I ever considered the reproduction from cinema equipment to be of good quality. The trouble, to me, seems obvious. It is pure overloading on one or more stages, even before any appreciable output has been obtained. What is worse than undue emphasis of sibilants?

Several times I have inspected the apparatus concerned, and in each case have found it to be of good make, so that I have come to the conclusion that the bad quality of reproduction is simply due to incompetent handling of the gear.

In many cinemas the sound equipment is attended by a cinematograph operator, so that even should he notice a deterioration in quality he has not the proper time to give the equipment attention. The trouble can only be solved satisfactorily when each cinema permanently employs a competent sound engineer.

In conclusion, let me add that, as one having spent many years on the investigation and improvement of quality of sound reproduction, I unfortunately have just cause to regret the dispersion of cinema orchestras. H. R. WILKINSON.

Enfield.

'Phone and Key Transmissions

AS a regular reader of *Wireless World* for over eleven years, I note with interest E2MI's remarks in your issue of August 17th, especially those regarding service and civil aircraft.

Apparently, owing to his indisposition—I wish him speedy recovery—Mr. Milne did his listening to these horrible, bubbly, mushy, over-modulated transmissions from the comfort of his own pet armchair.

Mr. Milne, in his condemnation of the R.A.F. operator, makes no allowance for the circumstances under which he is operating. Has Mr. Milne ever operated dressed in a sidcot suit complete with parachute in hardly enough space to turn round? Has he ever sent with a gloved or half-frozen hand on a heavily damped key? And in the case of telephony he should know that a damped microphone is essential. Perhaps E2MI lacks the experience of outdoor transmissions on a windy day. Also, E2MI makes no parallel by which we can judge fairly.

Has he listened to French service aircraft, or civil for that? Has he listened to the chaos on the 600-metre waves? Has he listened to his tongue-tied compatriots who call themselves "hams"?

Perhaps E2MI is not aware that R.A.F. transmitters can be bought in the streets of London, and if he obtained one and tested it he would be enlightened as to their efficiency.

I am in agreement that there is no excuse for bad quality or bad operating from a ground station, but quality from the skies is a difficult problem. J. N. H. WALKER.

Bristol. Late W/1 Section, R.A.F.

Orchestral Extravagance ?

IT is with considerable interest that I learn from the columns of your excellent journal of the decision to increase the size of the North Regional Orchestra.

For some fifteen years, as a musical director, I have been endeavouring to provide entertainment for several hours daily for all kinds of audiences, and as I have been rewarded with a considerable measure of success, perhaps I may be permitted to criticise what I consider to be a gross extravagance.

The *average* listener is the one with whom I have had most experience. Music to him represents something which provides a pleasant atmosphere in his home or elsewhere. It must not intrude, but remain a respectful background to his social and domestic activities, and when through force of circumstances he is compelled to listen, he prefers to hear light music of the type so ably featured by Joseph Muscant, Fred Hartley, Reginald King, Alfredo Campoli, etc., etc.

It seems obvious to me, therefore, that this type of music should be available from one station or group of stations throughout the broadcast day, and if each station possessed one of these *inexpensive* orchestras this service could be economically maintained.

To the discerning listener, whether he prefers symphony concerts, hot jazz, or any other specialised form of music, this could be provided from an alternative service at appropriate times by proper orchestras reserved entirely for the work for which they are intended.

In conclusion, as a regular reader may I thank you for your excellent technical and topical articles. I have constructed many of the sets which have been described, including the original Single Span, through which I have obtained many pleasant hours "on a busman's holiday."

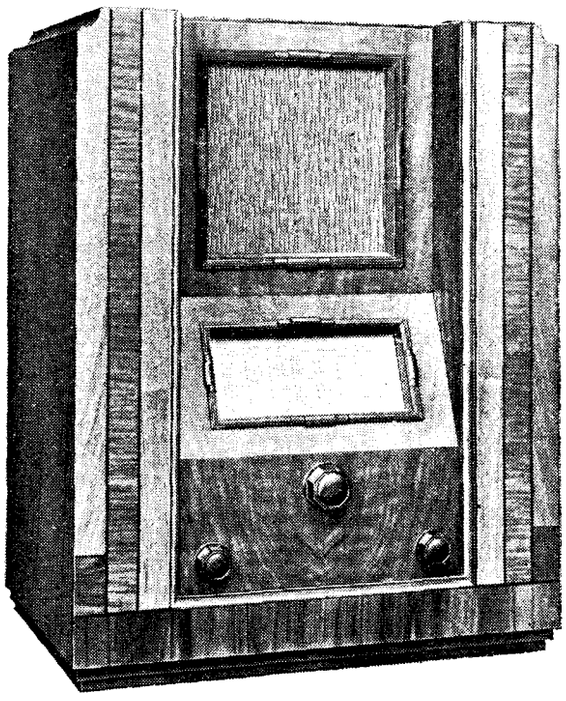
Preston. JACK HARDY.

Correspondence, which should be as brief as possible, should be addressed to the Editor, "The Wireless World," Dorset House, Stamford Street, S.E.1, and must be accompanied by the writer's name and address.

Telsen A.C. Superheterodyne

MODEL 3435

A Sensitive Receiver with an Up-to-date Circuit Specification



FEATURES :—*Type.*—*A.C. mains superheterodyne with A.V.C. ***Circuit.*—***Signal-frequency amplifier with iron-cored coils—triode-pentode frequency-changer —I.F. amplifier—double-diode second det.—output pentode.* **Controls.**—*(1) Tuning, with special station indicating dial. (2) Volume and on-off switch. (3) Wave-range switch.* **Price.**—*14 guineas.* **Makers.**—*Telsen Electric Co., Ltd., Aston. Birmingham, 6.*

THE circuit specification of this receiver is much above the average to which we have been accustomed during the past season in sets of comparable price. Of the consequent improvement in sensitivity and selectivity there can be no doubt; but it is gratifying to find that the set is in no way more difficult to tune. On the contrary, the new "Pointograph" tuning scale enables any of the principal European stations to be selected with ease. Essentially, the new scale consists of a transparent cursor, similar to that fitted to slide rules. The hair line, however, is inclined from the vertical and is made to intersect small dots corresponding with the station names which are arranged in a series of vertical columns. A subsidiary horizontal scale is marked in wavelengths, which are indicated by a separate hair line on the cursor. At the extreme right of the scale is the tuning indicator, the needle of which is viewed through a vertical slot. The cabinet design allows the scale to be inclined so that it can be easily read.

Simple Controls

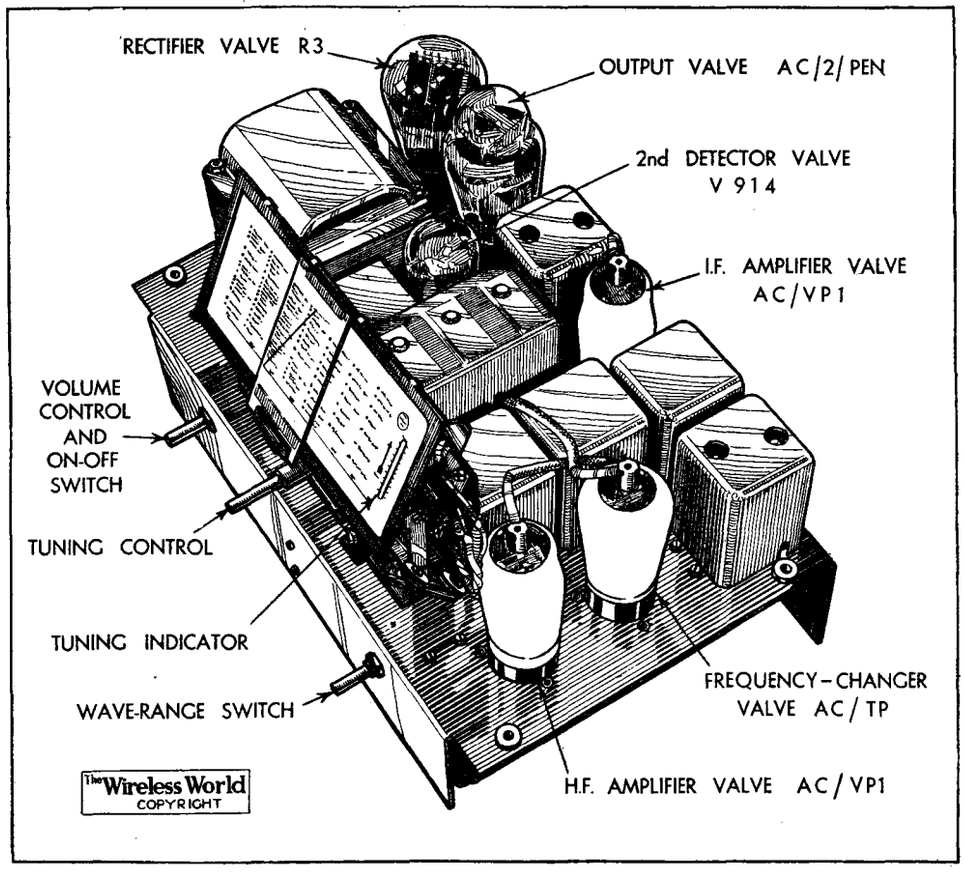
There are only three controls: the main tuning knob in the centre, the volume control and mains switch on the left, and the wave range and gramophone switch on the right. On first switching on the set the level of background noise appeared to be rather high, but this proved to be entirely due to the high sensitivity of the receiver and not to pick-up from the mains. Any station of sufficient strength to operate the automatic volume control at once brought down the level of background noise, but it has to be admitted that careful handling of the manual volume control was necessary when changing from one station to another. In other words, the manual volume control was called upon to fulfil the function often delegated to a noise suppression stage.

The high sensitivity was at once apparent from the volume of those Continental stations which are receivable on the medium waveband during the hours of daylight. In the case of practically every station it was necessary to reduce the volume control from maximum to bring down volume to a comfortable level for a living room of normal size.

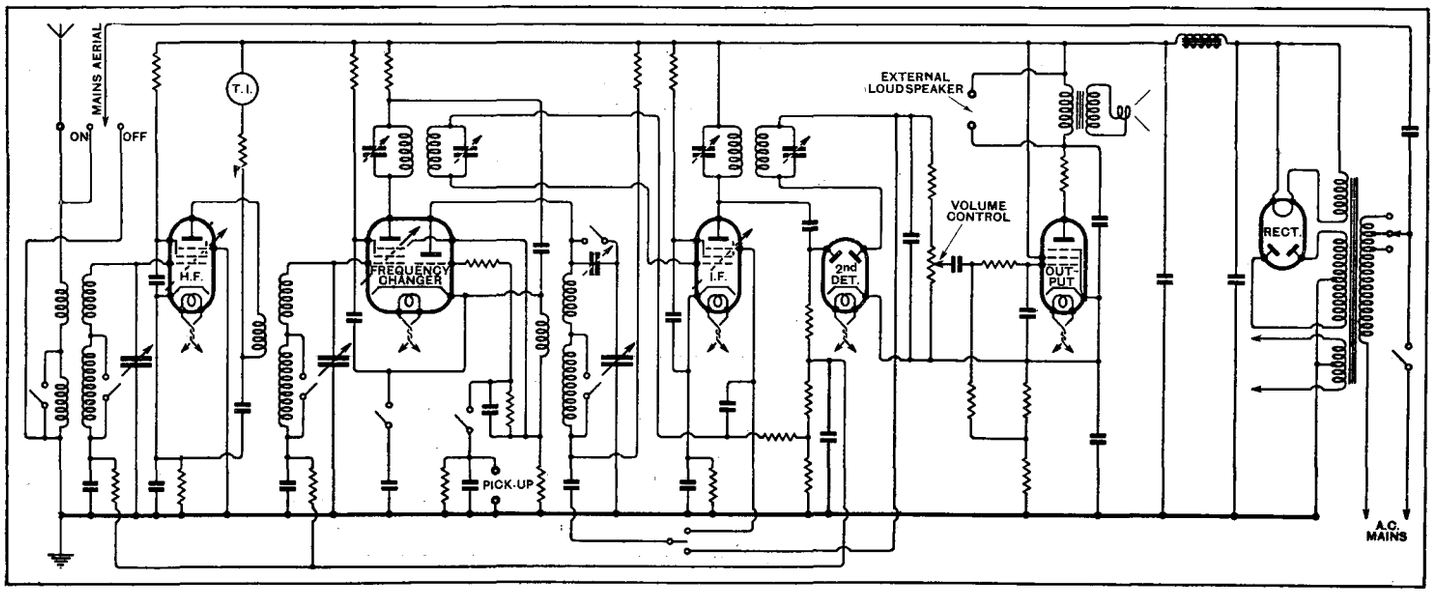
The selectivity, too, is of a high order. On the medium waveband in Central London four channels were lost on either side of the National transmitter, but only two in the case of the Regional station. On long waves the Deutschlandsender comes in clear of modulation interference from Daventry and Radio Paris, but with the usual, and at present the inevitable, slight background of sideband splash.

Quality of reproduction is at its best on the local stations, where the action of the automatic volume control has the effect of improving the balance between high and low frequencies. The particular form of cabinet design adopted gives rigidity and freedom from cabinet resonance with the result that the bass reproduction is smooth. With the set accurately tuned to a less powerful station, however, the need for a slightly better high note response is evident. This is probably most noticeable on the longwave range, but is easily corrected by very slight mistuning.

Second channel whistles on the medium waveband are entirely negligible, but there



Screened iron-cored coils are employed in the H.F. amplifier stage, and the tuning scale incorporates a lucid station selector.



Complete circuit diagram. A portion of the frequency-changer valve is used to provide additional amplification for gramophone reproduction.

was an isolated whistle of moderate strength at about 1,250 metres on the long-wave range, probably due to the second harmonic of the I.F. oscillator.

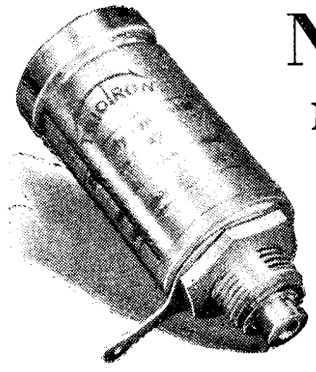
The circuit reveals many points of interest. The second detector, for instance, is a separate diode valve designed to handle large inputs and arranged to feed directly the output power pentode. The problem of providing sufficient amplification for gramophone reproduction has been solved by utilising the triode oscillator portion of the frequency-changer valve as an amplifier. Oscillation is suppressed by connecting a comparatively large condenser across the cathode coil; and the decoupling resistance becomes the load resistance, with the by-pass condenser as a coupling to the input circuit of the pentode valve. The volume control operates both on radio and gramophone.

The use of iron-cored coils in association with the signal frequency amplifying stage is noteworthy. The oscillator coils, however, are of the air-cored type.

There can be no doubt that this receiver marks a considerable step forward in design and can be recommended to those who require something a little above the average in the matter of range and overall sensitivity.

NEW APPARATUS

Manufacturers' Products Reviewed



Tritron wet electrolyte condenser, type G.431/10 of 10 mfds. capacity.

TRIOTRON CONDENSERS

ELECTROLYTE condensers of the wet type have for some time now been marketed in this country by Triotron Radio Co., Ltd., Triotron House, 26, Bloomsbury Street, London, W.C.1, and recently two new models have been added to their range.

One is a 10-mfd. size with the type number G.431/10, its peak voltage being 425, which suffices for most present-day needs. It is a tubular pattern with the case serving as the negative electrode, and the positive brought out through the centre of the large fixing bush in the base. To facilitate making a connection to the case, should it be mounted on a wood baseboard or, for any particular reason, on an insulated bracket, there is provided a large soldering tag that slips over the threaded bush between the nut and the base of the case.

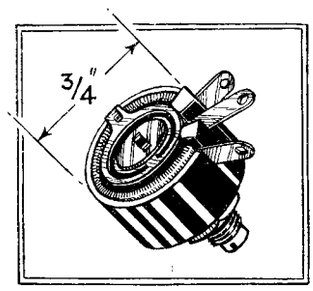
The other new model is described as the type B.25. It has a capacity of 25 mfds. and a working peak voltage of 320. This has been designed for use in universal sets.

Some specimen 10-mfd. condensers have been tested and found quite satisfactory, the leakage current at 400 volts D.C. being of the order of 0.5 m.A. only. The price of the type G.431/10 is 3s. 6d., and type B.25 4s. 6d.

KABI HUM BALANCER

THIS component has been introduced by F. W. Lechner and Co., Ltd., 61, Spencer Street, Clerkenwell, London, E.C.1, to provide a simple and easy way of obtaining the true electrical centre of filament windings on mains transformers. A device of this nature is essential where the windings are not centre-tapped, but even where such tappings are provided, it is possible, in cases where the usual remedies fail, to obtain a marked reduction in the hum level by accurately adjusting the centre tapping on these windings.

It is a very neat and compact component, and resembles the familiar type of potentiometer in general form, yet it measures only ¾in. in diameter. The resistance element is enclosed in a moulded case, and a single-hole fixing bush is fitted. Adjustment is made with a screwdriver, and, although the moving contact has a travel of about 300 degrees, a small movement either side of the mid-way position is all that is needed as a rule to balance out the hum.



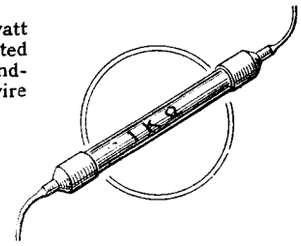
Kabi Hum Balancer, a miniature potentiometer for obtaining the true electrical centre of filament windings on mains transformers.

The specimen tested had a resistance of 66 ohms, and was found to serve its purpose in a most satisfactory manner. The price is 2s.

S.S. RESISTANCES

THESE resistances are made by Siemens-Schuckert (Great Britain), Ltd., 30-34, New Bridge Street, London, E.C.4, in ½-watt, 1-watt, and 2½-watt sizes. The first-mentioned type, of which several specimens have been tested, measure 1⅛in. long × ⅛in. in diameter, and they are fitted with metal end-caps and tinned copper-wire leads about 1½in. long. The wires are very pliable, and will stand a fair amount of bending in all directions without breaking or coming away from the end-caps.

S.S. half-watt resistance fitted with metal end-caps and wire ends.



The measured resistance of all our specimens was well within 5 per cent. of the marked values, and no measurable change was noticed when dissipating the rated watts. Neither was the rise in temperature abnormal, nor was there any discoloration or softening of the enamel.

The ½-watt size are listed as the type 2b, and cost 7d. each for all values from 200 ohms to 5 megohms. A colour code is not employed, and each resistance has its value marked in figures.

MISCELLANEOUS ADVERTISEMENTS

NOTICES.

THE CHARGE FOR ADVERTISEMENTS in these columns is

12 words or less 3/- and 3d. for every additional word.

Each paragraph is charged separately and name and address must be counted.

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ADVERTISEMENTS for these columns are accepted up to **FIRST POST** on **MONDAY MORNING** (previous to date of issue) at the Head Offices of "The Wireless World," Dorset House, Stamford Street, London, S.E.1, or on **SATURDAY MORNING** at the Branch Offices, 19, Hertford Street, Coventry; Guildhall Buildings, Navigation Street, Birmingham, 2; 260, Deansgate, Manchester, 3; 26B, Renfield Street, Glasgow, C.2.

Advertisements that arrive too late for a particular issue will automatically be inserted in the following issue unless accompanied by instructions to the contrary. All advertisements in this section must be strictly prepaid.

The proprietors retain the right to refuse or withdraw advertisements at their discretion.

Postal Orders and Cheques sent in payment for advertisements should be made ~~& Co.~~ payable to ILIFFE & SONS Ltd., and crossed ~~& Co.~~. Notes being untraceable if lost in transit should not be sent as remittances.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of private advertisers, letters may be addressed to numbers at "The Wireless World" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge, which must include the words Box 000, c/o "The Wireless World." All replies should be addressed to the Box number shown in the advertisement, c/o "The Wireless World," Dorset House, Stamford Street, London, S.E.1. *Readers who reply to Box No. advertisements are warned against sending remittance through the post except in registered envelopes; in all such cases the use of the Deposit System is recommended, and the envelope should be clearly marked "Deposit Department."*

DEPOSIT SYSTEM.

Readers who hesitate to send money to advertisers in these columns may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Wireless World," both parties are advised of its receipt.

The time allowed for decision is three days, counting from receipt of goods, after which period, if buyer decides not to retain goods, they must be returned to sender. If a sale is effected, buyer instructs us to remit amount to seller, but if not, seller instructs us to return amount to depositor. Carriage is paid by the buyer, but in the event of no sale, and subject to there being no different arrangement between buyer and seller, each pays carriage one way. The seller takes the risk of loss or damage in transit, for which we take no responsibility. For all transactions up to £10, a deposit fee of 1/- is charged; on transactions over £10 and under £50, the fee is 2/6; over £50, 5/-. All deposit matters are dealt with at Dorset House, Stamford Street, London, S.E.1, and cheques and money orders should be made payable to Iliffe & Sons Limited.

SPECIAL NOTE.—Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post. When sending remittances direct to an advertiser, stamp for return should also be included for use in the event of the application proving unsuccessful.

Set Manufacturers' Surplus, Clearance and Bankrupt Stocks offered in any of these columns may not be Manufacturers' current lines. Radio components advertised at below the list price do not carry any manufacturer's guarantee.

RECEIVERS AND AMPLIFIERS, ETC.

NEW Monodial Super, designers' specification; offers; cash, exchange.—45, Granville, Manopark, Slough. [6356

CROSSLEY Midgets and Car Radio.—Send for wholesale catalogue to importers.—Royal, 5, Buckingham Rd., London E.18. [6270

EKCO D.C.74, cost 14 guineas July 23rd., removing to A.C. district; 10 guineas or offer.—Bowers, 52, Trinder Rd., Crouch Hill. [6328

1934 Ekco 7-stage A.C. Superhet, chromium and black, as brand new, with 12 months' guarantee; £7/7.—58 Flat, Mantell St., N.1. [6349

OUR Kit of Parts for "Wireless World" Quality Amplifier, complete in every detail, including valves; amplifier only, £8/10; feeder unit, 36/-.

OUR Kit of Parts for "Wireless World" Olympic S.S. Six, complete in every detail, including valves and loud-speaker; £14/10.

SEND for Detailed List of Components for Either of the above Kits.

WE Can Supply Kits for Any "Wireless World" receiver or amplifier; carriage paid, cash with order or c.o.d.

WARD, 45, Farringdon St., London, E.C.4. Phone: Holborn 9703. [6317

21/-.—"Columbia" 2v. sets, 1934 models, fitted in beautiful walnut cabinet with speaker, or all complete with "Marconi" valves and batteries, 39/6 (list price £4/4).

BLUE-SPOT Class B.4 Valve Sets, band-pass tuning, M.C. speaker, Mullard valves; £4/19/6 (list price £9/19/6).—Radio Supplies, 20, Ramsgreave Drive, Blackburn. [6353

SPEAKERS, microphones, meters and all other gear appertaining to P.A. work at bargain prices; callers are invited; stamp for lists.—H. Franks, 23, Percy St., Tottenham Court Rd., W.1. Museum 8585. [6312

1935 Models.—4-valve superhet, A.C. or D.C., M.C. speaker, £3/19/6; 5-valve, £5/5; 6-valve, £6/10; car radio, £10/10 including valves; appro., "Wireless World" deposit.—Lovell Bros., 11, Avon Rd., London, W.1. [6269

55/-.—Class "B" 3-valve band pass, in superb horizontal 2-colour walnut cabinet, Radiophone 2-gang in metres, Kola P.M. (without valves, batteries), listed £9/9; c.o.d., carriage forward.—Kay, 167, City Rd., London, E.C.1. [6197

ARMSTRONG Latest 1935 Chassis, six new models, including 7 stage 5 valve A.C. Superheterodyne chassis, full A.V.C. Marconi valves; £6/18/6; royalties paid.—Write for particulars, Armstrong Manufacturing Co., 100, King's Rd., N.W.1. [6352

PUBLIC Address Amplifiers.—A.C. mains, three stage, 21 watts, undistorted A.C. output, complete with valves, £15; universal A.C./D.C. three stage, 7 watts output, complete, £13; guaranteed 12 months; trade supplied; deferred terms.—D. E. Clarkson, B.Sc. (Eng.), 45, Manor Rd., Wallington, Surrey. 'Phone: Wallington 3953. [6280

Receivers and Amplifiers, Etc.—Contd.

MIDGET Receivers, every one brand new, working off A.C. and D.C. mains, 100-130 or 200-240 volts, by universal adaptor supplied, all incorporate moving coil speaker, complete with valves, etc.; Emerson 5-valve chassis, complete with valves and speaker (sealed carton), £3/15; above chassis incorporated in handsome figured walnut cabinet (10×7½×5½), complete, £4/6/3; Belmont Midgets, specification as in Emerson's 4-valve, complete in cabinet, list £9/9, at £3/15; Belmont 5-valve superhet, A.V.C., operating from batteries as well as mains (suitable for cars), complete in beautiful cabinet, list £15/15, at £6/5; all carriage paid, cash with order or c.o.d.—Degallier's, 4, Coryton House, 21, Upper Marylebone St., London, W.1. Museum 7795. [6343

MAINS EQUIPMENT.

VORTEXION Leads Again.

VORTEXION Specified Olympic S.S. 6 transformer, S.S.352, 5 years' guarantee, 25/-; less terminals and guarantee, 21/-; power chassis, £3/17/6; choke, 12/6; single span model, 25/-; power chassis, £3/10.

VORTEXION.—Quality amplifier or super monodial, 425-0-425, 120 m.a., 4v. 6-8a. C.T., 4v. 3a. C.T., 4v. 1a., 4v. 1a., super shrouded, core size 2¼in.×1½in., 2½% regulation primary engraved insulated terminals, weight 14lb., 26/-, carriage 2/-; normal shrouded, 22/-; open type, 20/-, post 1/3; speaker field replacement choke, 16/-; special output transformer, to "W.W." spec., 12/6.

VORTEXION.—A.C. short wave receiver, 350-0-350, 60 m.a., 4v. 3a., 4v. 2a., screened primary; 16/-, post 9d.

VORTEXION 7.30h. 120 m.a. Choke, 215 ohms, in die cast shrouding to match; 12/6.

IMITATED, but unequalled. Good enough for a "Wireless World" specification is good enough for you.

VORTEXION Cost Little More than the Cheapest, but unequalled by the dearest.

VORTEXION Standards Despatched by Return.

VORTEXION A.C./34, used by author in construction of A.V.C. Three, as illustrated; 18/-.

GUARANTEED 12 Months, and within 5% normal and 2½% super models, neat shrouding, with detachable feet, as used by Government Departments, etc., etc., any model guaranteed 5 years at extra cost of 2/-.

ALL Secondaries Centre Tapped

VORTEXION.—250-0-250 60 m.a. 4v. 1 to 2a., 4v. 2 to 4a., open type, 10/-; shrouded, 12/6; post 9d.

VORTEXION.—Ferrocart III. 350-0-350, 60 m.a., 4v. 2.5 C.T., 4v. 3.5 C.T.; open type 13/6, shrouded 16/-; post 9d.

VORTEXION.—Super model for H.T.8 or 9 or 10, 4v. 1 to 2, 4v. 2 to 4; open type 14/6, shrouded 16/6; post 1/-.

VORTEXION.—350-0-350, 120 m.a. 4v. 2 to 5a., 4v. 2 to 4a., 4v. 2.5a.; open type 14/6, shrouded 16/6; super shrouded model, weight 11lb., 4 filaments to specification, 21/-; post 1/3.

(This advertisement continued on next page.)

Mains Equipment—Contd.

(This advertisement continued from previous page.)

VORTEXION.—400 or 450 or 500v. 120 m.a., 4v. 2 to 5, 4v. 2 to 5, 4v. 2.5a.; open type 19/-, shrouded 23/-.

VORTEXION.—400 or 450 or 500, 150 m.a., 4v. 4a., 4v. 2.5, 4v. 2, 4v. 2, 4v. 2, core size 2¼×1¼in., a super job, 2% regulation, 35/-, shrouded, with terminals; less terminals, 30/-; open type, 26/-; post 1/3.

VORTEXION Auto Transformers to B.E.S.A. Specification. 100, 110, or 120v. to 200, 220, or 240 volts, 60 watts, 9/-; post 9d.; 120 watts, shrouded 12/6, open type 10/6, post 1/-; 200 watts, shrouded 16/6, post 1/-; 2,000 watts, £4/10 .

VORTEXION 1,000-watt Transformers; £4/10, carriage free.

VORTEXION 30h. at 60 m.a. Chokes, 5/6; 40h. at 60 m.a., 8/6; 30h. at 150 m.a., 200 ohms, 10/6 open type, 12/6 shrouded.

VORTEXION Transformers Made to Your Specification; price according to wattage, 6v. filaments same price unless wattage grossly exceeded; special quotations by return.

VORTEXION (S. A. BROWN), 182, The Broadway, Wimbledon, S.W.19. Tel.: Liberty 2814. [6360

PARTRIDGE, N., Radio Transformer Specialist.

PARTRIDGE, N., B.Sc. (Eng.), A.M.I.E.E., A.I.Rad.E.

PARTRIDGE Transformers.—"Certainly above the average . . . very soundly constructed transformers." —*Wireless Trader.*

PARTRIDGE Transformers.—"Runs perfectly cool . . . a sound electrical job . . . represents very good value.—*Wireless World.*

PARTRIDGE Transformers.—"Voltage regulation excellent . . . transformer remained remarkably cool."—*Radio Trade Review.*

PARTRIDGE Transformers.—Guaranteed 12 months; screened primaries, 200-250v., 50 cycles; all L.T. windings centre tapped.

PARTRIDGE Transformers.—250-0-250v., 60 m.a., 4v. 1a., 4v. 2-4-a., 11/-; 350-0-350v., 60m.a., 4v. 2-2½a., 4v. 2-4a., 13/6.

PARTRIDGE Transformers.—350-0-350v., 80 m.a., 4v. 2-2½a., 4v. 2-4a., 4v. 1a., 16/6; 350-0-350v., 120 m.a., 4v. 2-2½a., 4v. 3-5a., 4v. 1-2a., 18/6.

PARTRIDGE Transformers.—425-0-425v., 120 m.a., 4v. 2-2½a., 4v. 3-5a., 4v. 2a., 20/6; 500-0-500v., 100 m.a., 4v. 2-2½a., 4v. 3-5a., 4v. 2a., 21/-.

PARTRIDGE Transformers.—500-0-500v., 120 m.a., 4v. 2-4-a., 4v. 3-6a., 4v. 1-2a., 4v. 1-2a., 27/6; larger types supplied to order.

PARTRIDGE Transformers.—0-7½-9-11v., 1-3a., 10/-; 0 15-18-22v., 1-2a., 10/-; 240v. (tapped 200v)., 200 m.a., 4v. 2-4a., 12/9.

PARTRIDGE Transformers.—Step-up or step-down autos, tapped 0-100-110-200-230-250v., 60w., 10/-; 100w., 12/6.

PARTRIDGE Transformers.—For "W.W." single-span, 18/6; for "W.W." P.P. quality amplifier, 27/6; for "W.W." Olympic S-S Six, 18/6.

PARTRIDGE Transformers.—Wound to any specification, accuracy of output guaranteed, competitive prices, quick delivery.

PARTRIDGE Output Transformers.—5w. to 100w. speech, no audible distortion, 32-10,000 cycles, designed for any conditions, relay or P.A. work.

PARTRIDGE Chokes.—140H., 60 m.a., 2,500 ohms, 13/6; 75H., 25 m.a., 1,400 ohms, 7/6; 25H., 60 m.a., 560 ohms, 7/3; 22H., 120 m.a., 350 ohms, 9/9.

PARTRIDGE Chokes.—13H., 200 m.a., 160 ohms, 12/-; 8H., 120 m.a., 225 ohms, 6/9; 6H., 500 m.a., 50 ohms, 19/6; 3H., 250 m.a., 70 ohms, 6/6.

PARTRIDGE.—Special Terms to the Trade.

PARTRIDGE.—Trade List per return.

PARTRIDGE, N., B.Sc. (Eng.), A.M.I.E.E., A.I.Rad.E.

PARTRIDGE, N., Kings Buildings, Dean Stanley St., London, S.W.1. Tel.: Vic. 5035. [6348

TANTALUM for A.C. Chargers H.T. and L.T.—Blackwell's Metallurgical Works, Ltd., Garston, Liverpool. [5039

BATTERY Chargers.—The N.P. are renowned for quality, 1 to 4 circuits from 65/-.—N. P. Electrical Co., 514, Alum Rock Rd., Birmingham. [6365

WESTON Model 267 D.C. Instruments, 0-500v., £2; 0-150v., 25/-; 0-10v., 25/-; 0-100 m.a., 25/-.—Whitfield, 93, Primrose Lane, Hall Green, Birmingham. [6333

"EKCO" A.K.25 Eliminators and Trickle Charger Combined, 25 m.a.; charges 2, 4, or 6v. accumulators at ½ amp.; 42/- (makers' list price £5/17/6).—Radio Supplies, 20, Ramsgreave Drive, Blackburn. [6354

LESDIX Chargers, all steel, A.C. and D.C. mains, 2 to 200 cells at low prices; state requirements; dynamos and rotaries in stock, all sizes; battery superseders for 2-volt input, 80-volt output, 37/6; fractional H.P. and sewing machine motors, 25/-.—Below.

LESDIX Measuring Instruments, 2½in. bakelite case, flush panel, any reading, A.C. or D.C.; from 6/- each; ask for full range instrument list.—Below.

LESDIX Microphone.—We are makers of 25 types for all uses; Home Radio mikes, solid bakelite body, 5/6; G.P.O. microphones, on stand, with mouthpiece, 7/6; P.A. mikes, 50/-; list free.—Electradix Radios, 218, Upper Thames St., London, E.C.4. [0398

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GET A DIX-ONEMETER

The ideal of multi-range moving coil meters. Microamps to 20 amps, milli volts to 1,000 volts. 50 ranges on one meter. Two clear scales with mirror and knife edge pointer.

ONLY **55/-**

A remarkably low price for a meter worth £10. For Novice or expert.

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The High-grade Radio Tester. Low Price. High Value.

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MULTIPLIERS EACH, 6/6.

COMPLETE RADIO OUTFIT

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For other Bargains see our Advertisement in Components for Sale Column or send for Illustrated List free.

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SOUND AMPLIFYING EQUIPMENT

for all purposes, with undistorted A.C. outputs from 2 to 150 watts — Heavy duty M.C. speakers, microphones, etc. Tannoy sound equipment is used whenever quality is the first consideration.

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YOU CAN HAVE MUSIC WHEREVER YOU GO !

SEE THE NEW

EDELTONE *Extension Speaker*

AT OLYMPIA—STAND 242

Made by *BAKER of CROYDON*—The Pioneers of Moving Coil Speakers

THE HEART & SOUL OF GOOD MUSIC.

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Start *now* your Short Wave listening with the latest and most efficient

SHORT WAVE CONVERTER

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Short Wave Specialists, 18a, South End, CROYDON

THE MOTOR CYCLE Every Thursday **3d.**

Mains Equipment.—Contd.

PARAMOUNT Mains Transformers, equal to any, and better than most; try them once and you will always use them!

PARAMOUNT Auto Transformers, 100-120v. up to 200-250 volts, or vice versa, 60 watt, 8/6; 120 watt, 10/-; shrouded 2/- extra, post 9d.

PARAMOUNT.—250-0-250v. 60 m.a., 4 volt 1 to 2 amp., 4v. 2 to 4a., open type, 9/6; shrouded, 11/6; post 9d.

PARAMOUNT.—350-0-350v. 60 m.a., 4v. 2.5a., 4v. 3 to 5a., 13/-; shrouded, 15/-; post 9d.; 120 m.a., 4v. 5 amp., 4v. 4 amp., 4v. 2.5a., with screened primary, shrouded, 16/-; post 1/-.

PARAMOUNT.—Single span model, with 1½in.×1½in. core size, 350-0-350v. 100 m.a., 4v. 5a., 4v. 1a., 4v. 2.5a., shrouded, with screened primary, 2½% regulation, 20/-.

PARAMOUNT.—500v. or 450v. or 400v. 120 m.a., 4v. 5a., 4v. 4a., 4v. 2.5a., screened primary, 18/-; shrouded, 21/-, post 1/3; 150 m.a., 4v. 2.5a., 4v. 4a., three 4v. 2a., with 2¼in.×1¼in. core size, shrouded, 28/-, post 1/3.

PARAMOUNT.—Westinghouse transformers, H.T.8, 9 or 10, with 4v. 2a., 4v. 4a., shrouded, 16/-, post 1/-.

PARAMOUNT.—Chokes, 30h. 60 m.a. 5/6; 20h. 120 m.a., 8/6, post 9d.

PARAMOUNT Mains Transformers are Guaranteed for 12 Months

PARAMOUNT Products are Fitted with Neat Aluminium Frames or Shrouds, all filaments C.T., insulating paper 2½ mils thick between each layer, and tested thoroughly before leaving our works.

PARAMOUNT Transformers Made to Your Own Specifications; price according to wattage; quotations by return

PARAMOUNT Guaranteed Electrolytic Condensers, 4+4 mfd., 500v. peak, 3/6, post 3d.

PARAMOUNT Mains Transformers, manufactured by Brock and Salter, 66, Hartfield Rd., Wimbledon, S.W.19 (one minute from Wimbledon Station). Tel.: Liberty 3226. [6315

HOYNE'S Transformers, fitted with tapped and screened primaries, filaments, all centre tapped, stout cast aluminium clamps and clearly marked terminal strips are fitted to all models. write for list.

HOYNE'S Components are Guaranteed for One Year; one type only manufactured, the best, as used by many well-known set manufacturers after testing all others.

HOYNE'S.—"W.W." transformers, wound strictly to specification of author: "W.W." test reports, June 22nd: "The insulation is particularly good throughout . . the transformer is satisfactory in all respects."

HOYNE'S.—Push-pull quality amplifier transformer, 25/-, post 1/3; 7/30 henrys choke, 9/6, post 9d.; 20 henrys. 7/6, post 9d.

HOYNE'S.—Single span, 15/- post 1/-; choke, 10 henrys, 7/6, post 9d.

HOYNE'S.—Everyman A.C. super transformer, 12/6, post 1/ . choke, 10 henrys, 7/6, post 9d.

HOYNE'S.—A.V.C. Straight Four transformer, 18/-, post 1/3; choke, 26 henrys, 12 m.a., 140 ohms, 9/6, post 9d.

HOYNE'S.—A.V.C. Three transformer, 12/6, post 1/-; choke, 30 henrys, 60 m.a., 7/6, post 9d.

HOYNE'S.—250-0-250v. 60 m.a. 4v. 1 to 2a., 4v. 2 to 4a., 10/-, post 9d.; with extra 4v 1 to 2a. winding, 12/6, post 1/-.

HOYNE'S.—Ferrocart III, 350-0-350v. 60-70 m.a., 4v. 2 to 3a., 4v 2 to 4a, 12/6, post 1/-; with extra 4v. 1 to 2a winding, 13/6, post 1/-.

HOYNE'S.—500-450-0-450-500v. 140 m.a., 4v. 2 to 4a., 4v. 4 to 6a., 4v. 2a., 4v. 2a., 27/6, post 1/3; weight 11lb

HOYNE'S Transformers, built to specifications up to 1 K.V.A., keenest prices, best materials and workmanship; quotation by return.

M. J. HOYNE, ALL-POWER TRANSFORMER, Ltd., Offices and Works, 8a, Gladstone Rd., Wimbledon, S.W.19. Tel: Liberty 3303. [6079

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MANUFACTURERS' Clearance.

ULTRA "Panther," a modern cabinet, with contrasting figured walnut veneer panels, 20×17×11, 13/6; pedestal type, 35×22×12, 30/-, undrilled; photo sent on request.

SET and Speaker Cabinets; 5/- upwards.

RADIOGRAM Cabinet; 37/6 upwards.

SPEAKER Cabinets; 4/6 upwards.

SEND Particulars of Your Requirements (giving size of set, etc.), or call and make your choice from our stocks of over 100 different types; from 3/6 to £4/10.

REFER to Previous Advts. for Detailed List of Bargains.

H. L. SMITH and Co., Ltd., 287-9, Edgware Rd., London, W.2. Tel.: Padd. 5891. [6052

CLEARANCE, 50 only, veneered walnut, dome top, 19in. ×13in.×9in., 6/-, carriage paid; solid mahogany 2-door pedestal, 3ft. 6in. high, 10 only, £1, carriage paid.—A. Pollock, "Normanie," Jedburgh. [6338

DYNAMOS, ETC.

CONVERTER, NO-RO-CO, output 60-90 watts, as new; £3/15.—Ideal Radio Stores, Clarendon Rd., Harrow. Harrow 1950. [6332

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27/6!!!—Brand new B.T.H.-R.K. speakers, 6v. field, suitable for P.A work etc.

£2/7/6!!!—B.T.H. speakers, as above, for 100-250v. A.C., complete with field rectifier.

MAGNAVOX D.C.152 (9in. cone), 22/6; Magnavox 154 (6¼in. cone), 16/3; all with hum-bucking coils, power or pentode transformers and 2,500 or 6,500-ohm fields; Magnavox P.M.254, 18/-.

ATTENTION to All Orders Within 24 Hours; carriage paid; cash with order or c.o.d.

WARD, 2nd Floor, 45, Farringdon St., London, E.C.4. Telephone; Holborn 9703. [5723

"CELESTION" "Soundex" Moving Coil Speakers, 12/11 (list 27/6); Celestion P.P.M.W., 18/6 (list 45/-); brand new, sealed boxes.—Radio Supplies, 20, Ramsgreave Drive, Blackburn. [6355

VAUXHALL.—Magnavox permanent magnets, universal, suitable for Class "B," power or pentode, 6in. cone 15/6, 7in. cone 17/6, 10in. cone 23/-; mains energised, 2,500 or 6,500, 10in. cone 23/-, 7in. cone 15/3; brand new, with humbucking coils; state power or pentode transformer; unused manufacturers' stock; immediate delivery, carriage paid, cash with order or c.o.d.—Vauxhall Utilities, 163a, Strand, W.C.2. Temple Bar 9338. [6277

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ALL Types of Brand New American Valves in Stock; first-class makes, guaranteed for 6 months.

247, 235, 551, 89, 18, 19, 46, 59, 6A7, 15, 42, 41, 38, 39, 78, 75, 57, 58, 224, 44, 36, 235, 83, 43, 12/-; 25Z.5, 14/6; U.X.171A, U.X.199, U.X.280, U.X.245, U.X.226, U.Y.227, 7/6; U.X. 250, U.X.210, U.X.281, 17/6; U.X.867 photocells, 25/-; various transmitting valves in stock; post paid; cash with order or c.o.d. WARD, 2nd Floor, 45, Farringdon St., London, E.C.4. 'Phone; Holborn 9703. [5722

METROPOLITAN RADIO SERVICE Co. for American Valves with a Guarantee; any type at keenest prices; trade supplied.—1021 Finchley Rd., Golders Green, N.W.11. Speedwell 3000. [0436

AMERICAN Valves Direct, 5/- each, three for 12/6, post paid, leading brands, factory fresh, guaranteed; 1A6, 2A7, 6A7, 25Z5, 5Z3, 37, 42, 43, 56, 57, 58, 75, 77, 78, 245, 280; all others at similar prices; send postal order; duty 5d. to 7d. each on delivery; send for lists.—Export Radio Co., 41, Union Square, New York City, U.S.A. [6297

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PREMIER SUPPLY STORES Announce the Purchase of the Complete Stock of a World Famous Continental valve manufacturer, all the following standard main types fully guaranteed, 4/6 each: H., H.L., L. power, medium, high, low mag and variable mu screen grids, one, three and four Watt A.C. output, directly heated pentodes, 250v. 60 m.a. full wave rectifiers, D.C. types. 20v. 18 amp., filaments, screen grid H., H.L. power.

THE Following Types, 5/6 each: 350v. 120 m.a., full wave rectifier, 500v. 120 m.a. full wave rectifier, 2½ watt indirectly heated pentode.

THE Following American Types, 4/6: 250, 112, 171, 210, 245, 226, 47, 46, 24, 35, 51, 57, 58, 55, 37, 80.

THE Following Sizes, 6/6 each: 42, 77, 78, 25Z5, 36, 38, 83, 39, 44, 53, 6A7, 6B7, 2A5, 2A6, 2A7, 2B7, 5Z3, 6C6, 6A4, 6D6, 6F7; the following valve: 866, 25/-.

PREMIER SUPPLY STORES, 20 and 22, High St., Clapham, S.W.4. [6318

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R.

RYALL'S RADIO, 33, Chancery Lane, London, W.C.2 (nearest Tube: Chancery Lane; 'bus 67 passes door, or tram to Savoy St.). Holborn 3529. Open Saturday afternoon. Close 7 p.m., Saturday 5 p.m., Thursday closed 1 o'clock.

SET Repairs, any commercial or amateur built set serviced, at "Trade" prices, British or American, satisfaction guaranteed.

BRITISH Radiophone Volume Controls, with mains on-off switch, new, 10,000, 15,000, 20,000, 35,000, 100,000, 2/6 each.

BRITISH Radiophone Radiopaks: B.P. superhet, 110 kc/s 30/-, postage 1/3; sets Radiophone 3-coil units on base, with terminals, B.P. superhet, 110 kc/s, 8/9, postage 9d.; Ferrocart coils, G1-2-8, 25/-; all with mains switch.

SPECIAL Offer of New Garrard Double Spring Motors, No. 11B, 12in. turntable, fully automatic unit plate, etc.; 20/-.

T.C.C. 0-1 Non-inductive Tubular Condensers, 10d. each. 350v.; T.C.C. electrolytic 15 mfd., 50v., 1/4, new; T.C.C. 0.01 mica, type M, 1/-; T.C.C. 0.0001, type M, 5d.; H.M.V. condenser blocks, 250v. working, 4×4 mfd., 3/6; 4×4×1×1×½ mfd. 4/-; T.C.C. 0.1×0.1, 450v. working, 1/6.

HELSEY Non-inductive Condensers, bakelite cased, 4 m.f., 250v.w., 3/-; Ryall's 4 m.f., 250v.w., 2/-; Dubilier, 2 m.f., 250v w., 1/6; Dubilier electrolytic, 450v. peak, 3/-, 8 m.f.; ditto, 4 m.f.

UNIKNOBS, Polar 2-gang, new, brown, 8/-, with cover, 9/6; Polar disc drive, complete with Polar No. 4 0.0005 condenser, listed 9/-, 4/- the two; R. and A. type output transformers, 18-23-32-1, new, 5/-; Paxolin formers, with guiders, 1in., 8d.; R.I. Hypermite transformers, 6/-, second-hand; R.I. Parafeed transformers, 5/-, second-hand.

RADIOPHONE Disc Drives, less escutcheon, fit 5/16in. spindle, read 0-100 from left to right; 1/6 post free.

WIRE, new Knifetown, etc., ¼lb. reels, 16S.W.G. En., 8d.; ¼lb. 18S.W.G. C.C., 8d.; ½lb. 26S.W.G. En., 9d.; ¼lb. 32S.W.G. C.C. 1/-; ¼lb. 30S.W.G. En., 8d.; 2oz. 30 and 32 C.C., 6d each.

SIFAM 0-6v. Meter, 10/-; Weston 301 0-100 m.a., 20/-; Turner 0-100 m.a., with cut-out switch, 17/6; Weston 0-300 m.a., projecting, 20/-; Weston 301, centre zero, bakelite cased, 20/-; 0-100 m.a., Sifam 0-300 m.a., 15/-; all otherwise moving coil and flush type.

R. [6342

Components, Etc., for Sale.—Contd.

24.

MILDMAY RADIO EXCHANGE Offers the Following Sound and Perfect, cash with order or c.o.d.

MONODIAL, "Wireless World" 1933 model, completely assembled with specified parts to specification, including all valves and the special type 2A7 Pentagrid, receiver and amplifier, coupled with plugs as shown, including also pair Rola dual speakers; £15.

KOLSTER BRANDES Type 444 A.C. Mains Superhet Receiver, complete with valves, in brand new condition; £6/10; for mains of 200/250 volts A.C.

LOTUS 3-valve Screen Grid Battery Operated Receiver, complete with valves and speaker in self contained walnut cabinet; £3/7/6.

ATLAS 3-valve Screen Grid Battery Operated Receiver, type 3RD., complete with valves and moving coil speaker, in self contained walnut cabinet; £4.

ALBA 3-valve Screen Grid Battery Operated Receiver, complete with valve and Rola moving coil speaker, in self contained walnut cabinet; £3/15.

"WIRELESS MAGAZINE," "The Super Senior" 7-valve battery operated superhet radiogram, complete in solid oak cabinet with valves, gramophone motor, pick-up and Edison Bell moving coil speaker; £5.

FERRANTI Radio Service Tester, A.C. or D.C., £3/17/6; Ferranti 0-50 M./amp, 20/-; Ferranti 0-1 amp., 15/-; Ferranti 0-7 volts, 14/-; Ferranti triple range meter, 0-7.5v. 0-150v. 0-15 m./amps., 20/-.

VARLEY Nicore I Transformers, 8/- each; pair Varley push-pull transformers, 18/6; Varley 20H chokes, 100 m./amp., 10/- each; Multitone Toco, with pot., 14/-; Varley 500-0-500, 120 m./amps., with L.T. tappings, 25/-; Varley 250-0-250 60 m./amps., with L.T. tappings, 17/6 each.

EKCO Mains Units for A.C. Mains.

TYPE A.C.25, output 150 volts 25 m./amps, having 4 tappings, 2 variable; listed at £3/17/6, our net price 33/- each.

TYPE K25, output 150 volts 25 m./amps., having 4 tappings, 2 variable, also trickle charger for 2-, 4-, or 6-volt accumulators; listed at £5/7/6, our price 39/-.

FERRANTI Inductor Dynamic Loud-speakers, equal and in fact better than cheap moving coil speakers; 17/6 each.

THE Above Post or Carriage Paid.

OPEN All Day Thursday, closed Saturdays.

'PHONE Clissold 5001.

24, Mildmay Grove, London, N.1. [6347

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PREMIER SUPPLY STORES Offer the Following Set Manufacturers' Surplus New Goods at a Fraction of the Original Cost; all goods guaranteed perfect, carriage paid over 5/-, under 5/- 6d. extra; I.F.S. and abroad, carriage extra.

SPECIAL Offer of P.M. and Energised M.C. Speakers, from well-known gramophone manufacturer.

TYPE 10971C, 9in. diameter, 2,000 ohm field, 40-70 m.a., Pentode transformer, handles 4 watts; 17/6.

TYPE 10955F, 9in. diameter, 11,650 ohm field, 20-30 ma.., auditorium type power transformer, handles 10 watts; 30/-.

TYPE 10955H, 9in. diameter, 115 ohm field, 350-400 m.a., auditorium type Pentode transformer, handles 10 watts, 30/-; A.C. conversion kit, 20/-.

TYPE 4430B, 9in. diameter, permanent magnet, handles 4 watts, 7 ohms speech coil, 13/6; Multi ratio transformer; 4/6 extra.

ELIMINATOR Kits, including transformer, choke, Westinghouse metal rectifier, T.C.C. condensers, resistances and diagram, 120v., 20 m.a., 20/-; trickle charger 8/- extra; 150v. 30 milliamps., with 4v. 2-4 amps. C.T. L.T., 25/-; trickle charger 6/6 extra; 250v. 60 milliamps. with 4v., 3-5 amps. C.T. L.T., 30/-; 300v. 60 m.a. with 4v., 3-5 amps., 37/6; 200v. 100 m.a., 39/6.

PREMIER Chokes, 40 milliamps, 25 hys., 4/-; 65 milliamps, 30 hys., 5/6; 150 milliamps, 30 hys., 10/6; 60 milliamps, 80 hys., 2,500 ohms, 5/6; 25 milliamps, 20 hys., 2/9.

ALL Premier Guaranteed Mains Transformers have Engraved Terminal Strips, with terminal connections, input 200-250v., 40-100 cycles, all windings paper interleaved.

PREMIER H.T.7 Transformer, output 135v. 80 m.a. for voltage doubling, 8/6; 4v. 3-4a. C.T. L.T., 2/- extra; with Westinghouse rectifier giving 200v. 30 m.a., 17/6.

PREMIER H.T.8 and 9 Transformers, 250v., 60 m.a., and 300v. 60 m.a. rectified, with 4v. 3-5a. and 4v. 1-2a. C.T. L.T and screened primary, 10/-; with Westinghouse rectifier, 18/6.

PREMIER H.T.10 Transformer, 200v. 100 m.a., rectified, with 4v. 3-5a., and 4v. 1-2a. C.T. L.T. and screened primary, 10/-; with Westinghouse rectifier, 19/6.

PREMIER Mains Transformers, output 250-0-250v. 60 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. (all C.T.), with screened primary; 10/-.

PREMIER Mains Transformers, output 350-0-350v. 80 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. (all C.T.), with screened primary; 10/-.

PREMIER Auto Transformers, 100-110/200-250v. or vice versa, 100-watt; 10/-.

(This advertisement continued on next page.)

Components, Etc., for Sale.—Contd.

(This advertisement continued from previous page.)

SPECIAL Offer of Mains Transformers, manufactured by Phillips, input 100-120v. or 200-250v., output 130-0-180 volts 40 m.a., 4v. 1 amp., 4v. 3 amps., 4/6; 200-0-200v., 4v. 1a., 4v. 3a., 4/6.

WESTERN ELECTRIC Mains Transformers, 300-0-300v. 65 m.a., 4v. 1-2a., 4v. 2-3a., 6/6; 500-0-500v. 150 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 2-3a., 4v. 1a., C.T., 4v. 1a. C.T., 19/6; 1,000-0-1,000v. 250 m.a., 4v. 3a. C.T., 4v. 3a. C.T., 49/6; 2,000-0-2,000, 150 milliamps. 49/6.

PREMIER L.T. Charger Kits, consisting of Premier transformer and Westinghouse rectifier, input 200-250v. A.C., output 8v. ½ amp., 14/6; 8v. 1 amp., 17/6; 15v. 1 amp., 19/-; 6v. 2 amp., 27/6; 30v. 1 amp., 37/6; 2v. ½ amp., 11/-.

COLLARO Gramo. Unit, consisting of A.C. motor, 200-250v. high quality pick-up and volume control, 49/-; without volume control, 46/-.

B.T.H. Truspeed Induction Type (A.C. only) Electric Gramophone Motors, 100-250v.; 30/- complete.

B.T.H. Gramophone Motors, 100-250 volts A.C. or D.C., specially recommended for D.C., complete; 30/-.

EDISON BELL Double Spring Gramophone Motors, complete with turn-table and all fittings, a really sound job; 15/-.

SPECIAL Offer of Wire Wound Resistances, 4 watts, any value up to 50,000 ohms, 1/-; 8 watts, any value up to 15,000 ohms, 1/6; 15 watts, any value up to 50,000 ohms, 2/-; 25 watts, any value up to 50,000 ohms, 2/6.

WIRE Wound Potentiometers, 15,000 ohms, 1/6; 50,000 ohms, 2/-; 500,000 ohms, 3/-; 1,000 ohm wire wound semi variable resistances, carry 150 m.a., 2/-.

CENTRALAB Potentiometers, 50,000. 250,000, ½-meg. any value, 2/-; 200 ohms, wire wound, 1/-.

POLAR Star, manufacturers' model, 3-gang condensers, fully screened, 7/6; with trimmers.

AMERICAN Triple Gang 0.0005 Condensers, with trimmers, 4/11; Utility Bakelite 2-gang 0.0005 screened with uniknob trimmer, 3/6; Polar Bakelite condensers, complete with knob, 0.00015, 0.00035, 0.0003, 0.0005, 1/-.

ORMOND Condensers, 0.0005 2-gang semi-shielded, 2/6; brass vanes, with trimmers, 3/6.

MAGNAVOX D.C.152, 2,500 ohms, 17/6; D.C.154, 2,500 ohms, 12/6; D.C.152 Magna, 2,500 ohms, 37/6, all complete with humbucking coils; please state whether power or pentode required; A.C. conversion kit for above types, 10/-; Magnavox P.M. 7in. cone, 18/6.

RELIABLE Canned Coils with Circuit, accurately matched, dual-range, 3/- per coil; ditto, iron cored, 3/6.

RELIABLE Intervalve Transformers, 2/-; multi ratio output transformers, 4/6.

T.C.C. Electrolytic Condensers, 550v. working, 650v. peak, 8 mf., 4/-; 4 mf. or 8 mf., 440v. working, 3/-; 15 mf., 50v. working, 1/-; 25v. working, 25 mf., 1/3; 6 mf., 50v. working, and 2 mf., 100v. working, 6d.

T.C.C. Condensers, 250v. working, 2 mf., 1/9; 2 mf. 1,500v. working, 6/-; 4 mf., 1,500v. working, 10/-.

H.M.V. Condensers, 400v. working, 4×4×1×1×1×1×0.1×0.1×0.1×0.1, 4/9; 4×2×1×1×1×0.5, 3/9.

VARLEY Constant Square Peak Coils, band pass type B.P.7, brand new in maker's carton with instructions and diagram, 2/6.

VARLEY H.F. Intervalve Coils B.P.8, band pass, complete with instructions in original cartons; 2/6.

SCREENED H.F. Chokes by One of the Largest Manufacturers in the Country; 1/6.

PREMIER British-made Meters, moving iron, flush mounting, accurate, 0-10, 0-15. 0-100, 0-250 m.a., 0-1, 0-5 amps.; all at 6/-.

A LARGE Selection of Pedestal Table and Radiogram, cabinets, by best manufacturers, at a fraction of original cost, for callers.

THE Following Lines 6d. each, or 5/- per dozen.—Chassis valve holders, 5-, 6-, or 7-pin, screened screen grid leads; any value 1-watt wire end resistances, wire end condensers, 0.0001 to 0.1 trimming condensers, Bulgin 3 amp. mains switches.

PLEASE Send for Fully Illustrated Catalogue.

PREMIER SUPPLY STORES, 20, High St., Clapham, S.W.4. Telephone: Macaulay 2188. Nearest Station, Clapham North Underground. [6241

WOBURN RADIO Offer Final Summer Clearance:—

RESISTANCES.—Bargain parcel of 1½ watt, wire wound, accurate to 1%, containing 13 resistors, values 100 ohms to 0.1 meg., 3/9, post 3d.; Parcel B, containing 27 resistors as above 7/6.

DUBILIER 2 mfd., 1,000v. test 1/3; Wego, 750v. test, 1 mfd., 1/-, 2 mfd., 1/3; 4 mfd., 2/3; tubulars, 0.01, 0.02, 0.1, 6d.; snap type chokes, H.F., 1/-; S.W.H.F., 1/-; Radiophone straight line drives, with escutcheon, listed 8/6, 3/9; toggles, 6d.

WESTERN ELECTRIC Microphones, boxed, very sensitive, at 2/3; transformer for same, ratio 85/1, 2/3, post 3d.

PORTABLES.—Large clearance of shop soiled five-valve portables good condition, working order, less valves and batteries, 18/6; postage 1/3.

W.R.C. Eliminators, guaranteed 12 months, 150v. 30 m.a. output. A.C. model with trickle charger (2v., 4v., 6v., ½ amp.). 32/6; A.C., 21/-; universal, 21/-; D.C., 9/9.

NEW Trade List Now Ready; enclose heading.

WOBURN RADIO Co., 9, Sandland St., Bedford Row, W.C.1. Holborn 7289. [6369

Components, Etc., for Sale.—Contd.

UTILITY SALES Co. Bargains—all guaranteed new.

CELESTION P.M.M.W., 45/- model, 17/6; Ekco T.C.I. ½ amp. L.T charger, 17/6 (list £2/7/6)

REGENTONE A.C. Eliminator with L.T. Charger, S.G. and det. tappings, variable; 35/- (list £4/12/6).

RADIOGRAM Electric Motor, complete with turntable and accessories, works from 4v. accumulator or dry cell; 15/-.

MAINS Transformer by Standard Cable Co., primary 200-240, secondary 300-0-300 60 m.a., 4v. 3a. ct., 4v. 2a.; 8/6.

IGRANIC Band-pass Unit, comprising 3 iron core coils on base dual wavelength; 14/6 (list 33/-).

IRON Core Coils Dual Wave, matched for S.G., including diagrams for 3 circuits; 2/6 each.

MICROPHONES, Western Electric, hanging, 2/6; hand types, 3/6, including diagrams; transformers for ditto, 2/6 each.

BUTTONS, large tested model, 1/-; electric soldering iron, any voltage, fine value, 4/6.

G.E.C. 1934 Thirty-three, 3-valve receiver, complete with Osram valves and cabinet, sealed cartons; £4/10.

ELECTRIC Clock, bakelite case, battery model, complete and guaranteed; 12/6.

SPECIAL Purchase of 4v. S.G. Receivers, chassis built, handsome cabinet, ring valves, large M.-C. speaker, multitone control, built-in aerial, daylight Continental reception, complete with batteries; £4/19/6.

MARCONI 2v. Sets, ring valves, Marconi H.T., Exide L.T., speaker; (list £4/4), £2/12/6.

B.T.H. Universal A.C.-D.C. 100-250v. Gramophone Motor Complete, real bargain; 37/6.

CASH With Order, carriage paid, 24 hours' service.

UTILITY SALES Co., 27a, Sale St., Paddington, London. [6325

GILBERT INDUSTRIES Sensational Start to the New Season.

P.A. Amplifiers, brand new, 6 watts undistorted output, using 2PX4's.

LATEST Auto-coupled Circuit, including remote control, input transformer, high capacity smoothing and choke filter output.

A STEEL Chassis, custom built job, available owing to broken contract.

READY to Work, less valves, at 65/-; carefully packed and post paid (few only with valves).—Gilbert Industries, Ltd., 519, London Rd., Westcliff-on-Sea. 'Phone: Southend 492071. [6363

SCOTTS Radio Bargains.—Set manufacturers' guaranteed surplus.

SCOTTS.—Pick-ups: Marconi K.19 or M.25, 21/6; Celestion P.2, 16/-; Cosmocord, 12/-; Rothermel-piezo electric, 30/-.

SCOTTS.—Rectifiers: Westinghouse H.T.6, 7, 8, 9/-; 9, 10, L.T.4, 5, 10/-; Westectors W.4, W.6, 4/6; W.M.24, 26, 6/6.

SCOTTS.—Resistances: Dubilier, etc., 1 watt, all values, 6d.; electrolytic condensers, Dubilier and T.C.C., 4, 8, 50 m'd., 3/-.

SCOTTS.—Single span coils and transformers to specification: Our transformers, 19/-; single span coils, 34/-; Olympic single span coils, 45/- per set.

SCOTTS.—Speakers: Magnavox 152, 20/-; 154, 15/-; 136, 11/6; U.S.A. Rola, all types, from 17/- to 30/-.

SCOTTS.—Valves: American and non-ring European, also transmitting valves in stock; write for transformer and component list.—67, Harlesden Gardens, N.W.10. [6361

EPTON Here Again, with brand new and guaranteed surplus bargains!

13/6 Will Buy a 22/6 Cosmocord 1934 Pickup, with balanced tone arm, volume control, rest, etc.

17/6 Will Buy a Westinghouse H.T.8 Rectifier and Regentone Transformer to Match (180v. 100 m.a., 4v. 4a.); 18/6 for H.T.9 rectifier and transformer (300v. 100 m.a.).

45/- Will Buy a Celestion £6/10 P.P.M.79 Model De Luxe P.M. Speaker (Universal Transformer), in walnut, mahogany, or oak cabinet, packed in original carton.

EPTON, 93, New Rd., Chingford, E.4. (Cash with order or c.o.d.) [6341

1/6.—Cadmium plated chassis, 4-valve, pressed steel, 14×9; post 6d.

2/9.—New A.V.C. units for battery receivers, prevents fading, list 10/-, brand new.—Kay, 167, City Rd., London, E.C.1. [6159

MAINS RADIO DEVELOPMENT COMPANY Offer Following New Lines:—

T.C.C. Fixed Condensers.—Standard type, 250v. A.C. working, as new, 4 mfd., 2/-; 2 mfd., 1/4; 1 mfd., 6d.; 2x, 1x, 1x, 1x, 0.01 mfd., 1/9.

FRANKLIN Colour Coded 1-watt Resistors, all values, 100 to 100,000 ohms; 4d. each, 3/6 per dozen.

RADIOPHONE 10,000 ohm Potentiometers, with switch, 1/8; Radiophone on-off toggles, 6d.

SYSTOFLEX, standard gauge, new, three feet lengths; 1/- per 12, 5/- per 72.; carriage paid over 1/-, or call.—'Phone: Tudor 4046.

MAINS RADIO DEVELOPMENT COMPANY, 4-6, Muswell Hill Rd., N.6 London. [6334

PEARL and PEARL Bargain List A Free.—190, Bishopsgate, London, E.C.2. [0421

Components, Etc., for Sale.—Contd.

SOUTHERN RADIO'S Bargains.—Set manufacturers' guaranteed surplus.

VARIABLE Condensers.—Lotus 3-gang 0.0005, 12/6; Lotus 2-gang, 0.0005, 8/6; Lotus Dyblock single, 0.0005, 4/9 (list 9/6); all these condensers are complete with dials, escutcheons, knobs, fully screened with trimmers and boxed; Hydra block condensers, 16 mfd. (2+2+8+2+1+1), 1,000v. D.C., 7/- each; Dubilier 4 mfd. (2+1+1), 1,000v. D.C., 2/9; 4.5 mfd. (2.25+2.25) 1,000v., for mains noise suppression, 3/-; Utility Midget 2-gang variable condensers, 0.0005, with concentric trimmers, 3/5; T.C.C. 0.1+0.1, 1/3 each.

SPEAKERS.—Blue Spot permanent magnet, with universal transformer for power, super power, pentode and Class B; 23/- (list 39/6).

G.E.C. Stork Speaker in Cabinet; 19/6 (list £3/15).

S.T.400 Kits, all specified proprietary components; £2/19/6 (list £4/17/6).

EKCO A.C. Eliminators, each new and boxed, in original sealed cartons; type A.C.25, 33/6 (list £3/17/6); type K.12, with trickle charger, 37/- (list £3/17/6); Ekco trickle chargers, type T.C.1, for 2-, 4- and 6-volt accumulators, 20/- (list 42/-).

IGRANIC Superhet Coils, set of 4 (1 Osc., 2 I.F., with pigtails, 1 L.F. plain); 12/6 (list 50/-).

LISSEN Superhet 3 Coils Kit, screened, ganged on base with wave change and filament switches; type L.N.5181, for battery or mains; 12/6 (list 30/-).

VARLEY Constant Square Peak Coils, complete with all accessories, new, boxed, B.P.5; 2/4.

VARLEY H.F. Inter-valve Coils, B.P.6; 2/3.

FRAME Aerials.—Lewcos dual wave superhet; 9/- each (list 27/6).

PICK-UPS.—Marconi No. 19 (1934), 22/6 each (list 32/6).

READY Radio Instamat Transformers, for matching any valve to speaker; Junior model, ratios 1:2, 1:1, 1½:1, 2:1, 3:1, 7/6 (list 27/6); Senior model, ratios 10:1, 12½:1, 14:1, 16:1, 20:1, 25:1, 12/6 (list 37/6).

RECEIVERS.—3-valve screen-grid Elector Super, complete with valves, Exide batteries and accumulator, Celestion moving coil speaker, contained in magnificent walnut cabinet; £3/10 (list £10).

OSRAM Thirty-Three Music Magnet, complete with G.E.C. speaker, 2 Osram screen-grid and Osram power valves in moulded bakelite walnut cabinet; £3/12/6 (list £9/9); in original sealed cases.

BOTOLPH Lightweight Portable Receivers, complete with 5 Mullard valves, Exide batteries and accumulator, overall size 13in.×11in.×8in., £2/19/6 (list £8/8); a real suitcase portable.

READY Radio Meteor Screen-grid 3-valve Kits, all specified components new, in sealed cartons; 25/-, less valves; with 3 Mullard valves, 42/6 (list £5/7/6).

"A" Kit, as above, complete with magnificent walnut cabinet and Celestion perm. mag. speaker, less valves, £3/5; with 3 Mullard valves, £4/2/6 (list £8/17/6).

MULLARD Radio for the Million, "Station Master Three" battery kits, complete with cabinet and 3 Mullard valves (screen grid, H.L., power), brand new in original sealed cartons; £2/19/6 complete.

MISCELLANEOUS. — Westinghouse metal rectifiers, H.T.6, 7, 8, 9/3 each; Ferranti chokes, 20 henry 60 m.a., 6/9 each; Lewcos superhet, 8-way bases, complete with valve holders, grid leak, fixed condenser, type "48," 2/- each; Lissen base turntables, 1/6 (list 5/-); Lewcos coils, B.P.F./R., 4/-; T.B.F./C., 3/3; O.S.C./126 (Extensor), 3/3; T.O.S./R., 3/3; Morse tapping keys, with buzzer and flashlight signal, complete with battery and bulb, 2/- each.

ALL Goods Guaranteed and Sent Carriage Paid.

BRANCHES at 271-275, High Rd., Willesden Green, N.W.10, and at 46, Lisle St., W.C.2. Please send all post orders to 323, Euston Rd., N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren St. Tube). 'Phone: Museum 6324. [6366

WEST END RADIO STORES.—A few of our bargains during last few days of sale.

STANDARD Telephones Mains Transformers, 300-0-300v. 60 m.a., 4v. 4a., 4v. 2a., 4/11; Wearite 350-0-350 70 m.a., 4v. 4a., 4v. 2.5a., 7/6.

WESTINGHOUSE Rectifiers, 6 volts 1 amp., 4/11; H.T.5, 3/6; 6v. ½ amp, 3/11, or with trans. for 200-240 A.C., 8/6.

PHILIPS 20h. 180 m.a. Chokes, 4/6; 20h. 60 m.a., 2/6; tapped output trans., 0-35-1, 2/9; Marconi microphone trans., 75-1, 3/11.

CELESTION W-8 Pick-ups, new, 13/9; Dubilier 4 mfd. electrolytics, 450v. working, 2/3, new; Dubilier 6.5 mfd. banks, 1/6, 1,000v.

H.M.V. 2-gang 0.0005 Conds., 3/11; 3-gang, with drum drive, 7/6; Utility 2-gang 0.0005 mica conds., with trimmer, 2/9.

COLLARO New A.C. Gramophone Motors, 31/6; with pick-up, 46/6; Visitron photo-elec. cells, 9/6.

"MARVEL" 4-valve A.C.-D.C. Superhet., 100-250 volts, £3/19/6, foreigners guaranteed; hundreds of other bargains for callers; postage extra on all orders.

WEST END RADIO STORES, 14, Lisle St., Leicester Sq., W.C.2; also at 382, Coldharbour Lane, Brixton, S.W. [6336

Components, Etc., for Sale.—Contd.

ELECTRADIX.—8in. octagon moulded Bakelite frets improve speaker appearance, black 1/-.

ELECTRADIX.—L.F. chokes, leading maker, 20 H. 50 m.a., 4/6; centre tap, 5/-; mains 1 amp. chokes, 8/6.

ELECTRADIX.—Stand-off insulators, 4in. ribbed, 6d.; aerial cowl type, 10d.; aerial lead-in, steatite, 8in. at 9d.; 12in. at 1/-; renew your aerial, 7/22 cop. strand, 50ft. 1/3, 100ft. 2/6.

ELECTRADIX.—Fixed conden., Dubil. 1,000v. test .01 mfd., 1/-; Edibell, all from .001 to .0001, 4d. each, new; T.C.C. electrolytic, 8 mfd., 3/-; T.C.C. 5 mfd. 500v. test, 3/-; Dubil. pack 1,000v. 6½ mfd. total, 3/-.

ELECTRADIX.—Variable Tuning. Formo Log de Luxe, .0005 mf., 1/6; Amsco 2-gang .0005 mfd. each, 3/6; Pye .00035 with s.m. dial, 2/6.

ELECTRADIX.—Pot'meters, 5,000 ohms, 2/6; with switch, 3/6; 10,000 ohms, small, 1/6; ½ meg. Centralab, 1/6.

ELECTRADIX Coils, all types 2 pen., 1/3; Varley Sq. Peak, 2/6; Formers ribbed and slotted, 4d.

ELECTRADIX Headphones, English, alumin. head bands, 2/9 pair; single receivers, 1/-.

ELECTRADIX G.P.O. Table Pedestal Microphones, 7/6; hand mikes, 5/6.

ELECTRADIX M.C. Speaker Magnets, large 4-claw, powerful, 10/6; kit with magnet, cone, coil and chassis, 14/6.

ELECTRADIX Home Record Cutting Gear, centre drive, 4/6; screw spindle traverse, 7/6.

ELECTRADIX Keys, Morse Coded, 4/6; S. G. Brown transmit key, 8/6; sounders, 5/6; W. D. Bell's, 2/6; Bell wire, 1/- per 100 yds.; insulators, 9d. doz.; Empire cloth, 1/- per 100 sq. in.

ELECTRADIX Chargers, Tungar 6 volts 2 amps., 47/6; Philips trickle, 10/-; Westinghouse 24v. 2 amps. meter, s.w. and fuses, 24in. steel case, £6/10.

TUNGAR H.T. and L.T. 6 volts 1 amp. and 120 volts 100 m/a., 37/6; cadmium cell test., 2/6.

ELECTRADIX Dynamos, hand-geared alternators, 60v. 20 m/a., 10/-; H.T. and L.T. generators D.C. 600v. 90 m/a., 6v. 5 amp., 40/-; about 1,200 other machines, all sizes, specify wants.

ELECTRADIX Mains Transformers, all 110 to 240v. input, H.M.V., output 350-0-350v. 60 m/a., 4v. 1a., and 4v. 3a., 10/-; set transformers, output 150v. 30 m/a, 4v. 3 amps., 4/6; special 3 outputs of 8v., 12v. and 20v. 2 amps., 10/- each; Igranic H.T. and G.B. 180v. and 30v., 7/6.

ELECTRADIX Valves for Transmitters, A.T. 40, 4/6; Standard cables, 3/6; Tiny Weco for pocket receivers, 1v. bulb, only 3/-; or on 4-pin base, 3/9.

ELECTRADIX Lucas Signal Bulbs, 1/6; Thermo lamp flashers, 2/6; lenses and prisms for television and optics, from 2/6; Veeder coil turn counters, 1/-.

ELECTRADIX Photo Cells Sound Film Bulb, 15/-; secret ray sets of infra-red cell and amplifier, 36/-; electric wax sealers, 110-220v. automatic, 15/-.

ELECTRADIX Meters, largest stock in London, all ranges up to 10,000v. and up to 2,500 amps., 2½in. panel type Bakelite case for radio A.C. or D.C., 6/-; see special lists.

ELECTRADIX Resistances, H.M.V. in glass tube, 10,000, 25,000, 50,000, 100,000, 500,000 ohms, and 1 meg., 1/6 the set of 6.

ELECTRADIX Parcels of Experimenters' junk, coils, magnets, wire chokes, condensers, switches, terminals, etc., post free, 10lbs. 7/-, 7lbs. 5/-; 1,000 other bargains in New Sale List "W."

ELECTRADIX RADIOS, 218, Upper Thames St., London, E.C.4. [6346

THE Following Unused Set Manufacturers' Surplus, all goods guaranteed perfect; immediate delivery.

TRANSFORMERS, 350-0-350v., 75 m.a. 4v. 4a.-4v. 2a., 12/6; A.C. and D.C. eliminators, first class make, tappings S.G., detector, and power (150v., 25 m.a.), A.C. type, with Westinghouse rectifier, 25/-; D.C. type, 12/6.

DUBILIER Resistors, 1 watt type, 7d.; 2 watt type, 1/2; 3 watt type, 1/9; Dubilier or T.C.C. condensers, 8 mf. or 4 mf., 500v. working, 50v. 50 mf., 200 mf. 10v., 3/6; Mansbridge type, 4 mf. 400v., 4/-; 4 mf. 750v., 6/6.

MARCONI K19 Pickups, 22/6; B.T.H. pickup tone arms, 3/-; B.T.H. needle armature pickups, 29/-.

COLVERDYNES, 7/6; Clix 5-pin valve holders, 5d.; Rotorohm volume controls, with switch, 2/6.

WESTINGHOUSE Rectifiers, H.T.8, 9/6; H.T.9, H.T.10, L.T.4, L.T.5, 10/9; transformers (Regentone) for H.T.8 or H.T.9, with 4v. 4a. L.T., 7/-; carriage paid, cash with order or c.o.d.; send for list.

WARD, 45, Farringdon St., London, E.C.4. Phone: Holborn 9703. [6165

GRAMOPHONE Converters, loud speakers, cabinets, pedestals, tables, illustrated lists.—Beds Distributors, Biggleswade. [6331

1933 A.V.C. Monodial Kit, with a 5 watt power unit.—What offers to Jones, 21, Manor Park, Lee, S.E.13. [6327

"EDDYSTONE" Heterodyne Wavemeter, 13-550 (uncalibrated); G.R. Absorption, 14-220 (calibrated); London approval; 30/- each.—BM/ZLME, W.C.1. [6351

NEWPORT SURPLUS STORES Offers Exceptional Bargains in all Components; Ferranti meters and transformers always in stock.—Note address: 24a, Newport Court, Charing Cross Rd., W.C.2. [6357