

LINEN SPEAKER :: B.B.C. "OFFICIAL" CRYSTAL SET

Amateur Wireless

Every Thursday 3^d
and
Radiovision

Vol. XV, No. 386

Saturday, November 2, 1929

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The **MUSIC LEADER**
With its **LINEN SPEAKER**

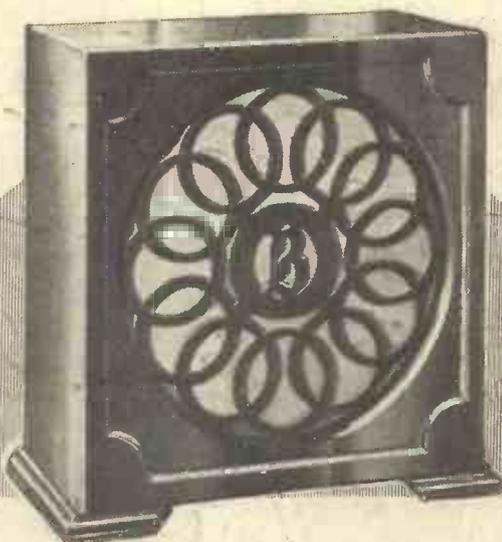
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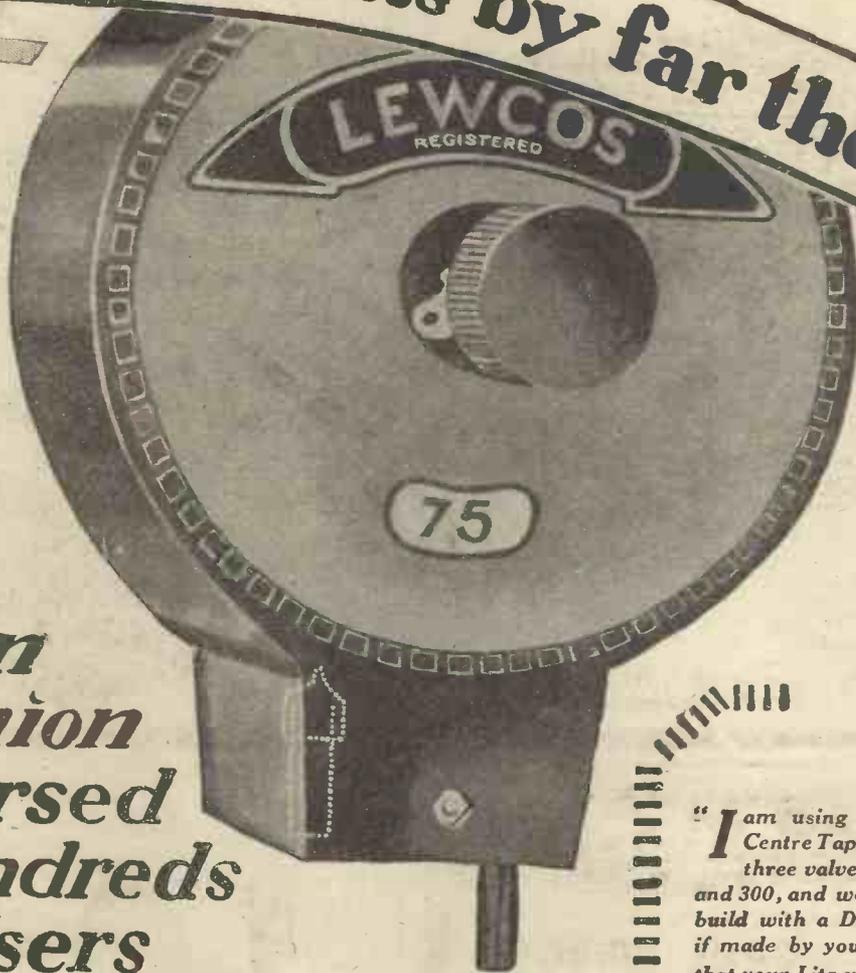


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Endorsed
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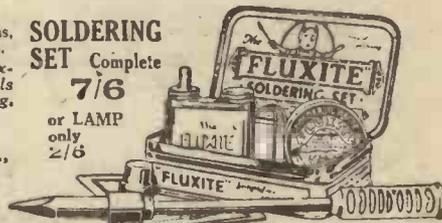
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The Leading Radio Weekly for the Constructor, Listener and Experimenter

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When Critics Go Astray!—The "North Regional"—Lehar as a Listener—The People's Palace Again!—Radio for the Schools—Next Week

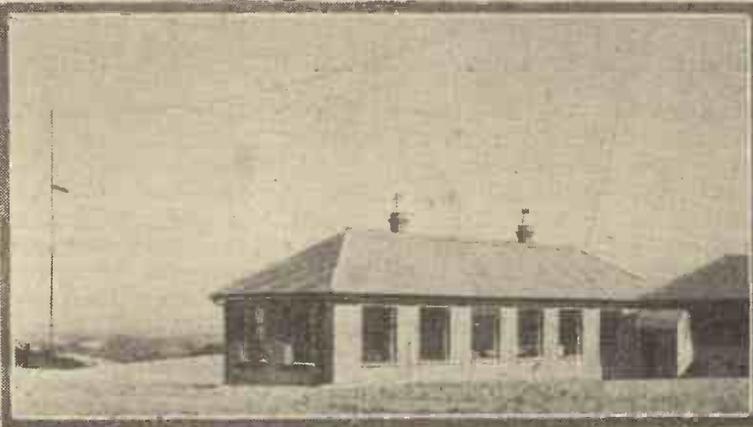
When Critics Go Astray!

—The broadcasting of Bernard Shaw's play, *Captain Brassbound's Conversion*, the other evening called forth a paean of praise from a well-known critic, who mentioned in his article that the broadcast started at 9.35, finished at 11.35, and was followed by dance music until midnight, which showed that he had studied the timing in the published programmes. But the broadcast started at 9.45 and did not end until 11.52, when the announcer apologised to listeners who had

been waiting for dance music and said that none would be given, as it was within a few minutes of midnight. Fortunate, perhaps, for the radio critic, that the play itself was not cancelled at the last minute!

The "North Regional"—A contract has been signed for the building of the North Regional broadcasting transmitter at Moorside Edge, near Huddersfield. The firm who was responsible for the erection of the building at the London regional transmitter at Brookmans Park will undertake the work. The building, which will be of brick construction, will take about a year to complete, and the layout will be very similar to that of Brookmans Park.

Lehar as a Listener—Most of us are familiar with the famous waltz, "The Merry Widow," and other works by the same composer—Franz Lehar—which are frequently broadcast. This being so, it is interesting to hear Lehar's own views on broadcasting. The composer is convinced that he owes his popularity to a great extent to the radio. "The radio is of priceless value to the creative artist," he said. "Many years ago, before broadcasting had reached its present development, I consented to the



The new B.B.C. receiving station at Tatsfield which is replacing the Keston listening post.

broadcasting of my musical comedies, as I realised that radio would become, and has become, a most important factor in our daily life. When I am sitting at home, with the loud-speaker in front of me, I get the sensation of the orchestra or vocalists being right opposite me, but hidden from view as though by a curtain."

The People's Palace Again!—Another series of those popular People's Palace concerts will be given by the B.B.C. at the

"Palace" in the coming season. Two of these concerts will take place before and six after Christmas. Mr. Percy Pitt (who is now music director of the B.B.C.) and Sir Landon Ronald will each conduct four concerts. A performance of a concert version of Humperdinck's fairy opera, *Hansel and Gretel*, is fixed for January 9, under Mr. Percy Pitt's direction; while a complete Wagner programme, also under Mr. Pitt, will be given on Thursday, February 13, in recognition of the anniversary of the death of Wagner, in

1883. Sir Landon Ronald will include many of his concert successes in his four programmes. Book the dates, either for listening-in, or for going to the "Palace" itself.

Radio for the Schools—In Germany the whole problem of school radio has been placed on a definite basis under Government supervision. As far back as 1924, the then German Secretary of State drew up a plan for the introduction of radio to the schools, and as a result of his efforts, over 8,000 German school teachers are to-day affiliated to the German School Radio Union. To give an example of the spread of the movement, Silesia has 24 schools, Westphalia 50, and East Prussia 66, all owning their own radio installations. In Prussia four hundred schools entered into negotiations for the purchase of apparatus!

The Short Waves—Now is the time to dodge all broadcast-band interference and go down to the "wavelets." Next week we are giving details of just the set you want—a world-wide short-wave receiver. Under the heading "Cutting Out Brookmans Park," Mr. W. James will have something of particular interest to say to those troubled with interference.

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By FRANK
ROGERS



THE WIRELESS EQUIPMENT OF R101

TWO wireless sets are carried on board the R101. One, of medium power, is intended to keep her in constant touch with her base, and the other, of low power, will only be called upon for landing operations, or in cases of emergency when the current is not available from the ship's mains.

The medium-power long-wave C.W. set works on a wavelength of 800 to 4,500 metres and can establish two-way communication easily up to a distance of 1,800 miles. The 220 volts A.C. are fed to the primary and there stepped to 6,000 volts and rectified. The special rectifying panels are mounted directly underneath the transmitter to the left of the operator.

Precautions Against Fire

The whole of the apparatus is cased in a gas-tight cupboard, somewhat resembling a fairly high sideboard. This is a precaution against fire. Even the make-and-break contact for telegraphy is inside the operator's desk, the plunger under his key working up and down through a gas-tight socket.

The wireless room is situated just above the control car and inside the hull, and its floor is of three-ply wood over the metal girders.

Because of the precautions taken against an explosion, it must not be thought that the set cannot be "got at" by the operator if anything goes wrong. It can quite easily, but the very act of opening the front automatically cuts off the current, and the whole set is at once dead. Thus there is no possibility of a spark igniting any stray gas. And when the cabinet is shut again the ventilating arrangements quickly dispels any gas.

The Wireless Installation

The wireless room is quite small, only 6 ft. square, and is shut in by two corridors running along each side. Noise will not penetrate the walls, as they are practically sound-proof. The room has no windows.

The low-power set has an input of 80 watts, and can be used for C.W., I.C.W., or telephony. Its wavelength range is from 500 to 3,000 metres. The power is supplied from batteries giving 12 volts in all. Apart from its uses mentioned above, it can be employed for I.C.W. communication with merchant ships on 600 or 800 metres by means of interrupter gear.

This set is suitable for two-way communication up to 200 miles on C.W. or I.C.W., and up to 100 miles on telephony.

The Aerial

The aerial is a trailer, 459 ft. long when the ship is sufficiently high, and shortened to 100 ft. when she is preparing to land. The aerial swings down below the hull for a few feet, then trails backwards for practically the whole of its 450 ft. The extreme end is provided with a 2-lb. lead weight.

C.W. and I.C.W. signals, and telephony can be received on a wavelength range of 300 to 20,000 metres.

Wireless engineers are always modest in their claims of what a set will do, preferring to state what they know to be easily provable. Captain Courteney, for instance, was forced down just near the Azores some time ago and established communication with a merchant vessel over a hundred miles away. He used an emergency aerial, and the set was operated under conditions likely to try it to the uttermost, yet it did more than was claimed for it. I feel we can safely say that R101's wireless will give it two-way communication over a far greater distance than the engineers are prepared to claim for it at present.

The chief work for the medium-power set is the reception of weather forecasts and the transmission of reports to its base. It is accepted airship practice that she should always be in communication with her base. Even when no forecast is expected for an hour or two, a test will be made every ten minutes or so to make sure that this contact can be made at any moment it is required.

Provision has to be made for sending out an S O S on the international wavelength of 600 metres in case of extreme emergency, and this can be done on the low-power set, of which the normal function is to carry on when for any reason sufficient current is not available from the ship's mains to work the other set.

It is likely that an experiment will be made in the near future in receiving weather reports on the Fultograph system. If this proves successful, a considerable saving in time will be effected, for at present some minutes are required to receive and transcribe all the data the captain requires.

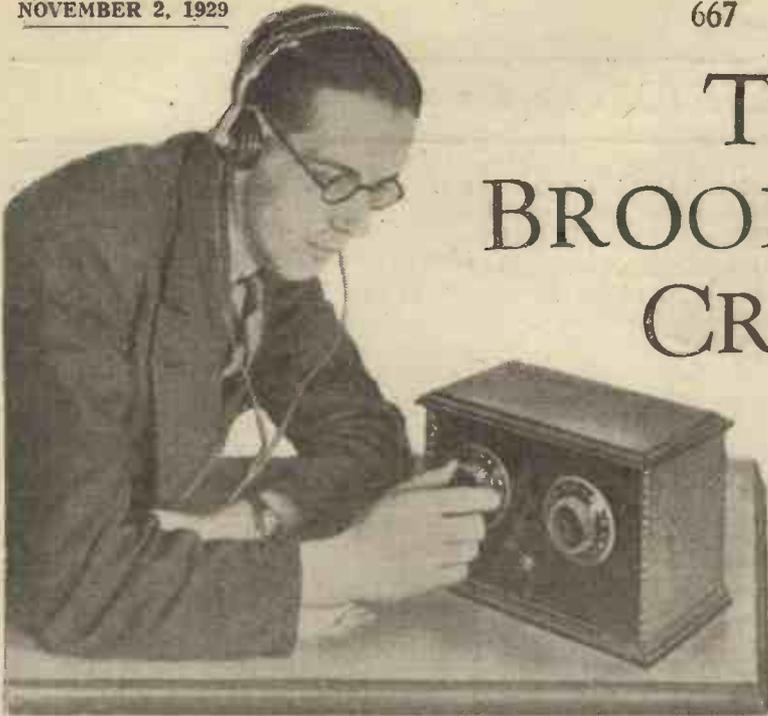
R101, whatever may be said in some quarters, has taken the air in a highly successful manner, and shown herself not lacking in speed and to be easily navigable. The 900 lb. of wireless equipment in her hull represents the best that science can provide, and is beyond a doubt the finest ever taken into the air. The wireless trials on the first flight were under the supervision of Flight-Lieut. R. F. Durrant, A.F.C., of the Air Ministry Wireless Department.

Her three operators, under the leadership of Mr. Keeley, who was on duty in R33 when she broke away from her moorings a year or two ago, will lose no time in accustoming themselves to the little peculiarities of their instruments and bringing their work to a high state of efficiency.

NEXT WEEK !
THE "WORLD WIDE
SHORT-WAVE THREE"

THE B.B.C. BROOKMANS PARK CRYSTAL SET

*A Practical Receiver based upon the
B.B.C. Recommended Circuit for
Brookmans Park*



IT was in the endeavour to provide a better broadcast service for all British listeners that the B.B.C. evolved the regional scheme. It was approved by an independent committee and afterwards submitted to the P.M.G. for his sanction.

The scheme has been greatly discussed all over the country and the first step has already been made in the erection of the new Brookmans Park station. As you may know, Brookmans Park embodies two complete independent transmitters and in a few months from now it is hoped to have

sets are not naturally selective because, unless special arrangements are made, the crystal itself exerts a damping influence and hence a "non-selectivity" influence upon the aerial circuit. For this reason many owners of existing crystal sets, consisting simply of one coil, tapped or in conjunction with a variable condenser, a pair of phones and a crystal detector, may find that both stations come in simultaneously, or at least with some degree of mutual interference.

The B.B.C. Circuit

It is to this end that the B.B.C. have gone carefully into the question of suitable crystal circuits. For instance, in a book entitled "Crystal Sets and the Brookmans Park Transmitter" a suggestion is made regarding loose-coupled tuning and a circuit is given which has been made up in the AMATEUR WIRELESS laboratory and the final result is illustrated herewith.

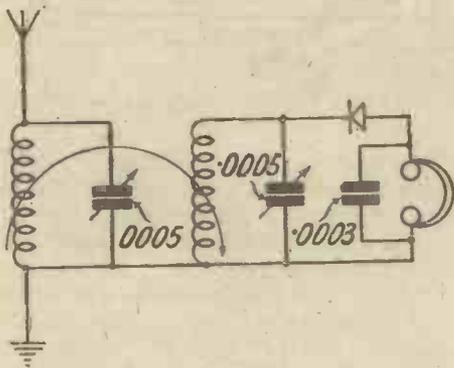
The AMATEUR WIRELESS Technical Staff have experimented with this set for some little time and have no hesitation in recommending it to all who have obtained the B.B.C.'s booklet and want to know how to make up in practical form this particular circuit shown.

The receiver here is a recommended design for all who do not wish to experiment at all, but who want to have a simple and safe set to follow in order to get good crystal reception under

the regional scheme. Of course, it would be possible to modify the layout of the set shown herewith, in order to fit it with parts at present owned; or, of course, low-frequency amplification could be added. But it is most strongly recommended that where a receiver is required which really will give good and selective working on Brookmans Park in the areas stated by the B.B.C. engineers, the present set should be made up and will be found entirely satisfactory.

Simple Construction

The following short constructional hints will be found useful by those who want to make up the set exactly as illustrated herewith. For convenience a blueprint has been prepared showing the construction of this simple crystal set. It will be a great help, particularly to those not well acquainted with set construction. In this particular set an important part is played by the coil coupling and the distance between the two



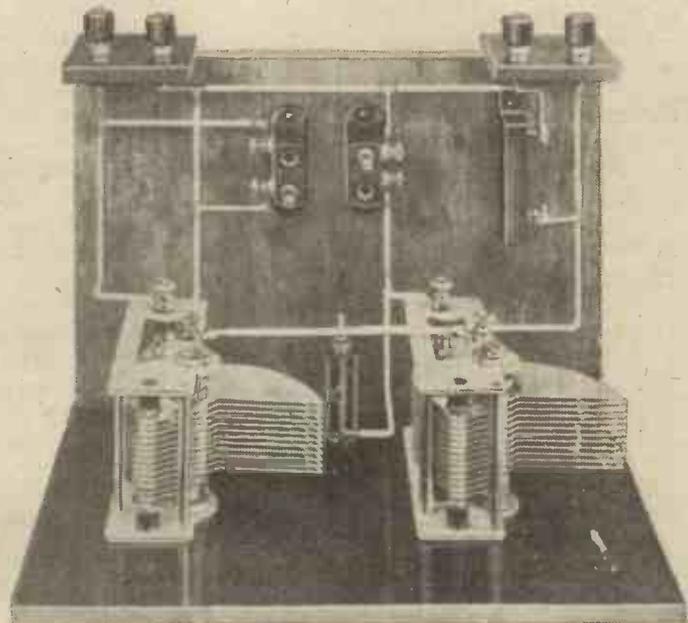
This is the circuit recommended by the B.B.C.

both working so that a "high power" alternative programme service will be obtainable from the same source.

The B.B.C. estimates that crystal reception will be possible in many cases at a distance of 60 miles or more, while excellent crystal reception will certainly be possible at anything up to 50 miles. The maximum possible range for crystal reception from the old 2LO was about only twenty miles.

Thus, over a very wide area, many people who formerly were unable to work a crystal set, will now come within crystal range of the new station, particularly in the south-east district.

The chief problem will be one of obtain-

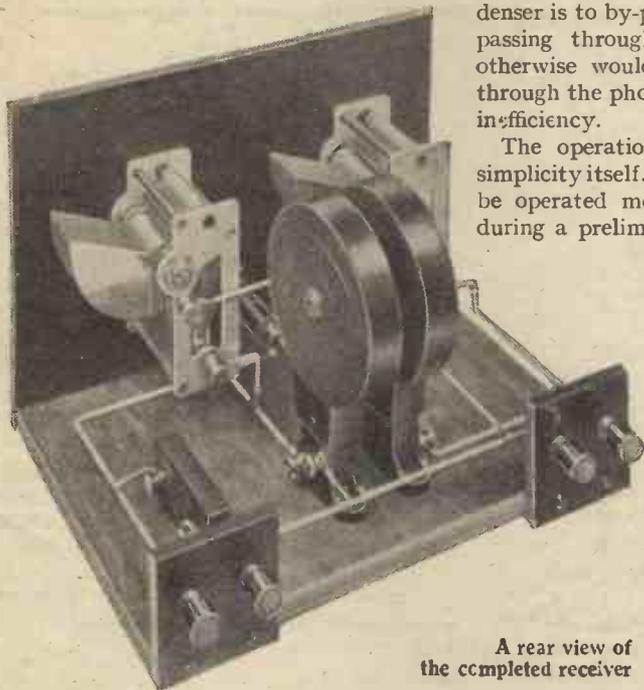


Here is a plan view of the practical receiver based upon the B.B.C. circuit

A B.B.C. "OFFICIAL" CRYSTAL SET (continued from preceding page)

plug-in coils is very important to note. If you mount the two coil sockets exactly as shown in the blueprint you can't go wrong.

In addition the blueprint shows the exact drilling centres for all components, and you can use it as a template, simply by sticking the panel portion to the ebonite



A rear view of the completed receiver

with two or three spots of adhesive and using the blueprint as a guide to the marking of the holes before drilling. The coil sockets and fixed condenser on the baseboard may be similarly mounted with the print as a guide. Finally, as each wire is shown in its correct place, and is numbered for convenience, it is practically impossible to go wrong when it comes to making the connections.

Components Required

The following parts will be needed.

Two .0005-microfarad variable condensers, with dials (Trix, Burton, Lissen, Igranic).

Ebonite panel, 9 in. by 6 in. (Pilot, Becol, Raymond).

Two terminal strips, 2 in. by 2 in. (Pilot, Becol, Raymond).

Two baseboard mounting coil holders (Lissen, Lotus).

Crystal detector (Jewel Pen, type Ro40, R.I.).

.0003-microfarad fixed condenser (Lissen, Dubilier, T.C.C., Watmel).

Four terminals marked A., E., Phones+, Phones- (Belling-Lee).

A word or two may be said regarding the circuit itself, which is given herewith for the benefit of those who understand the symbols used in theoretical circuit diagrams. It will be seen that a loose-coupled tuning

arrangement is employed, that is the aerial is not connected directly to the crystal, but is coupled to a second coil, and both coils are separately tuned. The condensers each have a maximum value of .0005.

The other condenser in the circuit is a .0003 fixed condenser placed across the phone terminals. The purpose of this condenser is to by-pass any unrectified current passing through the crystal and which otherwise would take the metallic path through the phone leads and perhaps cause inefficiency.

The operation of the complete set is simplicity itself. The two condensers should be operated more or less simultaneously during a preliminary test, but subsequent experiment will show which is the best setting for each station. The aerial condenser, that is the left-hand one, will be found to give rather coarser tuning than the closed circuit condenser. It must be emphasised very strongly that a crystal set gives no amplification whatsoever. The actual signals heard are caused by the current picked up by the aerial.

If the aerial and earth arrangements are not efficient, if the crystal setting is bad, or if the phones themselves are not responsive, then the results will be disappointing. It is no use relying on cheap components to give good results with a crystal set.

Coil Sizes

So far as coils are concerned a little safe experimenting may be needed in order to get the best results in any particular locality. For our test a No. 50 coil was used in the aerial socket, that is the left-hand one, and a No. 60 coil in the right-hand socket. Some conditions may necessitate a 50 coil in each socket while in other cases a 40 coil may be needed in the aerial socket in conjunction with a 50 or 60 coil in the right-hand socket. The degree of selectivity is varied largely by the coupling ratio between the two coils.

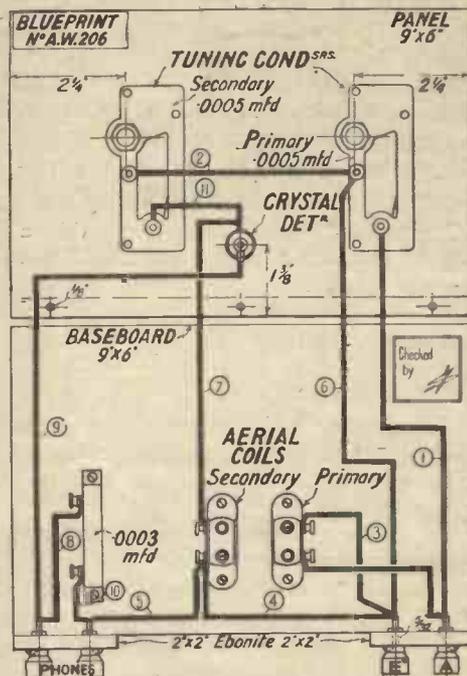
For the long waves two 200 coils, or one 150 and one 200 coil will usually be found satisfactory. A semi-set type of crystal detector is employed which obviates much of the need for "cat-whisker scratching" and therefore removes one of the bugbears of old-fashioned crystal sets.

External from the set itself are one or two factors, already mentioned, which vitally affect reception. Aerials play such an important part in crystal reception

that this fact cannot be stressed too strongly.

Use a Good Aerial

Occasionally, one hears of good reception on freak indoor aerials, but the best results are always to be obtained with a properly erected outdoor aerial, usually having an average height of about 20 ft. Thick stranded copper wire should be employed in order to cut down the resistance and the insulators should frequently be cleaned.



The wiring diagram. Blueprint available, price 6d.

The lead-in is very important and here the wire should be taken into the house by means of one of the many insulators on the market. Bare wire should not be run through window sashes and care must be taken that the window is not shut down upon the insulated lead-in wire, as the insulation may be frayed and a short will occur.

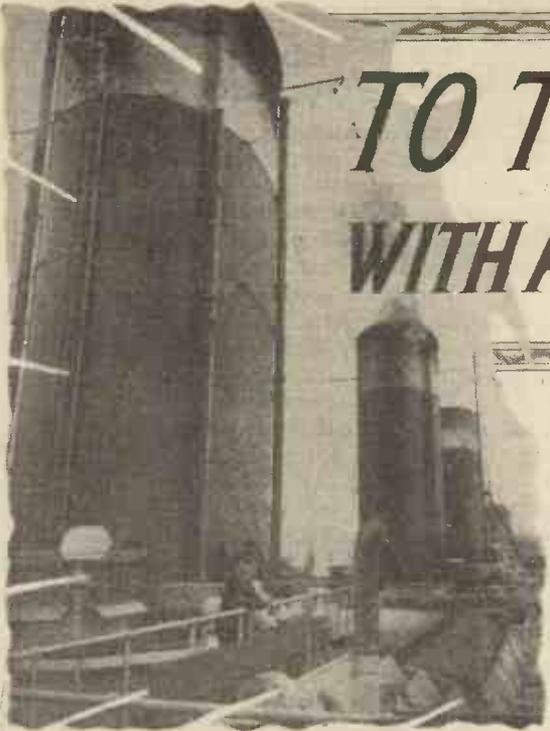
The importance of a short low-resistance earth wire cannot be stressed too strongly. Many crystal set troubles can be traced to a faulty earth or earth lead.

Some of Moscow's disused churches have been transformed into restaurants for the use of State workers; they have also been equipped with loud-speakers for the broadcast of musical entertainments and talks during meal-times.

A new aeronautical wireless transmitter has been established at Jask (Persia) on the England-India air route. This station, which will use the call-sign RVI, is intended exclusively for civil aviation purposes.

TO THE WEST INDIES WITH A SHORT-WAVE SET

A personal account by members of the Oxford University Expedition



WE, in this account, are the members of an expedition sent out under the auspices of Oxford University to study tropical conditions in British Guiana from a naturalist's point of view. As such, we found ourselves in a pretty strong radio position on board ship and were able to take with us an "Eddystone Scientific Four" receiver.

On sailing from the London docks, one of the very first things thought of was how on earth to amuse ourselves in the course of a three weeks' voyage across the Atlantic. The short-wave set was, of course, taken into account, and a sort of understanding was reached that, so soon as we could, the captain should be approached for his permission, and as soon after that as possible the set should be erected. "Ocean disease" didn't keep us below too long. The captain was asked on the first evening, and seemed not only very reasonable, but even keen on the thing, which was a good omen.

An aerial—quite the worst one ever erected—was slung from a stubby little derrick down on to the games deck and a portion of the ship's metal "chassis" was scraped bare to provide an earth. When the set was connected up we heard almost at once a Dutchman telephoning volubly on 16 metres at about strength R5, the time being about 15.00 G.M.T. This undermined my prestige a lot as I told the captain that it was Bandoeng, a piece of information he duly published, and I found it a little hard to issue an official *dementi* when I found it to be Kootwijk! However, all was well, because on Wednesday I actually did hear PLF; so no harm was done! At 6 p.m. (Greenwich) that night 5SW came in in great style and, as the night advanced, had a neck-and-neck rivalry with WGY.

The fifth day out from port was marked by the enthusiasm of the captain and the turn of the scale. He realised that our aerial was as vile as vile could be, screened by mighty erections of steel, and proceeded to help to erect a far better thing, which came down from a lanyard almost

at the top of the funnel to the deck awning on its outboard side. The aerial then came in under the awning to where the set was situated, almost under the top end of the wire. This new aerial thus formed a sort of vertical "L," leaning drunkenly against the funnel. At about noon, before its erection, I had managed to hear PLF weakly, and later W8XK came over R3. With the new aerial 5SW was well up to R8-9, and his band concert was enjoyed by many on board.

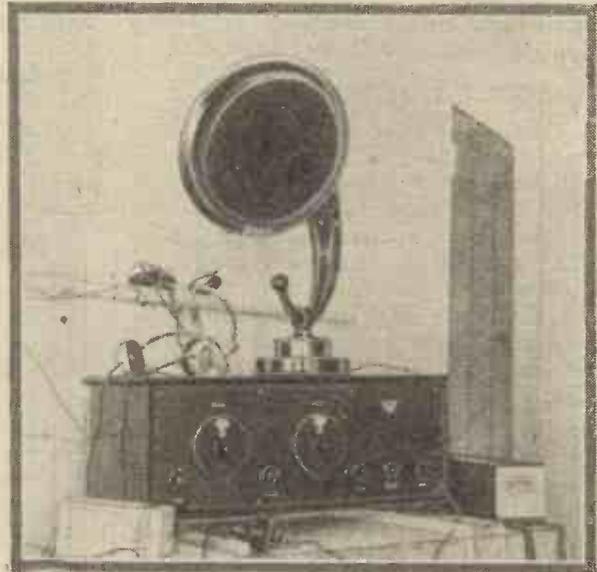
The next day was also successful. PCJ let us hear from him to the tune of R7-8, 5SW seemed a little discouraged and could only manage a strength of R6 before making "Big Ben" strike midnight at 9 p.m. ship's time. He managed, however, to shoot out his Greenwich pips at 6 o'clock with such strength that they reached the officer of the watch on the bridge quite safely!

On the eighth day of our voyage the American coast effect was most marked. At 23.00 G.M.T. the 14 mc. amateurs were very strong. W2CRB, W2NV, W2PE, W3ARY, W3AUO were those logged. The commercials WEA, WES, WIK, WIY were tremendous. On the broadcast band four carriers were heard, one station was just audible R1-2 (dance band) and another quite good with a soprano solo R2-3 (unidentified, perhaps KDKA). 5SW was, of course, taking his long week-end off.

The ninth day was amazingly good, except for the sloppy Sunday programmes, which we can't believe the American public likes. The worst atrocity was "The

Last Rose of Summer" *fortissimo* from WGY. It was part of the Atwater Kent Hour, and if anything could dissuade one from buying an excellent radio set I should think this would. They capped this by promising another orgy of sentiment next Sunday! W8XK was a formidable rival. His strength is just as impressive as that of W2XAD.

The second half of our voyage proved more interesting in every way than the first. A week ago, when we were half-way through our voyage, we were some 1,600 miles from the coast of North America and some 2,200 from England. Since then we had been steaming steadily south-west at a rate of about 300 miles a day, until we reached Barbados on the thirteenth day. After leaving Barbados we had called at the islands of Grenada and Trinidad, finishing the journey by steaming down some 100 miles off the coast of Venezuela to Georgetown, British Guiana. So, as regards the position of transmitting



The short-wave set used on the trip

stations, we had been steadily steaming away from 5SW, and therefore at first approaching the American stations a little, then moving along at a constant distance

(Continued at foot of next page)

For the Newcomer to Wireless: LOUD-SPEAKER POINTS

I HAVE a horn loud-speaker which I installed rather more than a year ago. It used to be very good indeed, but now I find it not up to standard.

What are the symptoms that you notice?

Well, first of all, it does not produce anything like the volume that it did.

You are using the same kind of output valve as you were originally, I suppose?

Yes, in fact, no alteration has been made in this particular receiving set during the time.

Is there anything else?

Yes, the quality of its reproduction is not what it was, and if I do increase the volume by using reaction, it has a distinct tendency to become harsh and even to "crack" on certain notes.

Have you had the permanent magnets seen to since you bought it?

No, I can't say that I have.

Well, I expect that that is the whole cause of the trouble.

Don't they retain their magnetism indefinitely?

Magnets made of very special steel are exceedingly long-lived, but those used in many loud-speakers are apt to become weaker as time passes.

What is the effect?

When a loud-speaker goes out new, its diaphragm is adjusted so that the best working is obtainable when the steady pull from the magnets is normal. When the magnets lose their force, the diaphragm does not respond as well as it should. There is, therefore, a falling off in signal strength.

What about the harshness?

This, again, occurs because, owing to the reduced pull upon it, the diaphragm is now not properly balanced, so to speak, and its movements are not exactly what they should be.

How does one get magnets attended to?

Send the loud-speaker to the makers, or to a firm which specialises in loud-speaker repairs and adjustments. The cost will be quite trifling.

Does the same thing apply to cone-

type loud-speakers?

Certainly, for there again permanent magnets are used.

Are there any other possible ways in which the loud-speaker can be injured so as to spoil its performances?

Yes, in the horn type the shape of the trumpet is very important, and should this be badly dented, reproduction may be affected adversely.

What about cones?

It is exceedingly important that the cone should not be deformed by warping, denting, bending, and so on.

Why?

The little nipple in the middle of the face of the cone into which the reed of the movement is secured must be absolutely central and the hole through it must be perfectly in line with the reed. Supposing that the cone does become deformed, the nipple is often slightly displaced, with the result that its hole is no longer perfectly aligned with the reed. Harshness is then quite likely to result.

"TO THE WEST INDIES WITH A SHORT-WAVE SET"

(Continued from preceding page)

from them, and finally leaving them directly astern. Our results were not at all what would be expected by studying our track-chart, especially on the short waves. The irregularities were more striking than the variation which we had expected due to our position, and these seem to have been caused both by unexpected atmospheric effects and by the absorption of near-by islands covered in tropical vegetation.

The U.S.A. Long-Wave Stations

One of the most interesting and most consistent results obtained has been the reception of the American long-wave stations on the broadcast band. Although we were never closer to the coast of the U.S.A. than 1,500 miles, almost every night at least a dozen good powerful carriers were audible, and three stations were heard pretty well. The best performer was WPG (Atlantic City, N.J.). He is alleged to use only 5 kilowatts, and yet is one of the best heard in England during the winter months, while for us, 1,600 miles away or further, he provided regular R4 reception.

The effect of atmospherics was very interesting. Until we were 150 miles north-east of Barbados they were quite innocuous and unnoticed, although we were told about three days before by the ship's operator that he found them troublesome on 18,000 metres. At that point, however, they began to be noticeable on the broadcast band, and at Barbados they were definitely bad, though not to the point of

being unbearable, and the short waves were completely unaffected. At Grenada they were a little worse, while at Trinidad, and off the coast of Venezuela, they made things quite impossible on the 400-metre band, and even affected the short waves in so far that they provided rather a troublesome steady rushing background, though this could in no way be compared with the sharp reports on the higher wave.

When we were over 2,000 miles from 5SW, and his signals had been steadily declining for the last few days, we had quite come to the conclusion that he would take rather a back seat. As usual in matters of short waves, we were absolutely and entirely wrong. The whole trouble about 5SW is his lazy week-end habits, which are

inclined to make anything in the nature of a continuous study of his transmissions impossible, added to which is the fact that by West Indies time his transmissions are so early in the afternoon that one is either ashore bathing, and so misses his programme completely, or else only hears the very end of it. At Barbados we were told that 5SW came over pretty well.

Skip Distances

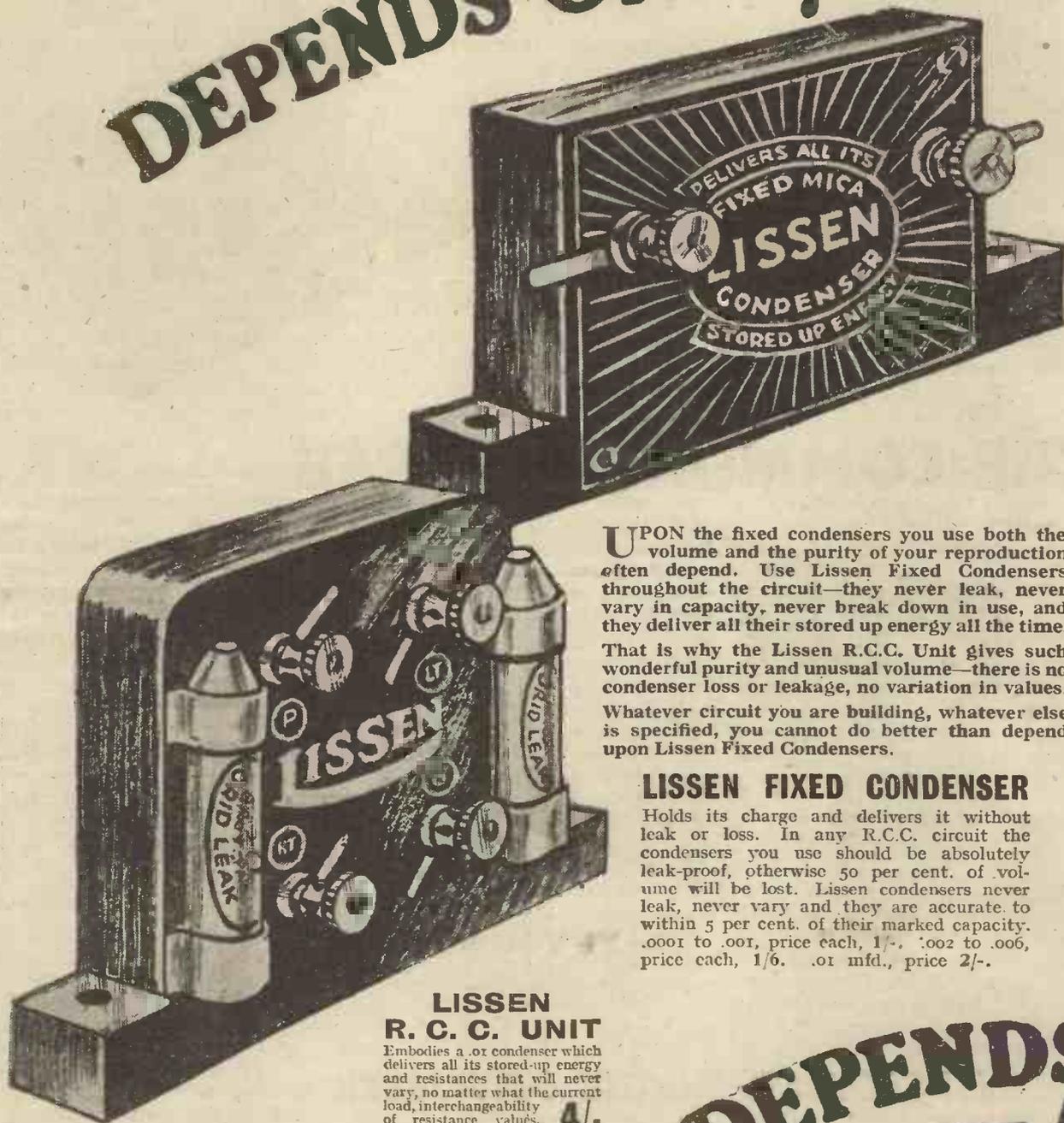
Looking back on our results, it would seem pretty certain that, whatever the skip distance of 15 megacycles may be, it is certainly not as much as 1,500 miles, as W2XAD was perfectly up to strength at that distance. Further, the only effect, bar this question of skip, that distance has on the short waves is that the further one is from the transmitter, the more pronounced and steeper is the daily curve, the sharper is the peak, and the greater the difference between the strength of a station, whatever its wavelength; at its daily maximum and its daily minimum. Finally, a powerful short-wave set such as ours can be depended on to receive at least three broadcasting stations every night at full phone strength, wherever it is in the world and, unless under very adverse conditions, at loud-speaker strength; the further one is away from civilisation, too, the more welcome this entertainment becomes, and goes a long way towards getting rid of that feeling of losing touch, as was rather well demonstrated on the last day of our voyage, when, off the coast of Venezuela, we heard a very good eye-witness account of the *Graf Zeppelin* flying over New York.

HAVE YOU NOTICED

—how San Sebastian, with its lady announcer and her "Atencion," has disappeared lately from the log of the average set owner?

—how the French programmes are inundated with advertisement announcements? Imagine this in the interval of a highly tragic play being broadcast from a B.B.C. station. The announcer suddenly bursting out with, "A good appetite, ladies and gentlemen! This will be your lot if you drink So-and-So's cocktails!" Yet this is what was sent out recently from one of the French stations.

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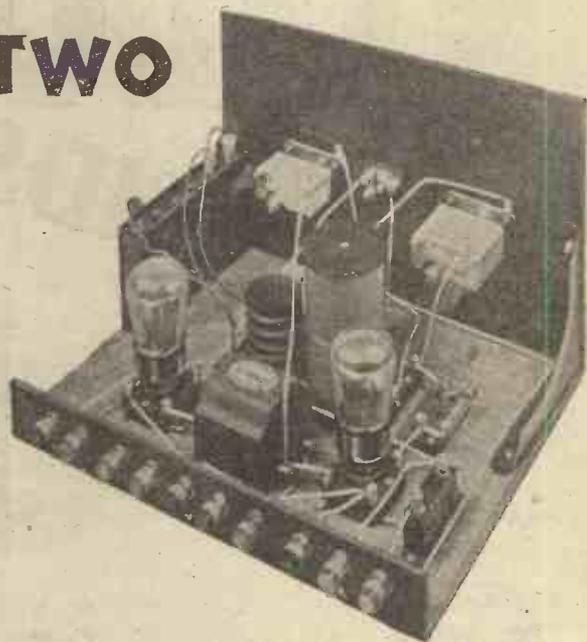
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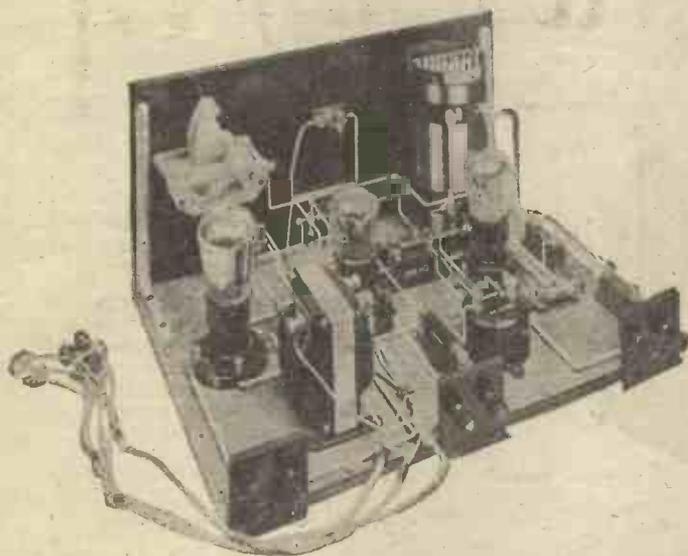
NEW SETS TO BUILD

THE BROOKMAN'S TWO

Sufficiently powerful for good results to be obtained from the local station and the two Daventrys, this set, for its size, cannot be beaten. Comparatively few parts are needed and it is inexpensive to build and to maintain.



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A first-class broadcast Receiver that will give a number of alternative programmes and also an efficient amplification for the electrical reproduction of gramophone records. This set will meet every need of the average listener.

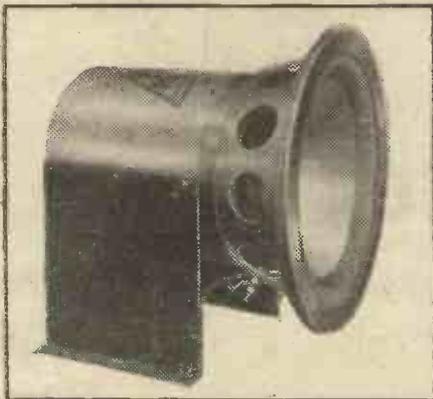
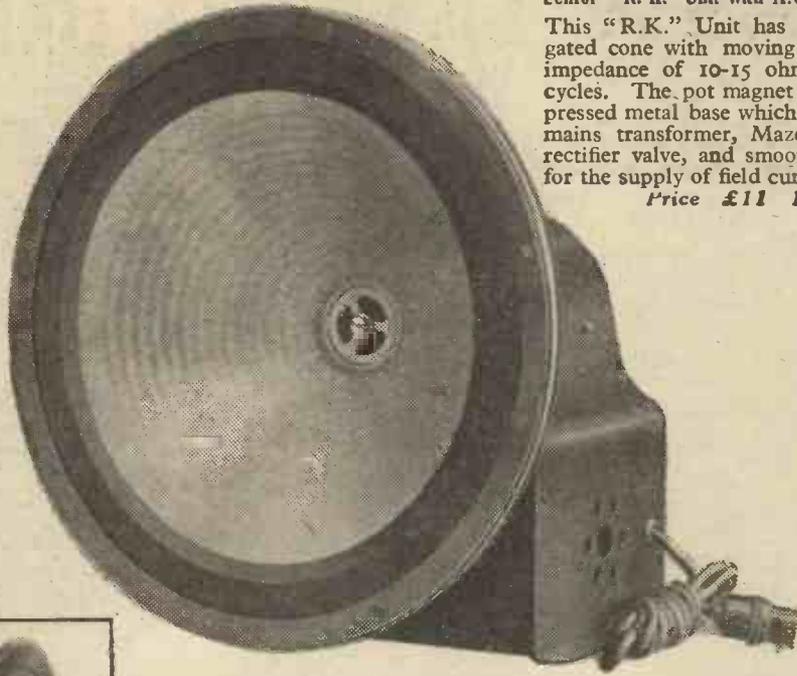
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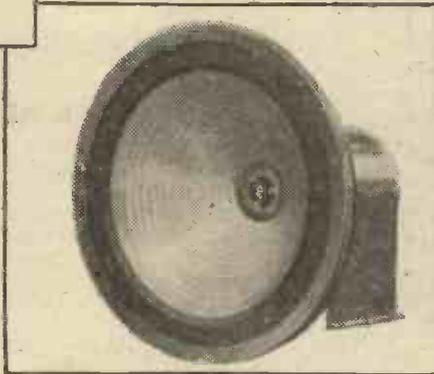
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 This "R.K." Unit has a 10 in. corrugated cone with moving coil having an impedance of 10-15 ohms at 50/4,000 cycles. The pot magnet is mounted in a pressed metal base which also contains a mains transformer, Mazda U.U. 60/250 rectifier valve, and smoothing condenser for the supply of field current.
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 Price £7 7 0.



When the "R.K." first appeared on the market it was hailed as the perfect reproducer and achieved instant leadership.

That leadership—so readily attained four years ago—is maintained to - day, and wherever fine reproduction is desired the "R.K." is the speaker to use.



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Price includes three of the latest type Cossor Valves, the handsome one-piece cabinet and all the parts necessary for its rapid assembly.

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Nearly all highly efficient Receivers have several intricate controls—considerable skill is necessary to get the best results. But anyone can use the wonderful 1930 Cossor Melody Maker—a mere twist of a single knob will cut out your local broadcast and bring in station after station at full loudspeaker strength. Yet in spite of its amazing efficiency the 1930 Cossor Melody Maker is so simple that you can easily assemble it in an evening—only 10 components—only 20 wires—that's all. Use the coupon and get to know all about it.

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Please send me free of charge a Constructor Envelope which tells me how to assemble the 1930 Cossor Melody Maker.

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Don't Forget to Say That You Saw it in "A.W."

On Your Wavelength!

Musical Experts

THERE was a time when the leading and the lesser lights of the musical world regarded radio and broadcasting as being mechanical inventions of the devil! Times have changed, however, and with the improvement in the quality of reproduction the musicians were won over to "our side" one by one. Indeed, some of these musicians have even gone a step further and ventured into the technical side of radio—a very fit and proper thing to do, in my opinion. But a little knowledge is a dangerous thing! I was present at a lecture given a few evenings ago by one of these converted musical enthusiasts and was astounded to hear the worthy gentleman drop technical "bricks" by the dozen.

Transformers and R.C.

The particular subject which seemed to inspire him the most was that time-honoured theme, "Transformers versus Resistance Coupling." After dwelling upon the "time-constant" of R.C. coupling condensers, he assured the audience that grid current flowed continuously in the grid circuit of the output valve, unless signals were very weak. And so, he deduced, this current was stored up in the R.C. coupling condensers, taking an appreciable time to discharge and affecting the reproduction quality unfavourably. I need hardly tell my readers that grid current does *not* flow almost continuously, unless signals are so loud as to overload the valve or if insufficient grid bias has been applied. There should be no grid current flowing at all in the grid circuit of the power valve or in the grid circuits of any other L.F. stage. Many high-quality super receivers, notably the "South Kensington" set, have a sensitive galvanometer in the grid circuit of the last valve in order to detect the slightest flow of current.

Grid Current

If grid current is allowed to flow, the time-constant effect that our musical friend was talking about comes into action. If transformers are used the effect of grid current flowing through the secondary windings is to load these windings with a current for which they were not designed. And this gives bad quality in the same way as the maltreated R.C. coupling condenser!

The Super-het.

If you haven't wrecked your old super-het., try it on and around the Brookmans Park transmission. I hope you'll be as agreeably surprised as I was. Working with a frame aerial, this gives me all the selectivity I desire, and with the detectors converted from leaky condenser to anode bend the quality is quite good.

Talking about super-heterodynes, I notice that this type of receiver is still immensely popular in France. Here, and in America, the super-het. has gone out of fashion almost as quickly as it came in! I say "out of fashion" because there really wasn't anything so radically wrong with the circuit to merit such a hurried abandonment. True, super-hets. were complicated, rather difficult to build, and invariably gave poor quality. The moving-coil loudspeaker "came in" and showed up the bad super-hets. in no uncertain light, exposing the lack of high musical frequencies, which were suppressed by the intermediate-frequency transformers. But super-hets. can be made to give good quality, especially if the intermediate-frequency transformers are not too sharply tuned. As for the popularity of the super-het. in France, I cannot understand it. The problem becomes all the more knotty when one discovers that the average French commercial super-het. gives deplorable quality.

'Ware Cheap Flex!

I wonder how many people realise the dangers of using poor quality flex wire? I was testing a receiver the other day and was puzzled by the failure of the set to come up to expectations. It was a simple three-valver having an H.F. (screen grid) stage, followed by a detector and low-frequency valve. This is a combination known to give good results, but in the actual receiver under test there was something lacking. After a careful check over of the circuit I decided that the only thing to do was to get down to it and make a thorough test.

One of the first tests which I put on a receiver which is not up to scratch is a megger test. This consists in the measurement of the insulation resistance between the various parts which are supposed to have an infinite resistance. It is really surprising what a number of portions of a receiver do not have an infinite resistance where they should have. One will find leaks from the baseboard or leaky valve holders or leaks across coils or condensers to a more or less serious extent, and as often as not it is found that one of these leaks is causing the trouble.

Leaks That Don't Matter

For example, if we have a leak across a variable condenser connected across the tuning circuit, then extra damping is brought into the circuit. There are other places where a leak does not matter, such, for example, to take a silly case, as a leak of two megohms across the two filament contacts of a valve holder. But, to get on with the story, I meggered the various parts and found, rather as I had suspected,

some very distinct leaks across the tuned circuit.

Now about some variable condensers one is prepared to believe evil. There are, on the other hand, some about which one hesitates before assuming that they can be faulty. These condensers were of the latter variety, and I was loth to believe that they were developing a leak of the relatively low order which I discovered. I tested all the other components, however, and began to wonder whether I had really struck a dud condenser. I therefore disconnected the condensers in question and tried their insulation resistance, which, as I half expected, I found to be infinity. Where, then, was the leak?

To cut a long story short, I found, on looking over the set again with a super-critical gaze, that there was some twisted flex in the circuit in such a position that it was across the tuned circuit. Ordinary rubber-covered flex it was; the sort of thing one straggles about sets without very much thought. Yet an investigation of this showed that it had a leak of something like $\frac{1}{2}$ megohm in its bad places and 2 or 3 megohms in the rather better places. I therefore yanked the flex out and inspected it for poor insulation. I was disappointed to find that there were no breaks visible in the insulation, and at first glance the rubber appeared perfectly good. It was not until I examined it more closely that I realised that the rubber had become perished and porous and that this was causing the leakage. So, 'ware old flex!

The New Voice

This note is being written on the morning after the night before—that is to say, on the morning following the ether debut of the new 2LO. It was a hectic evening, for my telephone bell started shortly after four o'clock and would, I think, have kept going until midnight if I had not at length left the receiver off its hook in despair. Friend after friend rang up to say that he was being completely swamped and could I do anything to help. You see, I happen to live just sixteen miles from Brookmans Park and in this locality the transmission comes in with something like a punch. This morning I have heard many more sad stories. Owners of some rather antiquated sets receive 2LO at all settings of their dials from 0 to 180; others, who were previously suffering from a certain amount of wipe-out from 5GB, now get a high-power duet. Even with quite modern receivers there is no question that the swamping within a very large radius from Brookmans Park is appalling. Honestly, I don't think that

:: :: **On Your Wavelength! (continued)** :: ::

the present power can possibly be used—otherwise the station will defeat its own ends.

Too Much Power?

Though the great majority of listeners regard the local station as their staple provider of entertainment, very few of those who possess valve sets do not thoroughly enjoy an occasional trip abroad. That this is so is shown by the fact that most designers and manufacturers are careful to make their apparatus so that they will bring in a number of foreign stations. It is surely a backward step in wireless that anyone nowadays should be tied to the local. The valve user is, in fact, no better off than the crystalite, except that he can use a loud-speaker

Worse to Come

But, though probably few people realised it, Brookmans Park let us down very lightly on the first night, for his modulation was clearly very shallow; certainly nothing like what it was during some of the preliminary tests. When some of these were in progress I found it a most difficult business to induce the needle of the milliammeter in the output circuit to remain steady. Though I was using anode-bend detection with a valve of modest impedance, a high plate potential and suitable grid bias, the detector was clearly being overloaded. On Brookmans Park's first whole night one could obtain with the same apparatus terrific volume from the station without a quiver of the tell-tale needle. If Brookmans Park gives us anything like full modulation there will be some queer happenings to record; and if he doesn't use full modulation he won't get the service radius that should be expected from 30 kilowatts. I am wondering very much what effect he is having upon reception conditions on the other side of the Channel. We shall hear, I suppose, in a few days; but meantime I don't mind wagering that Stuttgart, amongst others, is having a rather thin time of it.

The Quality Question

On this first evening the quality from 2LO was superb; but don't jump rashly to the conclusion that it will always be so. Marvellous reception is possible at moderate range from a high-power station using shallow modulation. It is when the modulation is made more deeply indented that the fireworks begin. Personally, I have always found it no easy matter to obtain absolutely first-rate quality from 5GB, though my distance from him is a matter of forty miles. The trouble is that you get sudden big grid swings on certain notes (particularly those of the piano) with which it is very hard to cope. For even modest loud-speaker strength in a small room a small power valve with 150 volts

on the plate and a 9-volt grid bias is inadequate, and when you want volume enough to fill a decent-sized room you may find that a super-power output valve suffers from overloading at intervals which is more than annoying. High power with full modulation introduces into wireless reception problems that are by no means easy to tackle.

Super Pentodes

One of the most interesting types of valve introduced this year is the super-power pentodes; which can deal with something astonishing in the way of volume. The standard pentode with 150 volts on its plate and a grid bias of $7\frac{1}{2}$ to 9 volts negative can handle pretty useful signals, but it is not hard to overload it if there is much high-frequency amplification or if the detector is coupled to the output valve by means of a transformer of fairly high step-up ratio. The super-pentode is designed for plate voltages up to 300, with as much as 200 on the priming grid. The possible grid bias is 30 volts or more and the amplification factor is over 80. What all this comes to is that one small valve, consuming less than .3 ampere of filament current and requiring a plate voltage no higher than 300, can handle all the volume that the biggest super-power triode can take, though the latter would eat vastly more filament current and would need a much bigger plate voltage. I have always been a great believer in the pentode, and I feel that this new type of valve marks a very big advance in wireless reception.

Wavetraps

Now that the new 2LO is exercising such a swamping effect in many districts, I expect that there will be a huge demand for wavetraps of various kinds. Readers who are affected will find that the trapping problem provides a field for very interesting experiments. There is little doubt, I think, that the series-rejector type of trap is the most effective for general use. It is an easily made addition to the set, since it requires nothing more than a coil and a variable or adjustable condenser. The great thing about the trap is to get its tuning just wide enough to trap the unwanted station, and not so wide as to wash out numbers of other stations on either side. It must also absorb so much energy from the unwanted signal that little or nothing comes through to the receiving set. This means that a low-

resistance circuit is necessary. What is interesting is to try out various numbers of turns on the coil with greater or smaller capacity in parallel.

Baird Television in Ireland

No doubt, Irish radio users have heard the mysterious noises which fill the ether from 11 to 11.30 a.m. via the London broadcasting station, but unless their sets were reasonably powerful it would not be possible to turn the noise into intelligible light signals and thus get the benefit of the Baird television transmissions. However, television will soon be nearer home in that country, for the Baird Company has now secured from the Government the right to broadcast from the Dublin station. I had heard some time ago that negotiations were in progress for the concession, and with the intimation of official permission arrangements to use the station for the purpose of television broadcasts are being proceeded with, and in about six weeks' time "faces" should be on the air. It is expected that the time to be occupied out of each day's programme will be an hour.

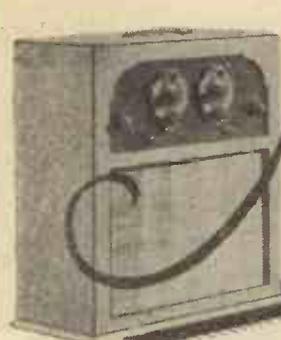
A Reversal of Movement

With regard to the interesting experiment of passing printed matter before the scanning disc, I was rather amused, yet puzzled, during the course of one demonstration which I witnessed. The writing in the form of a news bulletin, instead of moving along from right to left in the usual manner, moved from left to right, and really the letters and words looked most peculiar. Not being well versed in the technicalities of the system, I made inquiries as to the cause and found that the trouble arose entirely from mounting the disc in the televisor the wrong way round on the motor shaft.

Just picture for a moment what had happened. The actual object is scanned by a spot of light which moves from right to left and bottom to top, or, in other words, starts in the bottom right-hand corner and finishes at the top left-hand corner. According to the position of the projector lamp on the right or left of the scanning disc motor, so the disc will be made to revolve clockwise or anti-clockwise to produce this effect, bearing in mind that the focusing lens reverses the light-spot direction. Now, at the receiving end we have a disc revolving in front of a glowing neon plate, and in consequence the motor direction and disc spiral must be so arranged that we reproduce a similar condition of light-spot travel. It is now seen that turning the disc from back to front will cause the light spot to commence scanning on the left instead of the right, and this brings about the reversal of movement of anything being televised.

THERMION.

NEXT WEEK:
W. JAMES on Cutting
Out Brookmans Park



More about "The Music Leader"

This Self-contained Four-valver was the subject of a Free Blueprint presented with No. 384. Below are the constructional details of the Linen-diaphragm Speaker and Frame Aerial

THE "Music Leader" is an entirely self-contained transportable receiver which consists, as has been said, of the following five sections: the receiver unit, the cabinet, the frame aerial former, linen-diaphragm loud-speaker, and battery compartment. The receiver unit is made up in the conventional way with panel and base-board, and was fully described in last week's AMATEUR WIRELESS.

In an earlier issue (No. 384) was given away a valuable free blueprint of the complete "Music Leader." Those who are fortunate enough to have made sure of this issue will find that the blueprint is an immense help in the construction of the "Music Leader." For those who have not the print at hand, but who, of course, obtained their copies of the first two issues dealing with the construction of the "Music Leader," a reproduction of a portion of the print is given on the next page.

The portion reproduced deals with the linen-diaphragm loud-speaker, frame aerial former, and cabinet, the construction of which is now to be described. The linen-diaphragm loud-speaker will be dealt with first of all.

This linen speaker is a simplified edition of those which have already been published in many issues of AMATEUR WIRELESS. At the outset reference should be made to

the note which was published at the conclusion of last week's article dealing with the valid patent now held by Messrs. Ultra Electric, Ltd., on all linen-diaphragm loud-speakers.

The position is that the linen-diaphragm loud-speaker is now a patented article, but we have great pleasure in announcing that Ultra Electric, Ltd., give permission through us for any AMATEUR WIRELESS reader to make up an experimental model of this type of loud-speaker for his own use. Naturally the greatest objection is held against anybody making and selling a linen-diaphragm loud-speaker, whether for the "Music Leader" or any other purpose, except under the special licence obtainable from Messrs. Ultra Electric, Ltd., Ultra Works, 661-663 Harrow Road, N.W.10.

Ultra speakers of many types are available, and one of the smaller models can easily be fitted into the "Music Leader." This point will be of great interest to those who do not wish to go to the trouble of making up the linen speaker themselves. A photograph on the following page shows how the Ultra speaker is fitted in the "Music Leader."

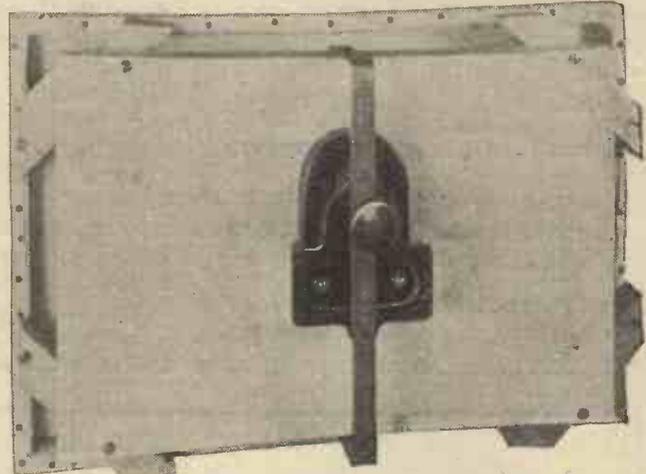
The home-made speaker is very simple to construct. It consists essentially of two frames, one 14½ in. by 9½ in., and the other 8 in. by 12 in. The wood used has the dimensions ¾ in. by ¾ in. The two frames are made up and strengthened with corner pieces. Each frame is then covered with linen, which is tacked round the edge.

The following procedure is then similar to that adopted with all other linen-diaphragm loud-speakers. Readers who have previously studied these constructional articles will find their knowledge of great assistance.

The centre of each diaphragm is located by the simple process of drawing diagonals and a small hole is made at the exact point of each. The hole is then button-hole stitched round to prevent the threads from

spreading. The special loud-speaker collar is then put in place, so that the two diaphragms are clamped together at their centres.

Each diaphragm is then doped with "Collodion Meth"; 10 oz. are required. This dope has been found to be very successful, though the aeroplane dope sold under the name of Titanine-Emallite has also been used in previous AMATEUR WIRELESS linen-diaphragm loud-speakers. The dope is simply painted on with a brush, and while the diaphragms are still wet, the two frames are drawn apart and the distance pieces are placed between. They

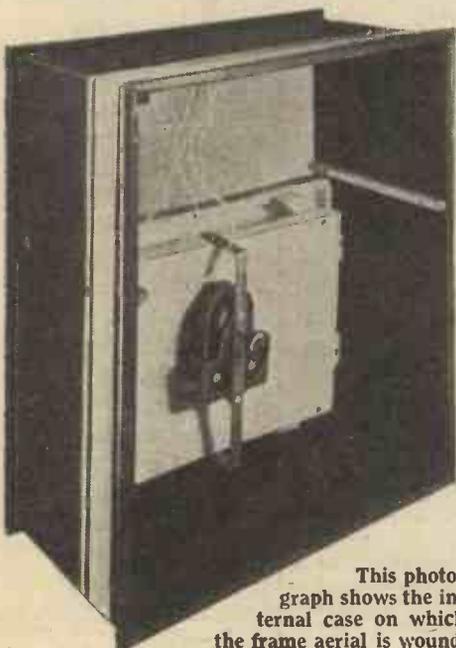


A photograph of the complete speaker

are then secured by passing fine screws through each corner. The assembly of the two frames and the method of inserting the distance pieces can be clearly seen in the blueprint.

The following points *must* be noted if success is to be obtained with a linen speaker. Only the best-quality linen should be employed, such as finest Irish linen. The linen we used was called "Webb's Irish Linen." The frame should be made strongly and stretched apart carefully so that the material is not split. Finally, the doping must be done thoroughly.

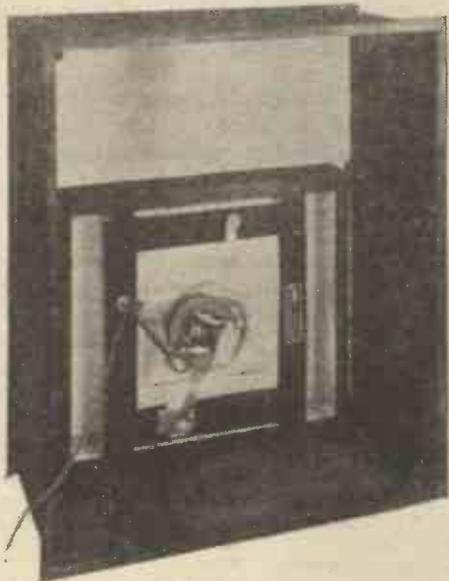
The loud-speaker unit is mounted on a metal strip bracket attached to the smaller frame. This is a brass strip, 12 in. long by ½ in. wide and ⅞ in. thick. One of the accompanying photographs shows how the double L bracket supports the unit. Inspection will show that a slot is cut in the



This photograph shows the internal case on which the frame aerial is wound, and the linen speaker

“MORE ABOUT THE ‘MUSIC LEADER’” (Continued from preceding page)

brass strip at each end so that the strip and loud-speaker unit may be varied slightly in position on the smaller frame. This enables the unit to be mounted to the best advantage. The metal mounting strip is held in place by two wood screws with flat washers placed under their heads.



This photograph shows the Ultra-air Chrome speaker fitted to the “Music Leader.” It may be obtained ready made

A preliminary trial will enable the best setting to be obtained, and then the screws should be tightly clamped down.

The Frame Aerial

The frame aerial turns are carried on a light wooden former measuring 16 7/8 in. by

14 7/8 in. by 7 3/8 in. This has fillets of wood along each edge, as will be obvious from the blueprint and the photographs, while two fillets on the inside of the former support the receiver baseboard. All the dimensions of the former are given in the blueprint, and it is therefore unnecessary to repeat them here.

All the frame aerial turns are in the same direction, and all are of No. 28 d.c.c. wire. For convenience, the blueprint of the receiver, which was given free, shows a schematic diagram of the frame aerial turns connected to the actual components in the set.

There are two windings, each of 19 turns, and two windings each of 9 turns. Wires Nos. 41, 40, 37, 38, and 39 connect up to tappings on the frame, as is clearly shown on the blueprint. The connections are actually made by means of short flexes, as you can see from the bottom photograph on page 677.

Assembly

The case can be obtained complete from the Messrs. Clarion Radio Furniture. It has the inside dimensions 16 1/8 in. by 15 in. In the front are cut two apertures, one 5 1/2 in. by 13 3/8 in., for the receiver panel, and the other 13 3/8 in. by 9 in., for the loud-speaker front, which should be covered with fancy gauze.

When the receiver is assembled the frame aerial former should be slipped inside the cabinet, the set portion should be slid in and supported on its fillets, and the frame aerial loud-speaker and battery flexes should be connected.

The question of batteries will be gone into in further detail next week, when also

will be given complete operation notes, so that the best results may be obtained from this ingenious transportable set.

The unit is supported on a metal strip

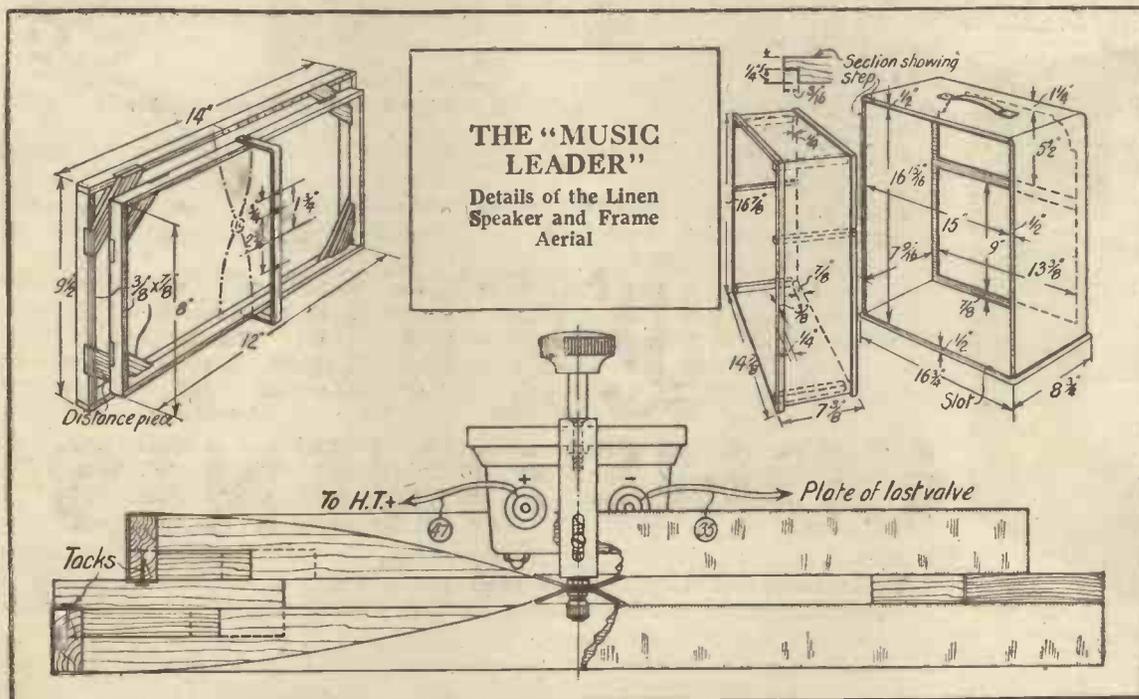


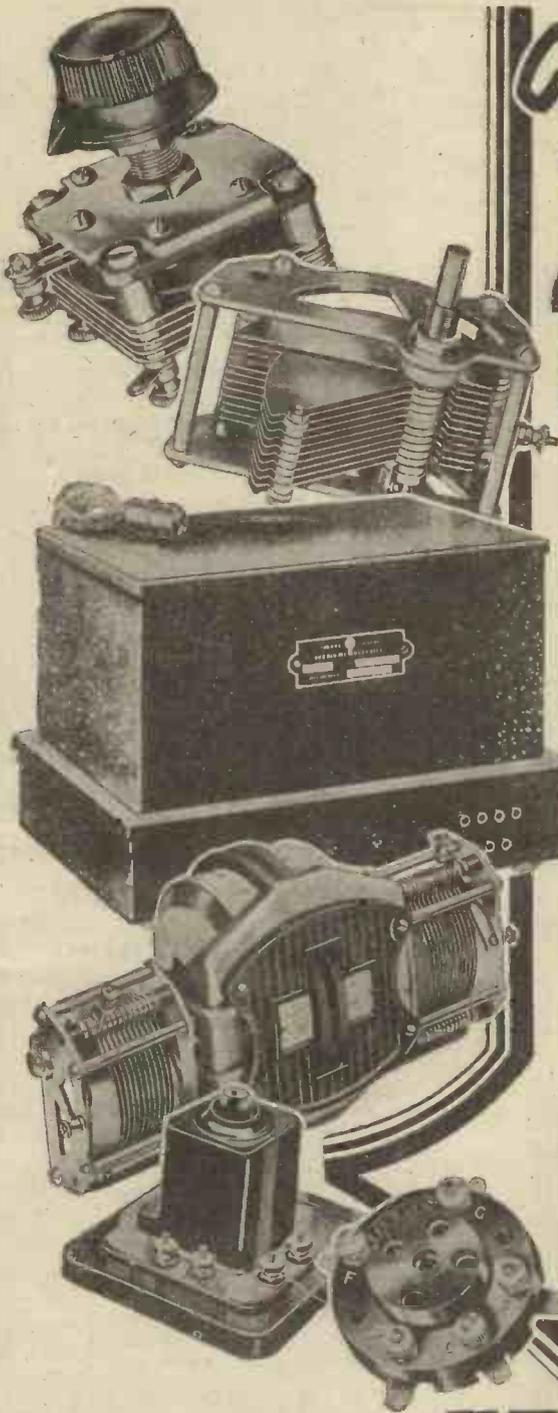
A NEW TELEVISION RECEIVER

MR. BAIRD has recently evolved the ingenious notion of utilising the rotating disc of his television receiver in a double capacity. Not only does it serve to build up the received signal impulses into a living picture, as usual, but it also functions simultaneously as the diaphragm of a loud-speaker, so that the two operations of picture and sound reception are merged into one.

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M. B.





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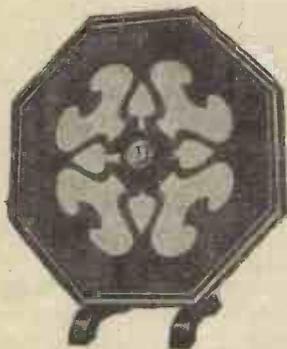
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DETECTOR VALVE COMPARISONS

Many listeners wonder what are the respective merits of 2-volt and 6-volt valves. It can be shown that for certain purposes the former is the better and in this article our Technical Editor explains what considerations apply.

A FRIEND of mine said to me the other day: "Do you know, it's a funny thing that I often find a 2-volt detector valve gives me much better results—or, at least, appreciably better results—than I can obtain with a 6-volt valve. I prefer to use 6-volt valves in my set because I've always got the feeling that, if you are prepared to spend a little more in your filament consumption, then you can reap the benefit in your set."

I agreed that this was so in the ordinary course of events and that for many purposes it was worth while utilising the slightly larger size accumulator in order to use valves having a longer filament with a consequently greater emission.

"But," my friend resumed, "I always find that the 6-volt detector valve does not seem to be as good as the 2-volt. I have an arrangement for putting in a series-resistance so that I can run the 2-volt valves off the 6-volt accumulator in company with the others and I seem to get definitely better results with the two-volt detector. Is this my fancy or is there some reason for it?"

A 2-volt Valve Best!

I assured him that the effect he noted had a scientific explanation and that it was not just his imagination. It is a fact that is not always realised that the 2-volt detector valve operates more efficiently than a 4-volt or 6-volt. The reason for this can fortunately be explained in a fairly simple manner if we are content to regard certain aspects of the problem only. Any complete analysis, of course, is a much more complicated question, but if it is shown that this superiority exists under certain circumstances, then it is reasonable to assume that some similar contributory cause is at work in other circumstances.

Anode-bend Detectors

Let us therefore consider a simple anode-bend detector valve. We have the filament acting as a source of emission and for purposes of detection we apply a negative bias to the grid to repel the electrons which are emitted from the filament so that the number of electrons which shoot through the grid to the anode is only relatively small. A signal applied across the grid and filament

then acts differently according to the direction of the applied voltage. If this is

Fig. 1. Perfect detector characteristic

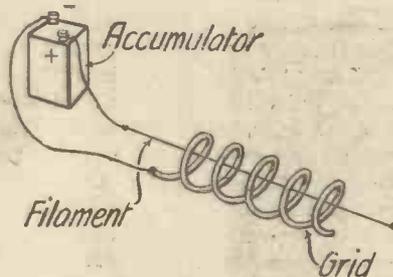
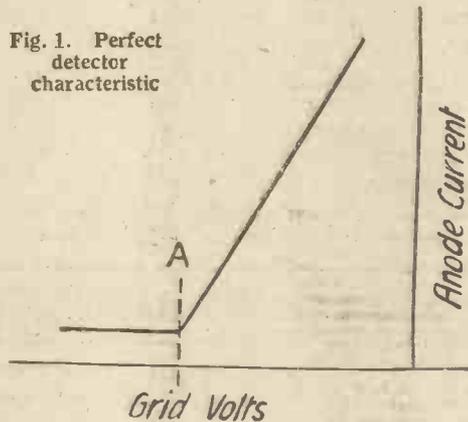


Fig. 2. Effect of voltage drop in filament

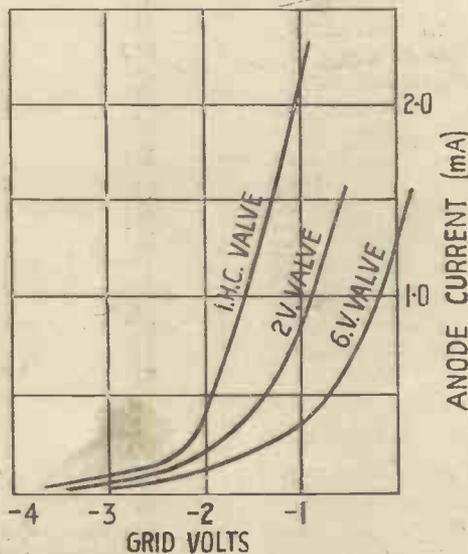


Fig. 3. Curves of different detector valves

such as to make the grid more negative, then it has very little effect, for the current has already been reduced almost to zero and a small additional negative bias will not have very much influence. If, on the other hand, the voltage is such as to make the grid less negative, then the choking effect of the negative charge on the grid is reduced and the electrons are liberated as it were, and rush across to the anode, causing a relatively large change in the current.

The Perfect Detector

Our perfect detector would have a characteristic somewhat as shown in Fig. 1. We should bias it to the point A when it will be seen that any change of voltage on the negative side causes no alteration to the current, whereas a change on the positive side causes a marked increase in the anode current. Such a detector would be a perfect one because it would pass no current in the reverse direction at all and therefore the rectification efficiency would be quite good whether the applied signal was small or large. If, in addition, we can obtain a fairly straight characteristic, then we get distortionless rectification.

Let us now consider an actual valve. We have a filament of wire as shown in Fig. 2 and we have grid wires surrounding the filament. Let us assume that when the grid is 2 volts negative, with respect to the filament we cause the anode current to be reduced nearly to zero. This is the condition of affairs that we adopt in our anode-bend rectifier. We make the grid negative by connecting a small battery between the grid and one side of the filament, usually the negative end. Therefore, if we put 2 volts on the grid, the grid is correctly biased with respect to the negative end of the filament.

The filament, however, is carrying a current and therefore there is a voltage drop across it. In other words, the potential between the grid and filament is continually varying. As we approach the positive side, so the difference in potential gets less and less and in fact the grid may even become positive with respect to the filament. Therefore, although when we

(Continued at foot of next page)

NEW CALLS FROM THE AIR

Jottings From My Log

By JAY COOTE

HAVE you heard Bucharest? The new transmitter is now on the air nightly, and as its power is 12 kilowatts in the aerial it is not a difficult task to pick up its programmes, although its wavelength of 394 metres places it in the immediate neighbourhood of Frankfurt. With a frame aerial, however, it is possible to separate them. It is also unfortunate that the Roumanian transmitter should be compelled to share this wave with the Norwegian relay Frederiksstad, but I take it that the powers-that-be may devise a plan by which one or the other will be permitted to move. Bucharest has engaged a lady announcer—their popularity is gaining ground weekly—and her voice and enunciation are all that can be desired. You will hear her call “*Radio Bucuresti*” clearly preceding announcements made in Roumanian and French. As an interval

signal—for the present, at least—the ubiquitous gong has been adopted.

Although at the time of writing I have seen no published detailed programmes, when I picked up the transmission a few nights ago I heard some excellent singing, with full orchestral accompaniment; in fact, I felt sure that a relay was being taken from the local Opera House.

A New Arrival

A fresh arrival to be found and logged is Radio Leuven (Louvain, Belgium), the new 8-kilowatt station erected by the Belgian Peasants' Association (Boerenbond), and of which the bulk of the announcements, talks, and so on are put out in the Flemish language. For the present, you will only hear broadcasts on Sundays, Tuesdays, and Thursdays between 8.15 and 10.15 p.m. G.M.T.

Again, notwithstanding its power, some trouble may be experienced, as the transmission is carried out on a wavelength which is common to Bremen; but, so far as I could judge, on a recent occasion Louvain was working slightly lower.

Strasbourg, by the way, I have definitely logged on 268 metres; the 364-metre wavelength allotted to this city will only be used by the new high-power transmitter under construction at Brumath.

On the other hand, Radio Catalana (EAJ13) recently disappeared; it was previously testing on 268 metres, or thereabouts. I may be mistaken, but I am under the impression that this Spanish station has taken a mighty leap upwards, and that he is to be found on about 465 metres, immediately under PTT Lyons, with whom he has violently collided on several evenings.

“DETECTOR VALVE COMPARISONS” (Continued from preceding page)

started off we were correctly biased, in other parts of the filament we are by no means working at the correct point.

Let us assume for example, that the filament is a 6-volt one. Then at the left-hand end we have the correct bias of 2 volts. At $\frac{1}{3}$ of the way across, the voltage on the filament is 2 volts positive with respect to the negative end and, therefore, the difference in potential between the grid and this part of the filament is $-2 + 2$ which is 0. As we go a further distance along to say $\frac{1}{2}$ of the way across, the filament is now $-2 + 4$, in other words 2 volts positive, and at the extreme end where we have the full 6 volts, we are 4 volts positive. It will at once be clear that the mean position here is not anything like the operating condition we require, for with positive voltage on the grid, there is no restriction on the electrons and quite a large anode current will result.

The result is that the effective characteristic we plot for a 6-volt valve connected with -2 volts on the grid is the aggregate of a number of characteristics of innumerable imaginary valves, each of which has a point for a filament and each of which has a slightly different bias ranging between -2 and $+4$ volts.

The aggregate of all this is a characteristic which is not sharp, but falls very gradually. The individual characteristic of each part of the filament is fairly steep and the bottom end is fairly sharp. Where we consider the aggregate, however, taking into account the number of portions of the filament where the grid is positive, it will be clear that this sharpness is destroyed

and we get a gradual curvature. This is not what we require, for we are departing all the time from our perfect rectifier which has an absolutely sharp bend.

Looking into the matter again, it will be clear that the smaller the voltage drop on the filament the less does this effect become. If the total voltage drop on the filament is only two volts, then our effective grid bias varies between -2 and 0. If we could make the filament of the valve have no voltage drop at all, then we should obtain an ideal result, for the grid bias would re-

Wireless Wit

AN American widow, being anxious to conceal the fact that her late husband had been electrocuted as a murderer, always explains that “he occupied the chair of applied electricity at one of our public institutions.”

AN absent-minded man's wife asked him to take down a recipe that was to be broadcast. He did his best, but he tuned in two stations at once. One was the right one and the other was broadcasting physical exercises. This is what he gave his wife afterwards:—

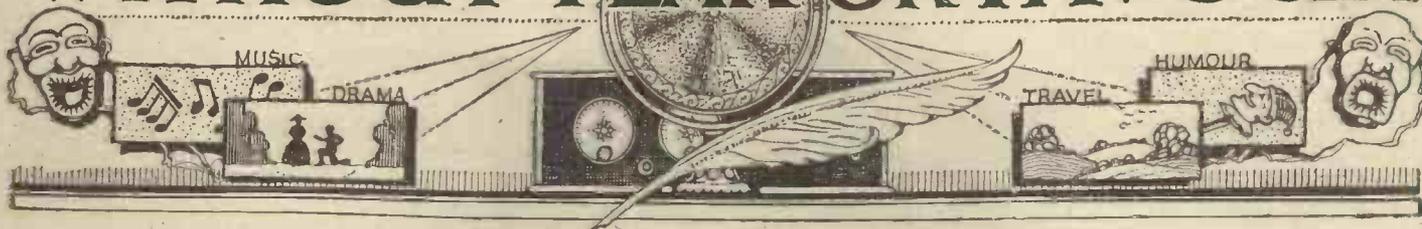
“Place one cup of flour on shoulders, raise knees and depress toes, mix thoroughly with half-cupful of milk. Inhale quickly one teaspoonful baking-powder, lower the legs, and mash with two boiled eggs in a sieve. Exhale and sift into a bowl. Lie flat on the floor and roll the white of an egg backwards and forwards until it boils.”

main the same for all parts of the cathode and this is what we obtain in the case of a valve with an independently heated cathode such as is used for mains operation to-day.

In order to emphasise these points, three curves have been taken and are reproduced herewith. The first of these is for an AC/HL valve having an independently heated cathode so that the cathode itself is at the same potential relative to the grid the whole way. It will be seen that the curve is fairly sharp. Secondly, we have a simple 2-volt valve of the HL type and this will be seen to be worse than the independently-heated cathode valve, but at the same time still reasonably sharp. Thirdly, we have a 6-volt valve of similar type and it will be seen here that the effect previously described is well in evidence, namely that the curve is now much more gradual and therefore the valve would not make anything like such a good detector. Moreover, the characteristics move over to the right as we increase the filament voltage due to the effect of a positive grid as already described.

Consequently, for ordinary purposes, the smaller the voltage drop on the filament, the better the valve is as a detector. As was pointed out earlier in the article, this explanation has been limited to the anode-bend rectifiers for the sake of simplicity. It is quite possible, however, to show that other forms of rectifier operate in much the same way, for they all depend upon the difference in voltage between the grid and filament and this, as we have seen, varies from point to point, because of the voltage drop on the filament itself.

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

H. G. WELLS'S aside was one of the most amusing things I have heard for a long time. Brilliant talk, but rather too abstract for the general listener.

I feel I must deal with some of the interesting letters that have reached me regarding the band problem.

As I imagined, not every reader agrees with the list that I printed a little time ago of the relative merits of our dance bands.

Here, for instance, is J. C. Hickling (N.W.8). Do you agree with this corre-

"would give the plum to Mr. Jack Payne."

Richard P. Lynn (Sunderland) gives his list of bands in order of merit as follows:—

1. Ambrose's Band.
2. Piccadilly Players.
3. Ambassador's Club Band.
4. Teddy Brown's Band.
5. Billy Francis's Band.
6. Cafe de Paris Blue Lyres.
7. Jack Payne's Orchestra.
8. Piccadilly Grill Band.
9. Bertini's Orchestra.

But he mystifies me by going on to say, "None of these bands can be compared with Elizalde's Band. The Piccadilly Grill Band makes too much noise. Jack Payne begins and ends like a symphony. The other night, at 10.15, Sir W. Davies, in his sermon, said: '... if you're not too tired.' Well, we were. By the way, we still get 'intervals' of dead silence."

I have always insisted that the Sunday services from the studio were better in several ways than those broadcast from outside.

In the first place, they are better balanced, they keep to time, and the B.B.C. can choose speakers who can get over. An example was Father C. C. Martindale, who departed from the usual dogmatic address and gave a thoughtful, earnest talk. The hymns were well chosen, the speech was good, so was the singing, and it finished to time.

Why cannot we always have services like this?

Sunday again was full of services and Bible reading, etc. In all good faith, I would like to warn the B.B.C. that they are overdoing this uplift business.

The News Bulletin again is badly run. After the announcement one wonders what is going to be the most interesting item of the day. It is usually a piece of foreign news which is of little interest to the average listener. For instance, the other night (Sunday) there was a long opening interview with one of the many Afghanistan kings.

I venture to think that not two listeners in a hundred were interested.

Glad to have Flotsam and Jetsam back

again. It is good policy to go away for a bit, as they did.

Muriel George and Ernest Butcher got away with it. The only thing that seems to be "samey" is the jazz.

"Smoke Rings" was entitled "A Bachelor's Retrospect," but this was merely a repetition of those sickly, sentimental love songs. Ugh!

The light-music concert by the Birmingham Studio Orchestra, conducted by Frank Cantell, is always acceptable. One point regarding announcing, however. Was it necessary to announce each of the short songs of the short suite entitled "On Jhelum River," by Woodforde Findon, which, by the way, the announcer called "Geelan." I was under the impression that it was "Yeylum."

If a deafening din is a criterion of successful broadcasting, then the palm goes to the special old-time vaudeville programme. In representing the realism of those days the producer was photographic (or phonographic), rather than artistic. The yells were so overdone and head-splitting that I switched off. I dare say a good many others did the same.

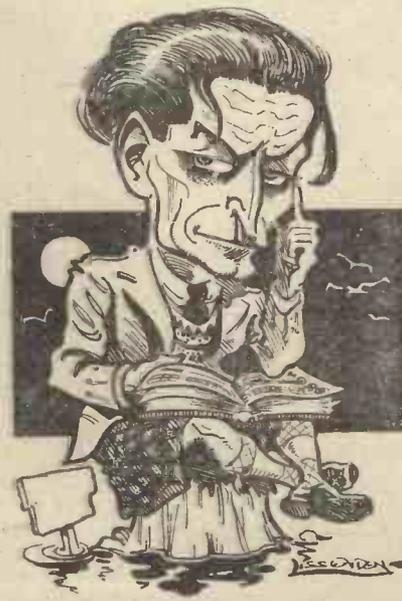


Paul England—an impression

spondent's list, which he places in order of merit?

1. Ambrose's May Fair Hotel Band.
2. Jack Payne's B.B.C. Orchestra.
3. Ambassador's Club Band.
4. Cafe de Paris Blue Lyres.
5. Billy Francis's Band.
6. Piccadilly Players.
7. Bertini's Orchestra.
8. Piccadilly Grill Band.
9. Teddy Brown's Orchestra.

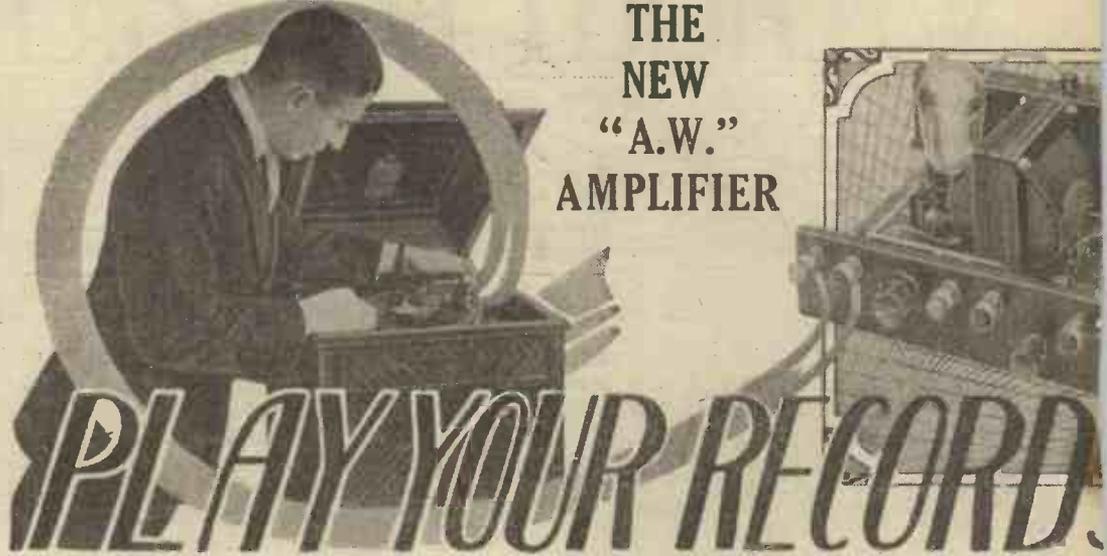
Another correspondent, A. M. Hankinson (Coventry), although not a lover of jazz,



Liszenden's idea of Compton Mackenzie

NINETY-NINE out of every hundred gramophone records nowadays are electrically recorded. The reason is that by the electrical process recording is easier and more sound detail is put on to the disc. The wax itself has certain very definite limitations, but the old-fashioned mechanical recording process, which necessitated large trumpets in the studio, did not even enable the limits of the wax to be approached.

Now, with a good microphone, a simple two- or three-stage amplifier and a steady cutter, it is possible for any gramophone manufacturer to produce results fully up to the record limitations. And some of the results achieved in the more recent recordings of the big manufacturers are literally amazing.



**THE
NEW
"A.W."
AMPLIFIER**

logical way of reproducing from modern records. But there is more in it than logic. There is a big point which will be appreciated by all except the owners of very "super" gramophones.

If one has a very indifferent gramophone it is cheaper to convert it for electrical reproduction than to bring it up to date in the mechanical way.

There are two courses available. One can simply replace the soundbox with a good pick-up, and connect this to the low-frequency side of the radio set; or a special little amplifier can be made up for the job, using the same batteries.

The expense of the separate amplifier is not great; as with most wireless sets, it is the battery and loud-speaker equipment which is more expensive than the components in the set itself. But, off-hand, it may not be obvious why the low-frequency side of the receiver is not entirely suitable for the gramophone work and why the expense of the additional amplifier is justified.

The first point is that in order to use the amplifier side of the wireless set a switching device will be needed to change over from "radio" to "gramophone" and *vice versa*, and this may introduce complications into the receiver itself which may affect its performance. For instance, in order to make proper use of all the valves

available it is the general practice to arrange the switching so that when the gramophone pick-up is being used the detector valve is converted into an amplifier. This means that the switch must be in the

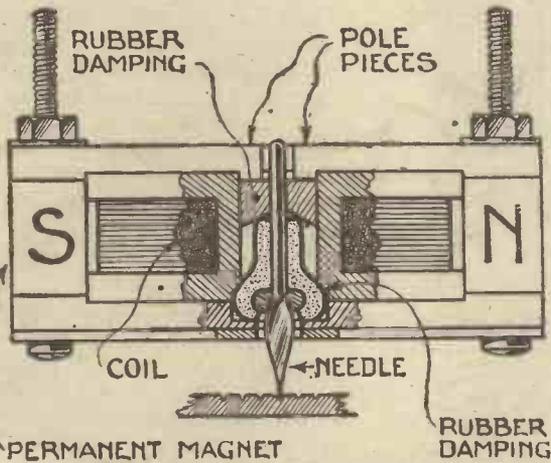
grid circuit of the detector, and unless the wiring and layout are carefully arranged considerable losses may be experienced.

A Separate Amplifier Desirable

This does not, of course, apply to other AMATEUR WIRELESS receivers which have been specially designed to be used for radio or gramophone work. In these cases the layout is so arranged that no loss is introduced by the presence of the switch. But if an amateur inexperienced in set design attempts to incorporate a radio-gramophone switch in his set there is a danger that he may adversely affect the working of the radio section.

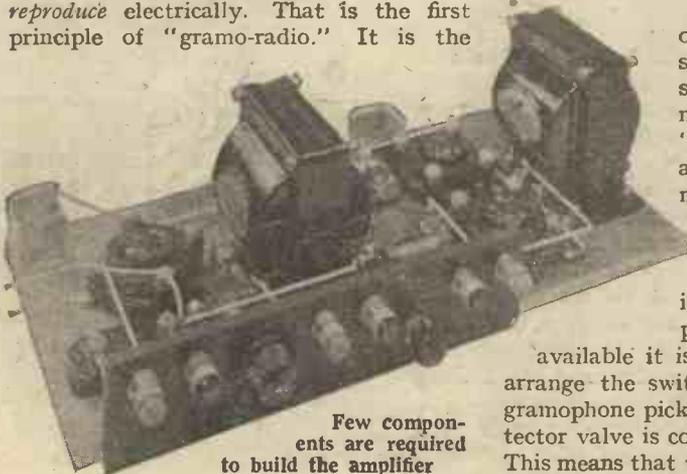
The use of a separate amplifier obviates this difficulty.

The further we go into the design of a radio amplifier and a gramophone amplifier the more we begin to see essential differences. The amplifier on the L.F. side of a radio set has to give a reasonable output from a minute input; on most stations the detector output is not considerable. In the case of an electric gramophone the output

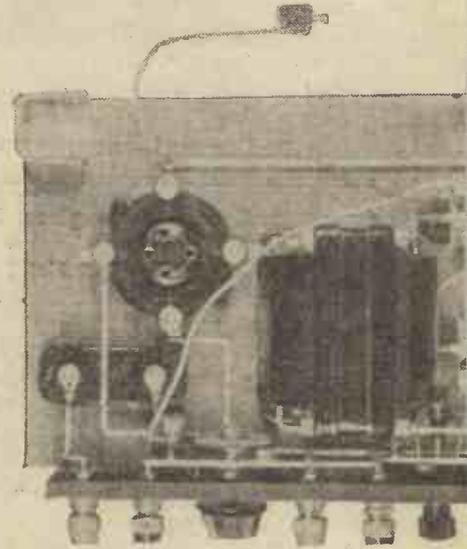


A sectional diagram showing the working principle of the Lissen pick-up

Obviously, then, electrical recording cannot stop at that. If detail is put on to a disc which cannot be faithfully reproduced by a mechanical gramophone, then the natural way to get better results is to reproduce electrically. That is the first principle of "gramo-radio." It is the



Few components are required to build the amplifier





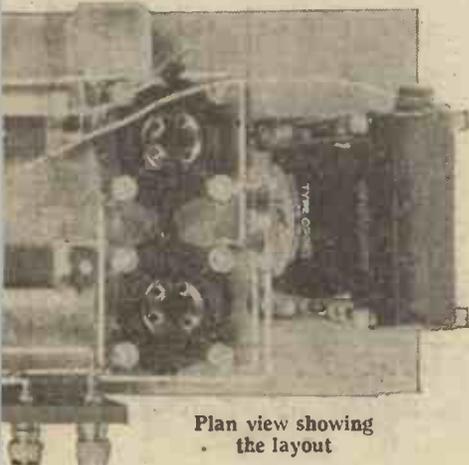
is, generally, required to be greater than is the case with radio reproduction. Good mechanical gramophones are capable of providing great volume. Moreover, the input may be quite large, the voltage swing from some makes of pick-up being as much as one volt. This swing is applied direct, as a rule, to the first L.F. valve grid.

Unless the radio amplifier is altered to suit these new conditions the whole equipment will be overloaded and over-worked.

Generally speaking, a gramophone amplifier requires to have larger output valves, heavier intervalve couplings and needs to be operated with a greater value of H.T. It is the last factor which is the most expensive, and which deters many people from making use of electrical reproduction.

Push-pull

There is a solution, however. Instead of using a very large super-power valve in the final stage of amplification, and allowing it to consume colossal filament and anode current, one can place two much smaller valves in a push-pull arrangement. This has the advantage of allowing a maximum



Plan view showing the layout

output to be derived with the expenditure of less H.T.

A suitable gramophone amplifier need not have more than two stages, if worked with the average pick-up. The pick-up can be coupled direct or through a simple condenser arrangement and volume control to the grid of the first valve.

This first stage is, of course, transformer-coupled to the push-pull arrangement, although there are choke and resistance arrangements which obviate the need for tapped-primary and tapped-secondary transformers. The output is generally arranged through the medium of a tapped primary transformer. Usually, it is easier, nearly as cheap, and even more efficient to use proper transformers specially wound for the job.

For the benefit of those who wish to take advantage of electrical reproduction the AMATEUR WIRELESS Technical Staff have made up a useful little two-stage push-pull amplifier, and this is illustrated by the accompanying photographs.

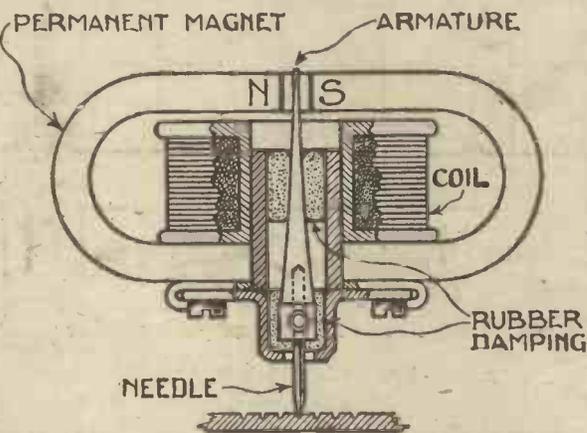
The amplifier is made up on the lines already described, as will be gathered from a short technical description of the circuit.

The pick-up, which is in practically every case of the magnetic type, is coupled to the amplifier through a .005-microfarad coupling condenser, partly shunted by a high resistance. This resistance is actually the winding of a 1-megohm potentiometer, and the slider is connected to the grid of the first L.F. valve. This valve can conveniently be of the ordinary L.F. type. In the case of two-volts, a DEL valve is suitable,

and if the amplifier is to be used for real "super" volume, which it will adequately provide, then a 6-volt P625 should be used. For normal working with a 6-volt valve a DEL is suitable.

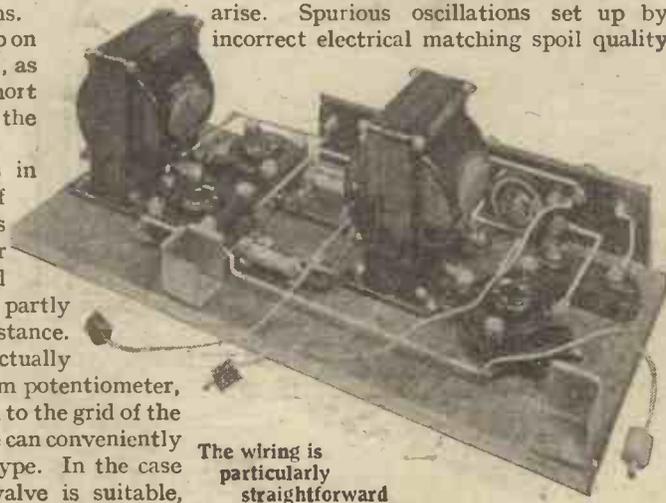
A split-secondary transformer is used to couple the first low-frequency amplifier to the push-pull combination. The centre-tapping of the transformer secondary is taken to the grid bias maximum tapping. A point which deserves special notice in this circuit is that little fixed resistances are placed in each grid lead. Each resistance has a value of 100,000 ohms, and the purpose of these "stoppers" is to prevent parasitic oscillations set up by the use of unmatched valves in the push-pull arrangement.

It is advisable, if possible, to have the



Here is another sectional drawing of a pick-up of a slightly different type—the Amplion

push-pull valves matched. Many manufacturers are prepared to supply two power valves specially matched for this work, but the presence of the fixed resistances obviates any little troubles which might arise. Spurious oscillations set up by incorrect electrical matching spoil quality



The wiring is particularly straightforward

“PLAY YOUR RECORDS WITH A PICK-UP” (Continued from preceding page)

and tend to heat the valves and shorten their lives.

For 2-volt working a DEP215 pair should be used, while the corresponding 6-volters are P625's. Two LS5a's can be used, with a preceding P625, where very great output volume is required.

Components

The components required are simple and not expensive, as shown by the following list.

Two grid-leak holders (Lissen, Ediswan).
Two grid leaks 100,000 ohms each (Lissen, Ediswan).

Six terminals marked, Input +, Input -, L.T.+, L.T.-, H.T.-, H.T.+ (Belling-Lee, Burton).

Connecting wire (Glazite).

Three wander plugs marked, G.B.+ , G.B.-1, G.B.-2 (Belling-Lee, Eastick).

One yard of flex (Lewcoflex).

Grid-bias battery, 16-volt (Ever Ready, Siemens).

The baseboard carries the remainder of the components, namely, the two transformers, three valve holders, .005 coupling condenser, two 100,000-ohm stopper resistances and the G.B. battery clips.

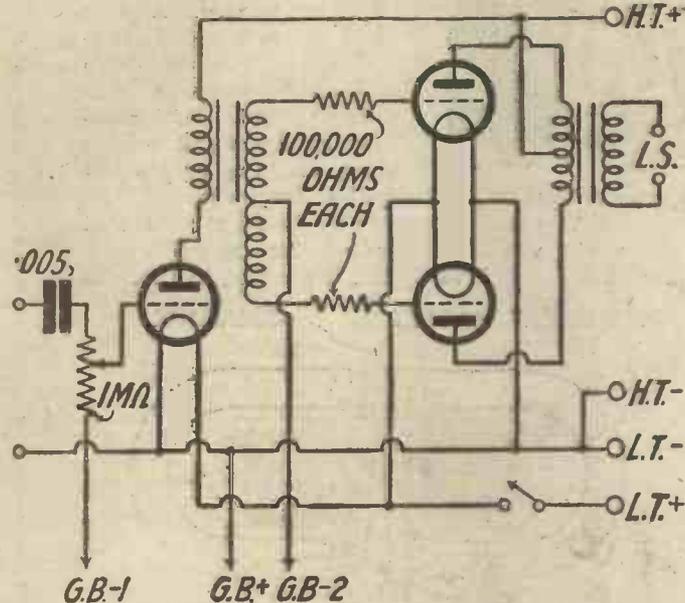
These parts can all be mounted with the aid of the print, which also shows the whole of the wiring. The layout is particularly neat in this amplifier, and undoubtedly part of the success is due to the neatness of the arrangement of the components. It is not, perhaps, generally realised how much depends on layout and neat wiring, even on the low-frequency side. Some of the wires are only half-an-inch or so in length.

Check over the wiring very carefully, for it is easy—and expensive—to make mistakes in any set.

When the amplifier is all ready for working, a suitable place should be found for it, either in the gramophone compartment, or else adjacent to the batteries with which it will be used. It should be borne in mind that it is always better to have the H.T. and L.T. leads long rather than to carry the pick-up leads for any considerable distance.

Battery Power

About 120-150 volts H.T. will be ample with output valves of the DEP or P625 class, and a 16-volt grid-bias battery will be suitable in order to provide an adequate biasing range. On an actual test in the AMATEUR WIRELESS Lab. it was found that 14 1/4-volts G.B. was needed for the push-pull stage when approximately 150 volts H.T. was applied to the anodes. The bias for the first valve under these conditions was 3 1/2.



The circuit of the New "A.W." gramophone amplifier

Baseboard, 14 in. by 6 in. (Pickett, Raymond).

Ebonite strip, 9 in. by 2 in. (Becol, Raymond).

Three anti-microphonic valve holders (Igranic, Lotus, Benjamin, W.B.).

.005 - microfarad fixed condenser (Dubilier, T.C.C., Lissen, Watmel, Trix).

1-megohm variable resistance (Igranic "Megostat," Rotorohm).

Filament switch (Lotus, Bulgin, Lissen, Igranic, Burton).

Push-pull input transformer (Ferranti type A.F.5 (c), Varley, R.I., Igranic).

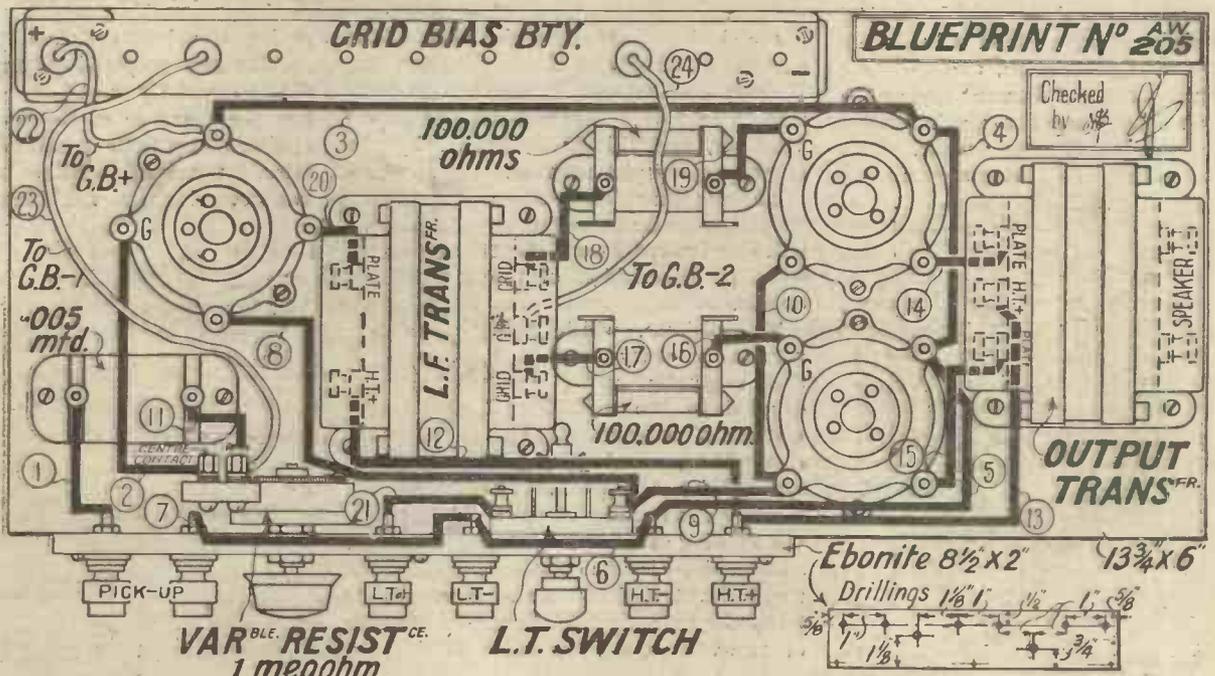
Push-pull output transformer (Ferranti type O.P.3 (c), Varley, R.I., Igranic).

tension terminals, the filament switch and the two high-tension terminals. The grid-bias battery is placed on the baseboard as shown.

In addition, a blueprint of this amplifier can be obtained from the Blueprint Dept. of AMATEUR WIRELESS, price 1s., post free. This is particularly helpful in showing the exact positions of each component, for the print is full size.

There is no panel, nor is any really needed, for the complete amplifier can easily slip into a compartment in the gramophone and will take up only the space occupied by a few records.

A terminal strip carries the two input terminals, the volume control, the two low-



The wiring diagram. A full-size Blueprint is available, price 1/-

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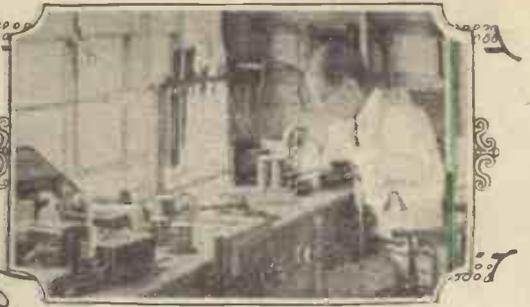
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60 volt (reads 65)	7/11
100 volt (reads 108)	12/11
120 volt	15/10
36 volt	4/8
60 volt (super power)	13/3
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My Wireless Den



Weekly Tips—Constructional and Theoretical—by W. JAMES

"Setting" Anode Bend

THE importance of carefully setting up a detector of the anode-bend type cannot too strongly be emphasised, as small changes in grid bias or high-tension, or both, may greatly affect the results. Valves of the same pattern are usually found to vary by a fair amount about the bottom bend, with the result it is necessary to try various values of bias or H.T. before finally deciding that certain values are the best. A point to note is that a finer setting is to be obtained by adjusting the high-tension voltage in small steps than the grid bias. This will be clear when it is remembered that a volt change in the grid circuit may be equivalent to 15 or 20 volts change in the anode voltage, according to the magnification factor of the valve. Valves sometimes change during use, and it is therefore advisable to check up an anode-bend detector from time to time. Some valves are, of course, much better detectors than others, as they have a sharper curve, and when two or three valves of suitable types are available they should be compared. Too much reliance ought not to be placed upon the valve-maker's curves as to the shape of the bottom parts, as they may vary by a large amount.

Making Signals Weak!

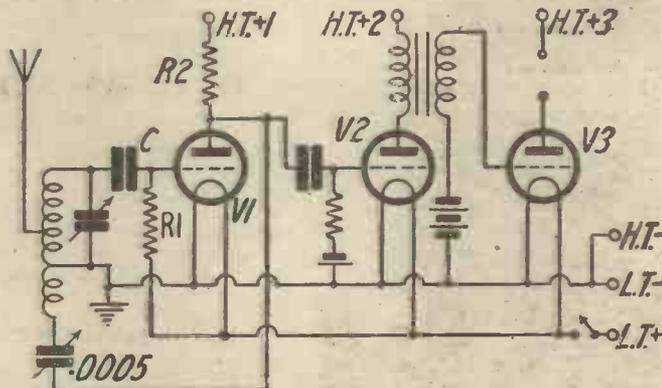
How best permanently to reduce the volume from a set of the local station type without spoiling the quality is something of a problem to those listeners who find the strength of Brookmans Park much greater than that of the old London station.

Detuning in many instances is not satisfactory, as not only is the station heard over the greater part of the tuning range, but the quality is not too good when the set is tuned well to one side of the tune point. Something is needed, then, for cutting down the magnification, and, obviously, the less expensive the part used, the more acceptable the scheme will be.

When a transformer is used a grid leak of fairly low resistance will cut down the volume if it is joined across the secondary winding. Use one having a resistance of

about 250,000 ohms; but it may be necessary to fit one having a still lower value, such as 100,000 ohms. The addition of a grid leak across the secondary (not in the grid lead) will lower volume without spoiling the quality. In fact, if the transformer happens not to be a very good one, the quality may be improved.

If the intervalve coupling is of the resistance type, the best method is to lower the value of the anode resistance, and when a leaky-grid detector is employed, a grid leak of .5 megohm, instead of the more usual 2 or 3 megohms, will not only reduce the volume, but improve the quality as well. There are occasions when a different type of valve may be fitted with success, but as valves are expensive it would be better to explore alternatives before making a change.



A circuit showing points at which variations may be made in order to accentuate the treble

Raising the High Notes

A question I am sometimes asked is how to increase the relative strength of the higher audio notes. This is a question that would not have been asked a few years ago, but now that good resistance and transformer couplings are available there is usually plenty of bass.

Lack of high notes means loss of brilliance and clarity. If the word *hiss* were broadcast it would be heard without the strong "iss," and speech as a whole would be less intelligible. The high notes are important, and when they are relatively weak the first step to take is to look at the condensers in the set.

Is there one across the loud-speaker? If so, listen to the reproduction when it has been removed. Then try the effect of using a .5 megohm grid leak at R1 in the

accompanying diagram and a grid condenser C of .0001 microfarad instead of the more usual .0003 microfarad. Finally, if the set has a resistance-coupled stage, as at R2 in the figure, reduce the value of the anode resistance if it is above 100,000 ohms.

These changes will strengthen the high notes, but it is possible to effect a still further improvement if this is necessary. Fit a valve of low impedance in the second stage—that is, at V2—and alter the grid bias to suit. This will give the transformer a rising characteristic and therefore increase the relative strength of the higher notes.

The low notes will, incidentally, also be strengthened a little, but probably not to the same extent as those of higher frequency. Thus the quality of the reproduction may be changed by various alterations and the quality made acceptable.

Reaction Condensers which "Short"

A fault that sometimes develops is a short-circuit in the reaction condenser. Perhaps, as the result of wear, the plates touch in one position, or maybe dust has collected. In any case, when the condenser has one of its sets of plates joined to the high-tension circuit and its other set to negative, a short-circuit will cause a current to pass through the reaction and anode circuits. This current may

be sufficient to damage such parts as a transformer or high-frequency choke that may be included in the circuit, and will certainly do the battery no good, even if it does not quickly discharge it. There is a simple and effective safety device, however, that may be included in the circuit. It is a fixed condenser, which should be joined between the reaction condenser and the anode of the valve. The fixed condenser should have a capacity of three or four times that of the reaction condenser—or, say, .002 microfarad. When this "safety" condenser is included in the reaction circuit, the only result of a short-circuit in the reaction condenser will be violent oscillation and probably noise. No parts will be damaged, however, as the fixed condenser is stopping the flow of a direct current from the H.T. battery.

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over eighty strings

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A single note is struck upon the keyboard—a single string vibrates—notice how sharply defined the note is against the background of the succeeding silence.

It is just like that when a note impinges upon the background of silence in which a Lissen Transformer amplifies. Each note is given its full value, each instrument its characteristic tone; high notes suffer no distortion, low notes come through in all their sonorous beauty

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This Super LISSEN Transformer is made in two ratios, $3\frac{1}{2}$ to 1 and also $2\frac{1}{2}$ to 1. The $3\frac{1}{2}$ to 1 is suitable for use in either the first or the second stage of an L.F. amplifier, or can be used in cascade for both stages, and with practically any valve. The $2\frac{1}{2}$ to 1 transformer is suitable for use after a high impedance rectifier valve without fear of distortion or loss of high notes and overtones. The price is the same for both ratios

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"A.W." TESTS OF APPARATUS

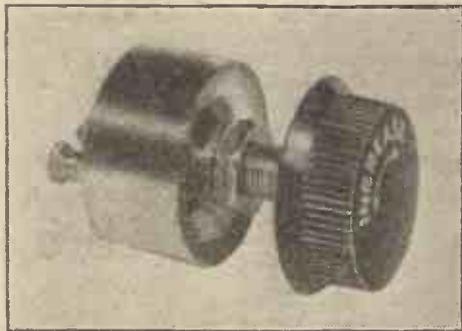
Conducted by our Technical Editor, J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

Regenstat Power Resistance

VARIABLE power resistances are particularly useful components, especially for use with all types of mains apparatus, allowing independent voltage adjustments to be made by the turn of a knob. Such a resistance must be capable of passing fairly heavy anode currents without any appreciable alteration of ohmic value.

We recently tested a Regenstat power resistance having a rated range of 250 ohms to 4 megohms and stated to be capable of dissipating power up to 10 watts. The resistance material of this component is contained in a sac housed in a metal container and compressed by rotation of the knob in a clockwise direction. A single hole only is necessary for fixing to a panel.

The resistance range of the sample tested proved to be from 120 ohms up to $1\frac{1}{2}$ megohms. The maximum value is thus below that claimed by the makers, although for mains work this is not of any consequence as the working resistance seldom exceeds 500,000 ohms. Continuing with our test, we passed currents through the resistance up to 100 milliamps with a voltage drop of 100, giving a dissipation of 10 watts.



Regentone variable resistance of the compressed-sac type, for power work

The makers are the Regent Radio Supply Co., Ltd., 21 Bartlett's Buildings, Holborn Circus, London, W.C.

Eastick Connectors

MESSRS. J. J. EASTICK & SONS, of 118 Bunhill Row, E.C., are probably well known to readers as makers of the Eelex plugs, sockets, and connectors. The experience gained by the firm during the time which they have been manufacturing small articles of this nature has led them to make various modifications to comply with the requirements of up-to-date apparatus.

The latest types of connectors are not only fully up-to-date, but ingeniously constructed rendering them handy and reliable in use. One of the most important requirements in any plug-and-socket system is that it should make a good electrical joint. The Eelex plugs are split into four sections and so shaped at the ends that they glide with ease into the socket but at the same time make good electrical contact with the socket.

Another improvement in these small accessories is the extra shrouding fitted to the sockets which overlaps the insulated shrouding on the plugs and thus completely obscures any metal work. The importance of this cannot be over-estimated in these days of high mains voltages when very often a chance contact with metal work may result in a nasty shock.

The method of fixing a wire to the plugs and connectors has also been improved and special precautions taken against a possibility for the lead not to pull out by holding it in with a grub screw.

One may obtain these components from Messrs. Eastick in any shape or colour of plug and socket which a wireless engineer could need. It may be added that the finish and workmanship are very good.

A Useful Switch

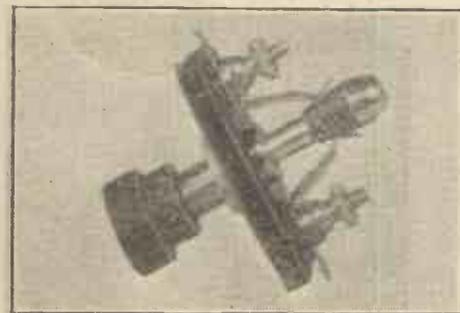
PUSH-PULL switches have become so popular with constructors that many varieties are available. Unfortunately one cannot always be assured of obtaining the right type of article and one which originally appears perfect electrically and mechanically may soon develop faulty contacts, a most undesirable type of fault in any set.

A small, neat, push-pull switch submitted for test by The Wireless Supplies Unlimited is a component on which much thought has evidently been expended. The makers of this "Unlimitex" product have probably benefited by the faults of other push-pull switches and produced an article which should certainly prove reliable.

In appearance the component closely resembles the standard type of switch; two springs with a soldering tag and terminal are attached to a small rectangular piece of insulating material through which the operating spindle slides. When the article is mounted on a panel, a polished black insulated knob and a suitably engraved celluloid plate are alone visible.

It is in the shaping of the springs and the spindle that the successful design of the

switch depends. In this case substantially thick springs are employed with curved bearing surfaces, so that contact does not occur between them and the spindle at a single point only, but over an increased surface area. In the "off" position, the springs are less extended than in the "on" position, and are therefore at rest during the major part of the day and should in consequence, retain their pressure for long periods. Due to the gradual tapering of the insulated bush on the spindle and the



A well made switch for L.T. or coil switching; made by Radio Supplies Unlimited

rounding-off of the metal bush, the action of the switch is quite smooth and yet provides a definite on and off position. This component is well-finished and, being reasonably priced, should appeal to readers.

The makers are Radio Supplies Unlimited of 278 High Street, London, E.15.

THE NEW BELGIAN HIGH-POWER STATION

UNDER construction for some months, the new Louvain (Belgium) broadcasting station gave its first transmission on Sunday, October 6. It has been erected by the N.V. Radio and financed by the Belgian Boerenbond (Peasants' Association). The broadcasts are made on 339 metres with a power of from 8 to 10 kilowatts in the aerial. As it is mainly destined to the Flemish-speaking districts, all announcements are made in that language, the call being "Radio Louven." For the present, transmissions will only be made on Thursdays and Sundays from 8.15 to 10.15 p.m. G.M.T., but in the course of a week or so broadcasts will also be carried out on Sunday mornings.

Radio Leuven has decided to offer to its listeners relays of concerts from Amsterdam, as well as religious services from St. Rombouts Cathedral, at Mecheln, whence will also be heard carillon recitals by the Chevalier Jef Denijn.



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By
W. JAMES

H.T. JUICE

AND SOME UNUSUAL SOURCES

The second and concluding article reviewing the available methods of obtaining H.T. current

EVERY amateur has, I expect, used dry batteries for the high-tension circuits at some time or other, and is therefore aware of the difficulties met with from time to time. Most dry batteries, it is true, give a reliable service, but certain of them are

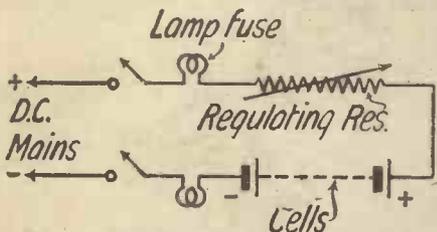


Fig. 1. Charging H.T. accumulator from D.C. mains

troublesome, as well as variable in their behaviour.

Who has not had the experience of connecting a new battery (not a freshly-made one) only to hear crackling noises, perhaps motor-boating, and to find the broadcast weak and distorted. These, incidentally, are the signs of a high-resistance battery. Perhaps one of the connections inside the battery is faulty or one of the cells may be defective. This one bad part is sufficient to render the whole battery useless, as one is seldom so fortunate as to be able to make good the fault or to cut out the defective cell.

Quite apart from troubles with new batteries that should be perfectly satisfactory, however, one is always faced with deterioration. The voltage of a battery falls after it has been used for a time; its resistance increases, and it is no longer able properly to supply the circuits with current unless, of course, they are fitted with filter circuits. Even then the variations in the resistance that occur are troublesome, as noises may be heard from the loud-speaker.

As the voltage of the battery falls, the performance of the set drops below normal. The magnification is less; more reaction must be used in an endeavour to maintain the volume. Therefore, the quality suffers. Further, the time soon arrives when the amount of the power output to be obtained from the last stage decreases. All that users of dry batteries can do to obtain more uniform results is to employ batteries having a large capacity. Naturally, they are more costly to purchase, but if account be taken of their capacity, they will be found rela-

tively much cheaper than smaller types.

Those who run a set having four or five valves, or who employ a good power valve in the output stage, sooner or later consider other sources of high tension. If they have a household supply of electricity, they probably build a mains unit or perhaps invest in a battery of accumulators and a charger. High-tension accumulator batteries are fairly popular just now, and it must be admitted they are quite useful if looked after. Some types soon wear out. Surface leakage is the trouble in many instances. The cells will not hold a charge for very long because of the leaks. I once had a battery of accumulators which would discharge in a few days if left. The filled-in tops were conductive. Sometimes a cell would fail and have to receive special treatment.

On the whole, however, accumulators are satisfactory. If of recent design and of

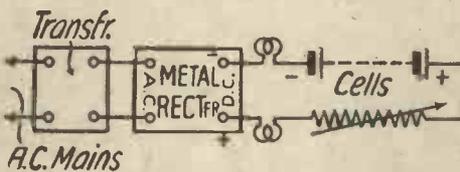


Fig. 3. Charging arrangement with metal rectifier and transformer

reasonable capacity, they should not be at all troublesome. They are particularly useful for laboratory purposes. When the household supply is of direct current at low

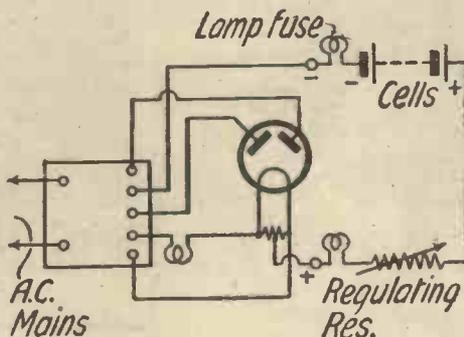


Fig. 4. Charging arrangement with valve rectifier and transformer

voltage, it may be used for charging, the amount of the current being regulated by a resistance, but only part of the battery, as a rule, may be charged at one time. A suit-

able arrangement is given in Fig. 1, where a lamp fuse, switch, and regulating resistance are indicated. An ammeter may be used in a circuit of this description, or one may estimate the charging current by the brightness of the flash-lamp bulb included in the circuit.

It is advisable to insulate the battery whilst it is being charged.

When the supply is of alternating current, a rectifier must be included in the circuit in order that current flowing in one direction only shall pass through the bat-

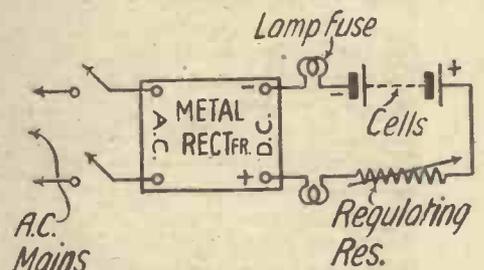


Fig. 2. Charging from A.C. mains through a rectifier without transformer

tery. A half- or a full-wave rectifier may be used, and it is not essential to employ a transformer. Perhaps the cheapest method of charging is by means of a dry-metal rectifier of the Westinghouse pattern connected as in Fig. 2; but when this arrangement is used particular care must be taken that the set be disconnected whilst charging. Failure to attend to this point may result in damage to the parts in the circuit. The adjustable resistance indicated may very well be of the "power" type of compression resistance, having a value of from 200 to 2,000 ohms.

For greater safety a transformer should be employed, as in Fig. 3, as it prevents a direct contact between the mains and the battery or set. It may be home-constructed from No. 4 stallo stampings built to provide a core 1 in. thick. The primary winding may have the following numbers of turns of No. 30 enamelled wire:

Voltage of Mains.	Turns on Primary.
200	1,400
220	1,540
240	1,680

A secondary winding of 2,000 turns of No. 30 enamelled wire tapped at 1,800, 1,600, 1,400, and 1,200 will provide a maximum of 280 volts A.C. approximately, and will therefore be suitable for various rectifiers and batteries, but the current must be limited to 100 milliamperes or thereabouts, or the transformer will heat up. There is a right and a wrong way of connecting a half-wave rectifier in a charging circuit, and this point should be

(Continued on page 694)

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**THE ORMOND
ADJUSTABLE
4-POLE
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Specified for use with the "Music Leader" linen-diaphragm loud-speaker as described in this issue.

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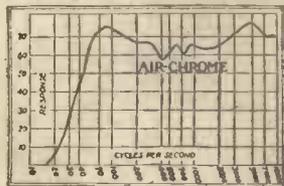
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The Remarkable Performance Curve of the Ultra Air Chrome Speaker.

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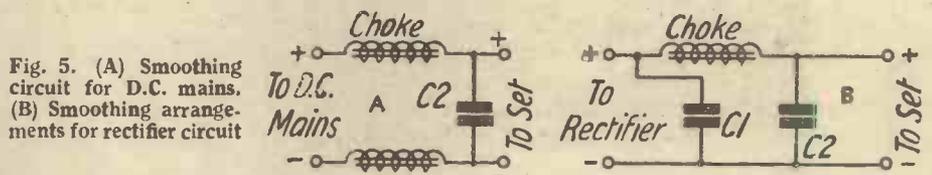
"H.T. 'JUICE'—AND SOME UNUSUAL SOURCES"

(Continued from preceding page)

attended to. It is possible to use machines and other devices for charging from a direct-current source of low voltage but most of them are rather too costly or need too much attention to be popular with amateurs. Valve rectifiers may also be used as indicated in Fig. 4, but as a rule it is cheaper and better to connect a filter to the rectifier for smoothing, and to arrange for various voltages by fitting suitable resistances or potentiometers.

It is, of course, a little more difficult to provide definite voltages from a mains unit than a battery of accumulators, but when accuracy is of importance an adjustable resistance may be used for regulating the voltage. A usual filter for smoothing direct

need not be joined through a choke. Many suitable chokes are marketed, and when choosing one care must be taken that the current-carrying capacity is sufficient and the resistance not too high. A great deal of inductance is not needed, but when the total smoothed current is in excess of, say 30 milliamperes, it is advisable to divide the circuit. Thus the last stage, which passes most current, can be supplied through a choke of medium inductance, as the smoothing afforded will be adequate. The other stages, which pass a comparatively small current, can be supplied from a separate smoothing circuit having a choke of high inductance. This choke may be of the same size as the one employed in the circuit of the last valve, but as it has less current to carry, its winding may be of finer wire. Therefore the inductance will be greater and also the resistance.



current main supplies is indicated in Fig. 5A. It will be seen to be rather different from that fitted to a rectifier, Fig. 5B. The essential difference is that a condenser is not used across the input when the supply is from direct-current mains, but that one is used, as at cr, when the supply is from a rectifier. The two choking coils shown in Fig. 5A may not be required. One of them will often suffice and it is therefore advisable when trying a circuit of this type to put a choke first in one main wire and then the other, as one may find the smoothing is satisfactory with one of the connections.

In certain instances, two chokes, as indicated, must be used. Much depends upon how the D.C. mains are earthed. One main is usually practically at earth potential, and it is this main which, as a rule,

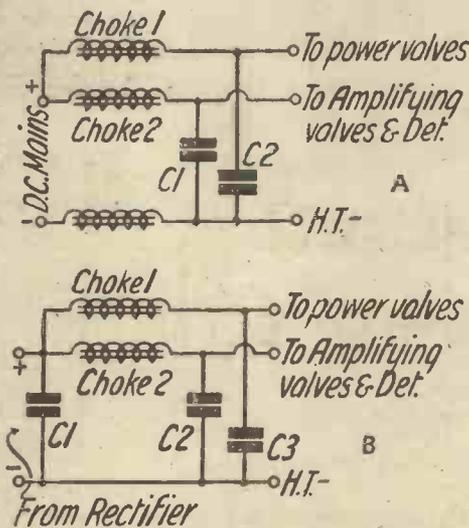


Fig. 6. Two smoothing circuits for when anode current is heavy

Suitable connections are indicated in Fig. 6, A and B, where choke CH1 has a large current-carrying capacity and a medium inductance, and CH2 a small current-carrying capacity and a high inductive value. Thus CH1 may be of 20 henries and CH2 of 50 henries. Condensers of 4 microfarads are usually suitable at cr and c2, but sometimes an 8-microfarad condenser must be used at c2.

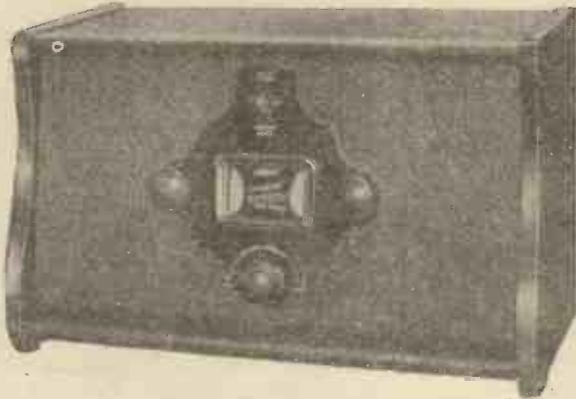
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FOR purity on the low notes, combined with a reasonable balance between the higher and lower ranges, many listeners swear by the moving-coil type of speaker, though their preference is to some extent offset by adherents of the balanced-armature and similar speaker models working on a purely magnetic drive. Certainly some excellent results were produced by non-moving-coil instruments at the recent exhibition.

To a certain extent, lack of balance in reproduction may be due to losses occurring in the intervalve and output couplings, and should not therefore be put down to the fault of the speaker. In order to overcome or counter-balance such defects, it has recently been proposed to use two separate power valves in the last stage of the amplifier and to couple these to a common loud-speaker through different transformer windings, one of which is designed to favour the higher and the other the lower notes. By adjusting the two valves independently the final output can be given the desired tonality and any intermediate resonance effect or loss made good.

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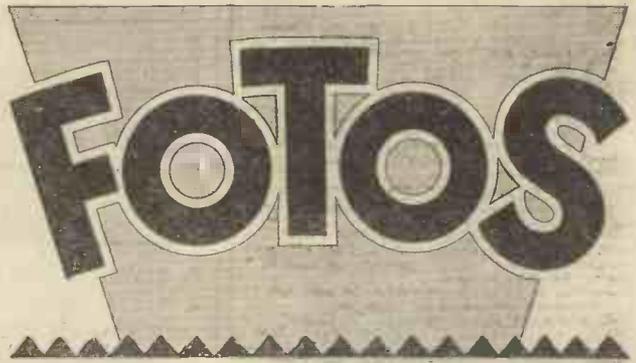
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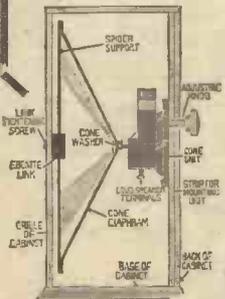
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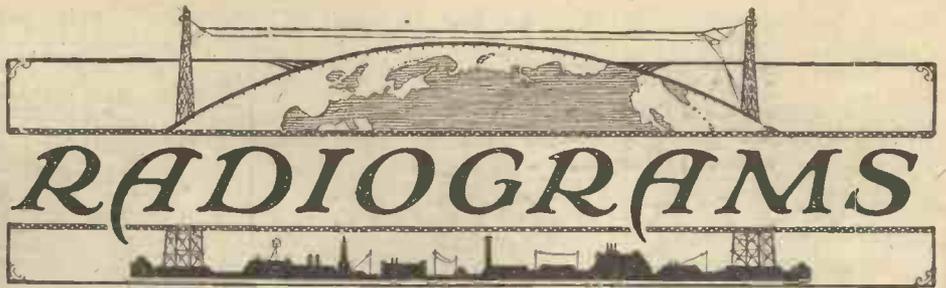
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NOW the Brookmans Park transmitter has been brought into operation, work is to be started shortly on the building to house the North Regional broadcasting transmitter at Moorside Edge, near Huddersfield. It will take about twelve months to complete and the layout will be very similar to that of the recently opened London regional station.

During the coming season another series of popular concerts will be given by the B.B.C. at the People's Palace, Mile End Road. Two of these concerts will take place before, and six after, the Christmas holidays. January 6 is the date fixed for a concert performance of Humperdinck's fairy opera, *Hansel and Gretel*, under the direction of Mr. Percy Pitt. The augmented Wireless Symphony Orchestra will take part in this series on November 7, December 5, January 9 and 23, February 13, March 6 and 27, and April 10. All the performances will be broadcast.

Starting on November 6 in a series of broadcasts, women M.P.'s will describe "The Week in Parliament." Mrs. M. A. Hamilton, the member for Blackburn, heads the list of speakers, to be followed a week later by the Duchess of Atholl.

On November 13 Ronald Frankau and his Cabaret Kittens will again visit the 2LO studio to present a third edition of their musical revue, *Up to Scratch*.

Further increases in power of German transmitters are to be carried out shortly. Berlin-Witzleben will exchange broadcasting plant with Leipzig; the former transmitter is to be strengthened, and in the meantime Leipzig will be given a provisional station.

The German broadcasting authorities have concluded a contract with the National Broadcasting Company of America for the interchange of radio programmes. Experiments made have proved eminently satisfactory. On October 4 last, coinciding with the official opening of the Pittsburg Radio Exhibition, a special concert was transmitted at 3 a.m. through Königswusterhausen on 31.30 metres. It was clearly received in the United States and rebroadcast through KDKA (East Pittsburg).

The Königswusterhausen short-wave transmitter on 31.38 metres has been brought into regular daily operation. This station now relays the lunch-hour (1 to 2 p.m.) concerts broadcast by Berlin, as well as the afternoon and evening entertain-

ments. Moreover, a special transmission is made once weekly between 11.30 p.m. and 12.30 a.m.

At an international conference recently held at Brussels practical measures were discussed with a view to an interchange of radio programmes between Belgium, Germany, and Great Britain on lines similar to those at present adopted by Germany, Poland, Austria, Hungary, and Czechoslovakia. If these relays can be carried out in a regular and satisfactory manner, through the German telephone system, it will be found practicable to link up the system with the Central and Eastern European broadcasting stations.

Moscow Popov on 1,100 metres, with an energy of 40 kilowatts in the aerial, is said to be the most powerful station in Europe. Its transmissions can be heard nightly; it will be found just above Hilversum, with which programmes it has been causing interference.

(Continued on page 698)

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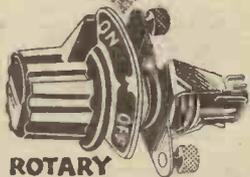
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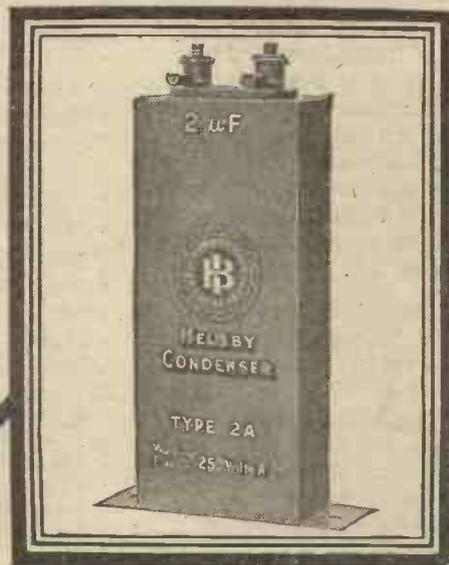
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"RADIOGRAMS"

(Continued from page 696)

According to decisions taken by the International Consultative Committee for the Technique of Radio-Electric Communications, which recently held a conference at The Hague, Holland, the wireless wavelengths have been re-classified as follows: Long waves, from 3,000 metres and upwards; medium, from 200 to 3,000 metres; intermediate, from 50 to 200 metres; short, from 10 to 50 metres; and ultra-short, below 10 metres.

Recognising the rich opportunities which John Buchan's "Huntingtower" affords for microphone presentation, the Scottish stations of the B.B.C. have commissioned a radio adaptation of the novel. Two adaptations from the works of Sir Walter Scott are other features of current Scottish broadcasting—one a scene from "Redgauntlet," and the other based on "The Highland Widow."

"Ici Station Radiophonique Paris Experimental" is the call of a new short-wave transmitter in France, working daily at 9 p.m. on 31.65 metres. Broadcasts are also made on Sundays at 3 p.m. As the power has been increased to 1 kilowatt, the programmes are being heard in many European countries.

Local subscriptions are being raised at

Lille (France) to defray the expense of erecting a new 12-kilowatt broadcasting station in that city. Lyon-la-Doua, the P.T.T. station serving the Lyons district, has been rebuilt and is now testing on higher power.

As Hamburg has now reverted to its winter-time schedule, early risers in Great Britain may pick up a time signal from the German station at 4.45 a.m. G.M.T., weather forecasts at intervals, and a concert of gramophone records at 6.20 a.m.!

Notification is given that it has been found necessary to change the call signal of the new wireless fog signal at Sule Skerry Lighthouse, situated some thirty miles north of Cape Wrath, from KSG to MSG.

The new 20-kilowatt Algiers broadcasting station, now the most powerful transmitter in French North Africa, has started its initial tests on 368 metres. As it is to be officially opened only in 1930 in connection with the centenary celebrations of the Algerian colony, for the present the new plant will be used exclusively for the evening programmes.

Trieste, the latest transmitter to be added to the Italian broadcasting net is said to be testing on 248 metres.

Radio Luxembourg, the new private broadcasting station operated by the *Compagnie Nationale de Radiodiffusion* in

the Grand Duchy of Luxemburg can now be heard clearly in the United Kingdom on almost every evening between 10 and 11 p.m. on a wavelength of 223 metres. It will be found sandwiched between the Flensburg and Cologne transmissions and can be recognised by an oft-repeated call in French, German, English, and Italian.

Recent statistics in America show that about one-third of the radio receivers sold are made in Philadelphia.

The radiobeacon station established at Sule Skerry (Orkney Islands) has recently been brought into operation and may be heard transmitting in I.C.W. morse on a wavelength of about 1,000 metres. The characteristic signals emitted by this station consist of several repetitions of the call-letters MSG, followed by a long dash and the call-sign sent again once.

Nearly fifty new short-wave commercial stations are stated to be in process of erection in different parts of Brazil. All these transmitters will be equipped for C.W. working, and have been allotted call-signs, the first two letters of which are PP, PR, PU, PV, or PY. Some of the call-signs are four-letter combinations, and therefore among the very few exceptions to the rule of three-letter call-signs for land stations which was adopted when the new Washington regulations came into force at the beginning of this year.

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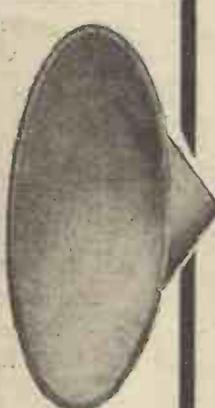
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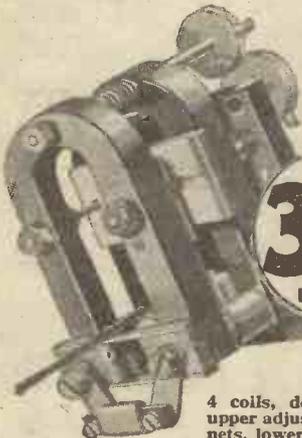
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"RADIOGRAMS"

(Continued from page 698)

The Spain-Argentine-Uruguay radio telephony service was officially opened at Seville on October 12 last. From Seville speech is conveyed by landline to Madrid, whence via radio it is sent to the Argentine, the extension to Monte Video (Uruguay) being made by a cable laid on the bed of the Rio Plata. A further step in the world's radio telephony system will be carried out by linking up Buenos Aires and New York.

Several Scottish talk periods are to be devoted to the vexed question of the Scottish Highlands, such well-known authorities as Mr. Evan McLeod Barron, Sheriff Macmaster Campbell, Cameron of Lochiel, and Miss I. F. Grant being booked to speak on various dates.

Now that most of the Glasgow programmes are being relayed by the Aberdeen station, the short weather forecast for farmers, which has been a feature of the Glasgow programme for years, is being extended to cover all Scotland and will be transmitted from all Scottish B.B.C. stations. The bulletin is prepared by the Central Meteorological Office of the Air Ministry at Renfrew.

Despite suggestions that the real reason of the visit to Glasgow of the wireless detector van is in connection with a search for a site for the Scottish Regional Station, it is learned that since its arrival in the city the number of licences taken out at the various post offices has exceeded 100 per day more than the usual average.

The B.B.C. has done not a little to foster community drama in Scotland, and now it is setting to work to temper enthusiasm

with the fruits of experience. It is almost invariably in production, and not in acting, that amateur companies fail, and Miss Elizabeth Orphoot, who is the official coach on play production to the Scottish Women's Rural Institutes, is therefore to conduct a series of talks on "Simple Play Production."

The Scottish Football League has resolved that applications to broadcast any league match must not be granted in future. It is understood that the ban will not affect any permissions already granted for league games.

Tests made with the new 60-kilowatt Oslo transmitter have demonstrated that on the allotted wavelength of 493 metres the extended area expected for crystal reception of the broadcasts has not been attained. It is thought that this failure is due to the geological conditions of the site, and steps are being taken by the Norwegian authorities to obtain a more favourable wavelength. There is a strong possibility that 1,071 metres allotted to Drontheim may eventually be chosen.

Although, at various times, it has been stated that the Irish Free State is shortly to erect a high-power broadcasting station, it would appear that the Post Office authorities have recommended the scheme, but no step can be taken in the matter until it has met with the approval of the Minister of Finance.

The high-power short-wave transmitter at Malabar, on the Island of Java, is the only station in the world which does not use aerial masts; the aerial is slung between two high mountain peaks, the transmitter being installed in the valley.

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BELLING-LEE

15/6

BROADCAST TELEPHONY

Broadcasting stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is aerial energy.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN											
25.53	11,751	Cheimsford (6SW) 15.0		588	1,449	Radio Lyons ...	0.5	*385	779	Genoa (IGE) ...	1.0
*200	1,500	Leeds (2LS) ...	0.13	288.5	1,049	Mont de Marsan ...	0.5	*441	680	Rome (Roma) ...	3.0
*242	1,238	Belfast (2BE) ...	1.0	304	1,020	Limoges (PTT) ...	0.5	453	662	Bolzano (IBZ) ...	0.3
*188.5	1,010	Newcastle (5NO) 1.0		305.6	987.7	Bordeaux (PTT) ...	1.0	*501	400	Milan (Milano) ...	7.0
*266.5	1,040	Swansea (5SX) 0.13		309	970	Radio Vitus ...	1.0	YUGOSLAVIA			
288.5	1,040	Stoke-on-Trent (6ST) 0.13		*316	950	Marseilles (PTT) ...	0.5	*921.4	977.3	Zagreb (Agram) ...	0.7
288.5	1,040	Sheffield (6LF) 0.13		316	950	Marseilles (PTT) ...	0.5	*433	693	Belgrade ...	2.5
288.5	1,040	Plymouth (5PY) 0.13		326.5	918.9	Grenoble (PTT) ...	0.5	500	530	Ljubljana ...	2.5
288.5	1,040	Liverpool (6LV) 0.13		331.4	905	Pcut Parisien ...	0.5	LATVIA			
288.5	1,040	Hull (6KH) ...	0.13	164	824	Algiers ...	1.0	*525	572	Riga ...	3.0
288.5	1,040	Edinburgh (2EH) 0.35		163	815	Radio LL (Paris) ...	0.5	LITHUANIA			
288.5	1,040	Dundee (2DE) 0.13		*381	788	Radio Toulouse ...	8.0	*1,935	755	Kovno ...	7.0
288.5	1,040	Bournemouth (6BM) 1.0		411	722	Radio Maroc (Rabat) ...	2.0	NORWAY			
288.5	1,040	Bradford (2LS) 0.13		447	677	Paris (Ecole Sup. PTT) ...	3.0	540	1,250	Rjukan ...	0.18
*301	995	Aberdeen (2BD) 1.0		408	640	Lyons (PTT) ...	5.0	*283	820	Notodden ...	4.6
*310	968	Cardiff (5WA) ...	1.0	1,354	222	Tunis (Kasbah) ...	0.6	*365	820	Bergen ...	1.0
350	848	Brookman's Park 30		1,463	205.76	Eiffel Tower ...	12.0	*304	761	Frederikstad ...	0.7
*377	797	Manchester (2ZY) 1.0		*1,725	174	Radio Paris ...	12.0	453	662	Tromsø ...	0.1
*393	553	Glasgow (5SC) 1.0		GERMANY							
*473	626	Daventry (5GB) 25.0		*218	1,373	Flensburg ...	0.5	*313	959	Cracow ...	0.5
*1,534	293	Daventry (5XX) 25.0		*227	1,319	Cologne ...	4.0	*335	896	Posen ...	1.2
AUSTRIA											
*246	1,220	Linz ...	0.5	*231	1,283	Muenster ...	3.0	385	779	Wilno ...	0.5
*283	1,058	Innsbruck ...	0.5	*239	1,256	Nurnberg ...	2.0	*408	734	Kattowitz ...	10.0
*352	851	Graz ...	7.0	*240	1,220	Kiel ...	0.35	*1,411	212.5	Warsaw ...	8.0
*453	666	Klagenfurt ...	0.5	*246	1,220	Cassel ...	0.25	ROUMANIA			
*517	581	Vienna ...	15.0	*253	1,134	Gleitwitz ...	2.0	*301	767	Buchares ...	12.0
CZECHO-SLOVAKIA											
*203	1,139	Morava-Ostrava 10.0		*259	1,157	Leipzig ...	1.5	RUSSIA			
*279	1,075	Bratislava ...	12.5	*270	1,112	Kaiserslautern ...	0.2	*351	855.5	Leningrad ...	1.0
*293	1,022	Kosice ...	2.0	*276	1,085	Koenigsberg ...	2.5	*427	702.5	Khar'kov (NKO) ...	4.0
*342	878	Brunn (Brno) ...	2.4	*283	1,058	Magdeburg ...	0.5	*483	627.5	Homel ...	1.2
*487	677	Prague (Prahá) 5.0		*283	1,058	Berlin (E.) ...	0.5	*825	364	Moscow (PTT) ...	20.0
BELGIUM											
*35.5	1,273.5	Charleroi (LL) 0.25		*319	941	Dresden ...	0.2	1,060	283	Tibis ...	10.0
246.1	1,212.6	Schaerbeek-Brussels 0.2		*311	941	Bremen ...	0.35	1,000	300	Leningrad (20.0)	
250	1,200	Ghent ...	0.5	*325	943	Breslau ...	1.5	1,010	300	Moscow Popoff ...	40.0
94	1,121	Liège ...	0.1	*380	833	Stuttgart ...	1.5	*1,304	270	Khar'kov ...	4.0
312	963.4	Arlon ...	0.25	*372	806	Hamburg ...	1.5	1,451	202.5	Moscow (Kom) ...	40.0
330	887	Louvain ...	8.0	*390	770	Frankfurt ...	1.5	SPAIN			
*609	590	Brussels ...	1.0	*418	716	Berlin ...	1.5	251	1,793	Almeria (EAJ18) ...	1.0
DENMARK											
*281	1,067	Copenhagen (Kjbenhavn) 0.75		*453	662	Danzig ...	0.25	314	956	Oviedo (EAJ19) ...	0.5
1,153	860	Kalundborg ...	7.5	*456	657	Aachen ...	0.35	*319	860	Barcelona (EAJ1) ...	8.0
ESTHONIA											
*297	1,010	Reval (Tallinn) 0.7		*473	635	Langenberg ...	13.0	*368	875	Seville (EAJ5) ...	1.5
FINLAND											
*221	1,355	Helsingfors ...	0.9	*533	563	Munich ...	1.5	403	743	San Sebastian (EAJ8) ...	0.5
*1,790	107	Lahti ...	40.0	*500	536	Augsburg ...	0.25	*424	707	Madrid (EAJ7) ...	2.0
FRANCE											
31 65	—	Radio Experimental (Paris) 1.0		*560	536	Hanover ...	0.35	453	662	Salamanca (EAJ22) ...	1.0
175	1,744	S. Quentin ...	0.1	*575	521.7	Freiburg ...	0.35	465	645	Barcelona (EAJ13) ...	8.0
211.3	1,220	Béziers ...	0.1	*1,635	183.5	Zeesen ...	32.0	SWEDEN			
221	1,364	Fecamp (Radio Normanie) 0.5		2,100	142	Norddeich ...	10.0	231	1,307	Malmö ...	0.6
237	1,265	Nice (Juan-les-Pins) 0.5		2,290	131	Luxembourg ...	3.0	*257	1,760	Hoeby ...	10.0
258	1,263	Bordeaux (Radio Sud-Ouest) 1.0		GRAND DUCHY							
130	1,256	Radio Nimes ...	0.25	223	1,376	Luxembourg ...	3.0	231	1,307	Malmö ...	0.6
*253	1,175	Toulouse (PTT) ...	0.5	HOLLAND							
*265	1,130	Lille (PTT) ...	0.7	81.4	9,554	Eindhoven ...		*257	1,760	Hoeby ...	10.0
268	1,121	Casablanca ...	0.5	HUNGARY							
208	1,121	Strasbourg ...	0.3	550	545	Budapest ...	20.0	270	1,112	Trollhattan ...	0.45
*242	1,103	Rennes (PTT) ...	0.6	ICELAND							
*263	—	Montpellier (PTT) 0.2		*1,200	250	Reykjavik ...	1.0	*322	932	Goeteborg ...	10.0
IRISH FREE STATE											
ITALY											
<p>All wavelengths marked with an asterisk have been allotted according to the Plan de Prague.</p>											



In addition to their own extensive range, PETO SCOTT offer YOU every known Radio Receiver or Component. The list given below merely illustrates our terms for a few well-known lines and we ask you to fill in the coupon, or send us a list of your requirements, for which we shall be pleased to quote for cash or on our famous system of

EASY TERMS with SERVICE AFTER SALES

The Music Leader (described in this and last week's issues). For complete kit, including Cabinet, Valves, Batteries, and all requisite accessories, send only 25/-, balance in easy instalments.

Music Lover's Gramo-Radio (described in September 28 and October 5 issues). Complete kit contains exact parts as specified. Cabinet and drilled Panel. Full-size Blueprint free with complete kits. Send only 33/9; balance in 11 monthly instalments of 19/2. Valves, gramophone motor, and accessories extra.

New Osram Music Magnet. Send only 16/6; balance in 11 monthly instalments of 16/6, valves included.

1930 Mullard "Orgola" Kit, including Cabinet and Valves. Send only 20/-; balance in 11 monthly instalments of 20/-.

Cosmor 1930 Three-valve Kit. Send only 16/-; balance in 11 monthly instalments of 16/-.

The Brookman's Three (see "Wireless Magazine," October issue). Complete kit, including Cabinet, Panel, and Valves. Send only 18/11; balance in 11 monthly instalments of 18/11.

Regentone, Ekco and all leading makes of H.T. Eliminators, from 4.7 down.

Celestion Z.20, in Oak. Send only 14/3; balance in 11 monthly instalments of 14/3. In Mahogany, 15/2.

Celestion C.12, in Oak. Send only 10/4; balance in 11 monthly instalments of 10/4. In Mahogany, 10/9.

Ultra Air Chrome U.12. Cabinet Model Loudspeaker. Send only 7/4; balance in 11 monthly instalments of 7/4. All Chassis and Cabinet Models also available.

B.T.H. R.K. Unit (for 6-volt accumulator or D.C. mains). Send only 11/7; balance in 11 monthly instalments of 11/7.

Exide 120-volt H.T. Accumulator, type W.J., in Crates. Send only 6/11; balance in 11 monthly instalments of 6/11.

Standard Wet H.T. 144-volt Battery, 10,000 m/a, absolutely complete. Send only 7/2; balance in 11 monthly instalments of 7/2. All parts for these batteries available.

All goods sent Carriage Paid. Everything available for cash if preferred.

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CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

- Nov. 5 A vaudeville programme.
- " 6 Carnival, by Compton Mackenzie.
- " 7 Running commentary on a speedway meeting.
- " 8 B.B.C. symphony concert.
- " 9 Speech by the Prime Minister at Lord Mayor's Banquet.

DAVENTRY EXPERIMENTAL (5GB)

- Nov. 4 Carnival, by Compton Mackenzie.
- " 6 "5GB Calling," Clapham and Dwyer's 1929 Concert Party.
- " 7 "Magneshah," a salty tale of the East, told by Dorothy Eaves.
- " 8 A vaudeville programme.

CARDIFF

- Nov. 4 The Barber of Bath, an operetta by J. Offenbach.

A concert was held in New York recently to amuse members of Byrd's Antarctic Expedition. The voices of the artistes, it was later reported, were heard across the 10,000 miles of land and sea and ice almost as plainly as though they had been in the next room. The concert was broadcast by KDKA.

An analysis by the Electrical Division of the American Department of Commerce reveals that there is a receiving set to every twelve persons in America. There is a set to every fifty-three persons in Europe. In the world as a whole there is a receiver for every eighty-eight persons.





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CONCEALED PIGTAIL

WEIGHT
4 1/2 OUNCES

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THEORY AND PRACTICE
By Captain H. J. Round, M.C.

Capt. Round is one of the greatest authorities in the world on radio science and practice, and his book is a complete guide to the principles under which this latest and most remarkable valve should be operated.

Loud-speaker Crystal Sets

How to Make and Manage Them

Provides working instructions for building a number of highly efficient crystal sets; making an attachment for simple connection to existing wireless set; and designs for crystal sets embodying the crystal loud-speaker system.

Wireless-controlled Mechanism

For Amateurs. By Raymond Phillips

This book is an illustrated practical guide to the making and using of short-range wireless control apparatus, and it has been written so simply that it can be understood by any enthusiast possessing an elementary knowledge of wireless.

The Practical "Super-het" Book

Explains what the Super-het is, what it does, how it works, and how to build up a number of super-het sets made of tested, British-made components.

The Short-wave Handbook

By Ernest H. Robinson (5YM)

Describes in very simple language the wireless apparatus used in short-wave work, shows how to make it and how to use it, and explains the technical principles with which the beginner will need to become acquainted.

The Practical Wireless Data Book

The intelligent novice, and particularly the home constructor and the keen wireless amateur who is always rigging up different circuits and experimenting for progress, will find this Data Book extremely helpful.

The Wireless Man's Workshop

By R. W. Hallows, M.A.

Written by a practical home constructor, this book—containing much useful wireless information—enlightens readers on the selection and right methods of using the tools and materials used in constructing wireless sets.

The Book of the Neutrodyne.

By J. H. Reyner, B.Sc. (Hons.), A.M.I.E.E.

CONTENTS: Why Neutralising is necessary; Systems of Neutralising; Difficulties Encountered in Neutralised Circuits; How to obtain Good Selectivity Without Loss of Quality; Design of High-Frequency Transformers; Lay-out in Neutralised Receivers; Some Suitable Circuits.

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- MULLARD ORGOLA KIT, including Oak Cabinet. Send only 14/3, bal. by 11 monthly payments of 14/3.
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BROWNIE

LETTERS TO THE EDITOR

The Editor does not necessarily agree with the views expressed by correspondents.

Loud-speaker Unit Adjustments

SIR,—Our attention has been drawn by a customer to a short article which appeared in your columns recently dealing with the adjustment of the 66K Blue Spot unit. By removing the dust-cover and adjusting the damping it was stated that a displacement of the armature can be corrected.

Whilst, no doubt, this "tip" was given by the writer in good faith, and he, together with others, is quite capable of carrying out this and possibly other minor adjustments, we have found by experience that it is in the interests of users in general to allow us to make such adjustments as and when required. For this reason the units are sold in a sealed condition under guarantee and, provided the unit is returned to us intact, it becomes automatically the subject of free service and attention.

F. A. HUGHES & Co., LTD.
(London, W.).

Coil Comparisons

SIR,—The letters previously published by you from A.W. (Manchester) and "Novice" (Kingston) are of much interest to me. As an amateur of six years' experience and one who has built many wireless sets incorporating various types of coils, I still think the two-pin plug-in style the best.

Apart from the unlimited choice of wavelengths and reaction variations, if, as in my case, the local station comes in at the bottom (zero) end of the condenser and 5GB near the other end, a larger coil brings the experimental station where the local was originally, incidentally cutting one out and increasing the strength of the other owing to less capacity.

My present outfit is rather novel, although simplicity itself.

It comprises leaky-grid detector followed by three stages of L.F., the first and third being transformers and the second being resistance-capacity, and plug and jack switching is used so that it can be tried as a one-, two-, three-, or four-valve set. It is also possible entirely to cut out the R.C. unit in order that two transformers only can be used. Using a loose-coupled aerial, grid and reaction condenser controlled, I can tune from 18 metres up to 2,000, or over if necessary, just by changing some of the coils—about four changes for the whole scale. C. (Liverpool).

Is the Regional Scheme Possible?

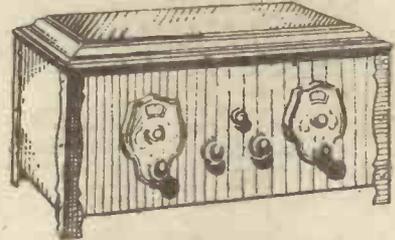
SIR,—May I draw your attention to certain criticisms by R. W. Hallows on page 565 of No. 384, which I consider are unjust and denote a selfish point of view

(Continued on page 704)

3 VALVE S.G. RECEIVER

Still the finest set on the market. Supplied with Coils, 3 suitable Valves (Mullard P.M.12, Triotron Detector and Power).

£5 12s. 6d. cash, carriage and packing free. Or with "N. & K." Cone Loud Speaker, 120 volt Ever Ready H.T. Battery and Oldham I.V.D. Acc., £7 15s. 6d. (Long Range Coils given free with this lot.)



Easy terms arranged, send for particulars. No deposit. Despatched within a few days after receipt of first instalment.

We absolutely guarantee this Set to receive at least eight different stations, but the general report from satisfied customers is 12 to 15 different stations at full L.S. strength.

If set is not entirely to your satisfaction, return it to us carriage paid and in good condition within seven days, when your deposit will be refunded.

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Cash Price, 34/- with long cord.
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 Clix Plug and Socket can
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Write for descriptive
 leaflets of Clix 2-Wire
 Terminals for perfect con-
 tact.

"LETTERS TO THE EDITOR"

(Continued from page 703)

on his part. Please let me enlighten you
 with the other side of the position.

On the south coast, as, no doubt, you
 are aware, wireless reception conditions
 have hitherto not been of the best as
 regards home stations. We have had to
 rely solely on 5XX, but with the coming of
 Brookmans Park the position is very
 different for us—at least, if the test trans-
 missions are anything to judge by. Let
 Mr. Hallows remember that this station is
 not only for London, but south and south-
 east England; also, he has had two years
 of alternative programmes at good strength,
 while we have to rely on one and must
 wait yet for ours. J. H. S. (Bognor).

The "Ranger"

SIR,—Being a regular reader of AMA-
 TEUR WIRELESS since No. 1, I think
 you will probably be interested to hear of
 the performance of one of your sets. I
 constructed the "Ranger," and am pleased
 to say that it lives up to its name, as its
 range seems to be limited only by atmos-
 pheric conditions. I have already re-
 ceived about sixty or seventy stations at
 various times, and have never used the
 phones. I added a filter output recently,
 which is the only material point in which
 I differed from the original.

C. (Port Erin, I.O.M.)

Are We Progressing?

SIR,—I should very much like to reply
 to the letter by F.P. (Liverpool) under
 the above heading, which appeared in your
 paper of October 12.

The remarks made by F.P. are certainly
 very logical, at first sight, and would
 make it appear to the newcomer to wireless
 that we had only advanced in certain
 directions and had definitely lost ground
 in others.

To take the general question raised by
 his letter, "Are the results any better?"
 (referring to the use of modern apparatus),
 I venture to suggest that quality, not only
 due to the improved manufacture of trans-
 formers, but also to modern circuits, the
 use of grid bias (which in the early days
 was more of a novelty than the usual
 practice), improved valves capable of deal-
 ing satisfactorily with a much larger input,
 and speakers having a more uniform fre-
 quency response, have made the L.F. side
 of the receiver considerably purer and more
 powerful.

Also, with regard to the range of a
 receiver, he must remember that in the old
 days the loud-speaker was hardly ever
 used—at least, so far as DX work was
 concerned—and we considered that we had
 done quite well if we could only just
 understand the announcements or speech
 of a foreign station. Nowadays we do not
 consider that we have truly captured a
 station unless every word is intelligible at
 a foot or so away from a loud-speaker.

(Continued on page 707)

YOU CAN CUT OUT



Brookman's Park

The Tunewell Cut-Out is a wonderfully
 efficient Station Selector with three
 Aerial Tappings, Sockets and Plugs to
 vary the tuning and degrees of selectivity.
 Incorporates most efficient astatically
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 denser. Enclosed in Superior Bakelite
 Case. The most efficient Cut-Out yet.

B.B.C. WAVE BAND HIGH WAVE
10/6 12/6

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Accessories: Best MANILLA Rope Halyards (will not rot) 60 ft., 1/6; 100 ft., 2/6. Special anti-rust paint (sufficient for one mast), 1/6. Coppered Earthing Tube, 1/9. C.P. special aerial has 14 strands of No. 28 gauge Enamelled high conductivity pure copper wire, 100 ft., 3/9.

Money refunded if upon examination you are not completely satisfied and return the mast within 7 days.

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OUR INFORMATION BUREAU



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See announcement below. Address Queries—AMATEUR WIRELESS Information Bureau, 58/61 Fetter Lane, London, E.C.4

“ Juice ” from the Mains.

Q.—Being interested in the construction of a mains unit similar to that described in “Amateur Wireless,” No. 319, and possessing 100-volt D.C. mains, I should like details of the current passed by 100-volt carbon-filament lamps.—A. K. (Essex).

A.—Owing to there being a slight voltage drop across the smoothing-circuit choke, the output from the unit you mention for H.T. purposes will be less than 100 volts maximum. We give a list of 100-volt standard carbon-filament lamps and the current each passes: 50 c.p., 2 amp.; 32 c.p., 1.3 amp.; 16 c.p., .6 amp.; 8 c.p., .3 amp.; 2½ c.p., .1 amp.—L. A. C.

Crackling Noises.

Q.—I experience crackling noises in my receiver, and although I have tested every component for continuity and have checked all connections, the noises still persist.—F. L. (Rednal).

A.—Although the components appear to be satisfactory in a continuity test, there is no doubt that one of your parts is defective. First of all, disconnect your loud-speaker and test the set with a pair of phones. If the noises

cease, then the insulation between the winding of the speaker has become impaired. If the

*When Asking
Technical Queries
PLEASE write briefly
and to the point*

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

trouble still exists, replace the L.F. transformers in circuit, one by one, with another

that is known to be in working order. Should this solve the trouble, then the insulation of one of the transformer windings has become defective. If either of the foregoing do not enable you to rectify the trouble, and the crackles appear to be recurring at constant intervals, then suspect a choked grid circuit. Replacing grid leaks or re-wiring the grid circuits to each valve should enable you to trace and rectify the fault.—L. C.

Crystal Set and Flat Tuning

Q.—I have an old crystal set and get quite good results from Brookmans Park and 5XX, with two pairs of phones. My complaint, however, is that the set is rather unselective. Can you advise me in the matter?—J. B. (Stratford).

A.—The fact that a crystal is used for “detecting” is sufficient to prevent the receiver from being selective. The crystal itself, being connected with the phones across the tuning circuit, causes damping and flat tuning, and the only way in which greater selectivity can be obtained is to use loose-coupled aerial tuning. Some arrangements for getting selectivity from crystal circuits are given this week in an article “The B.B.C. Brookmans Park Crystal Set.” This article will assist you.—C. L.

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A.1	WM153

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Globe DX Two (SG, D)	AW157
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All Mains Two (D, Trans)	AW180
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Hyper-selective Two (D, Pentode)	AW198
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Crusader (D, Trans)	WM69
Flat-dweller's 2 (HF, D)	WM76
Two-Daventry Two (D, Trans)	WM97
Tetrode Short-wave Two (SG, D)	WM99
Key-to-the-Ether Two (D, Pentode)	WM107
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James dual-range Three (HF, D, Trans)	AW196
All-wave High-Mag Three (Det. 2 Trans)	AW199
Knife-edge Three (D, RC, Trans)	AW201
Talisman Two-three (D, RC, Trans)	AW203
Five-guinea 3 (HF, D, Trans)	WM129
Britannia (D, RC, Trans)	WM67
Pole-to-Pole Short-wave (D, RC, Trans)	WM89
Glee-singer Three (D, 2 RC)	WM92
Aladdin Three (HF, D, LF)	WM95
All-wave Screened-grid Three (HF, D, Pentode)	WM110
Gramophone Three (D, 2RC)	WM115
Standard Coil Three (HF, D, Trans)	WM117
Festival Three (D, 2 LF-Dual Imp)	WM118
Wide-world Short-wave (SG, D, Trans)	WM120
New Year Three (SG, D, Pentode)	WM123
The Q3 (D, RC, Trans)	WM124
Lodestone Three (HF, D, Trans)	WM129
Simple Screen Three (HF, D, Trans)	WM131
Dynamic Three (A.C.—SG, D, Trans)	WM136
At Home Three (D, 2RC)	WM141
Short Wave Link (D, RC, Trans)	WM142
Binowave S.G. Three (SG, D, Trans)	WM152
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The Orchestra Four (D, RC, Push-pull)	AW167
All Europe Four (2HF, D, Trans)	AW173
Stability Four (HF, D, RC, Trans)	AW182
Clarion All-electric Three (SG, D, Trans A.C. Rectifier)	AW200
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Q-coil 4 (HF, D, Trans, RC)	WM71
Screened grid 4 (HF, D, 2RC)	WM77
Five-pounder Four (HF, D, RC, Trans)	WM91
Frame-aerial Four (HF, D, 2RC)	WM85
Touchstone (HF, D, RC, Trans)	WM109
Reyner's Furzehill Four (SG, D, 2 Trans)	WM112
Economy Screen-grid Four (SG, D, RC, Trans)	WM113
Binowave Four (SG, D, RC, Trans)	WM119
Standard-coil Four (HF, D, 2RC)	WM122
Dominions Four (2SG, D, Trans)	WM134
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Arrow (SG, HF, D, Trans)	WM154
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Adaptor for above (see miscellaneous list)	AW67a
Connoisseur's Six (2HF, D, RC, Push-pull)	WM88

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Daventry Loud-speaker Portable (2HF, D, RC, Trans)	AW107	1/6
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Arcadian Portable with Linen-diaphragm Loud-speaker (half-scale)	AW177	1/6
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MISCELLANEOUS

Adaptor for Short-wave Super 6	AW67a	-/6
H.T. from A.C. Mains	AW73	1/6
H.T. Eliminator for A.C. (250 v. output)	AW102	1/6
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"LETTERS TO THE EDITOR"

(Continued from page 704)

I am sure he must agree that there is a great difference in strength between these two conditions of reception.

Another point which he does not appear to have considered is that the number of receivers tuned to any one wavelength definitely reduces the strength of signals received on such wavelength. With improved apparatus the number of people listening to foreign programmes is considerably more than it was only a matter of a year ago—this chiefly owing to the introduction of the screen-grid valve, which F.P. regards merely as a toy.

I am at a loss to understand what he means when he speaks of dead-end losses. To quote his words, "nowadays one never hears mention of dead-end effects; not because such phenomenon is non-existent, but just because it seems easier to have a tapped coil in some corner behind the panel." I think the two chief methods of connecting the aerial to the set in these days are by means of a centre-tapped aerial coil or transformer, or by means of a "Q" coil. In neither case is there any dead-end loss, as the full coil is used, although centre-tapped, and with the "Q" coil the long-wave winding is connected in parallel with the short-wave winding when receiving on the short waves (the coils being placed in series for the long waves). This, as a matter of fact, is equivalent to increasing the gauge of wire used for the short wave band.

There is, however, one point in F.P.'s letter with which I am to a great extent in agreement, i.e., that in order to reduce damping, and so obtain maximum selectivity, our coils should be wound with larger section wire. J. L. (Liverpool).

A Helpful Varley Publication—A section catalogue just published by Oliver Pell Control, Ltd. (Varley), of 103 Kingsway, should be in the possession of every amateur. Each section deals with some specific line of complete sets or components, and listeners can have any one section which interests them or, of course, the complete catalogue. There are five sections, covering the whole Varley range—coils, resistances, transformers, chokes, R.C. couplers, pick-ups, and so on. The receivers range from a two-valver to an all-electric gramophone. In conjunction with the section catalogue has also been issued a most comprehensive instruction book, relating particularly to Varley components and giving very many helpful circuit diagrams, layouts, and much data. This is really the best instruction book of its kind we have seen for a long time, and it should be in the possession of every reader. The publication is nominally priced at 1s., but it may be obtained free of all cost on mention of AMATEUR WIRELESS.

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A.W., Sept. 21/29 (Mr. Reyner)

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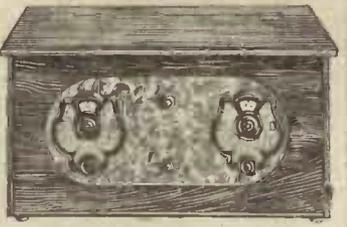
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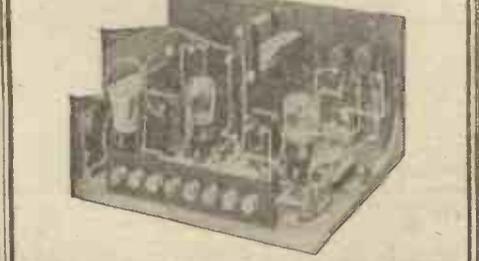
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70/- Net Cash. Not C.O.D. Post Free U.K.

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CLARION S.G.3
A child can use it.
EASY TERMS
SET IN CABINET **READY TO USE**
S.G. Valves, 2 D.E. do. (2 volt), suitable H.T., 2 volt L.T., Cone Speaker, Aerial, etc.
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Balance in ELEVEN Monthly Payments of **16/8**
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B. M.

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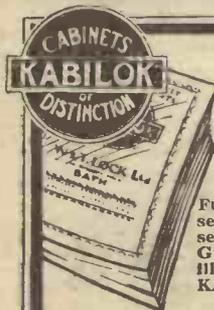
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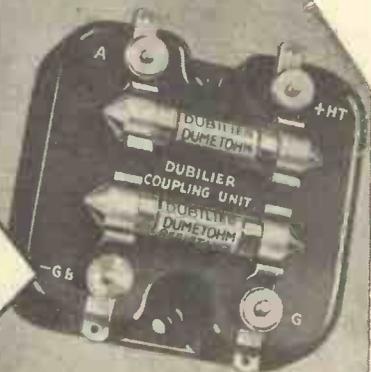
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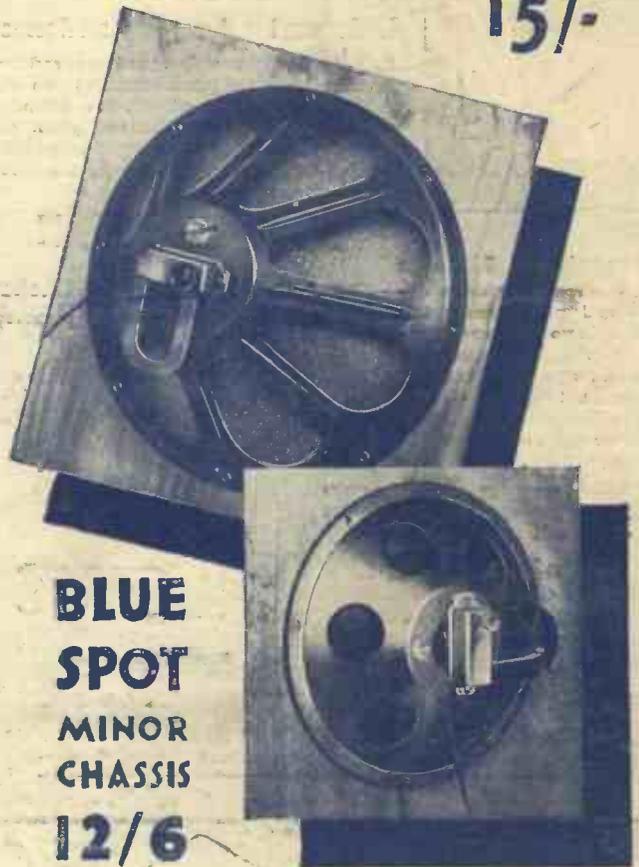
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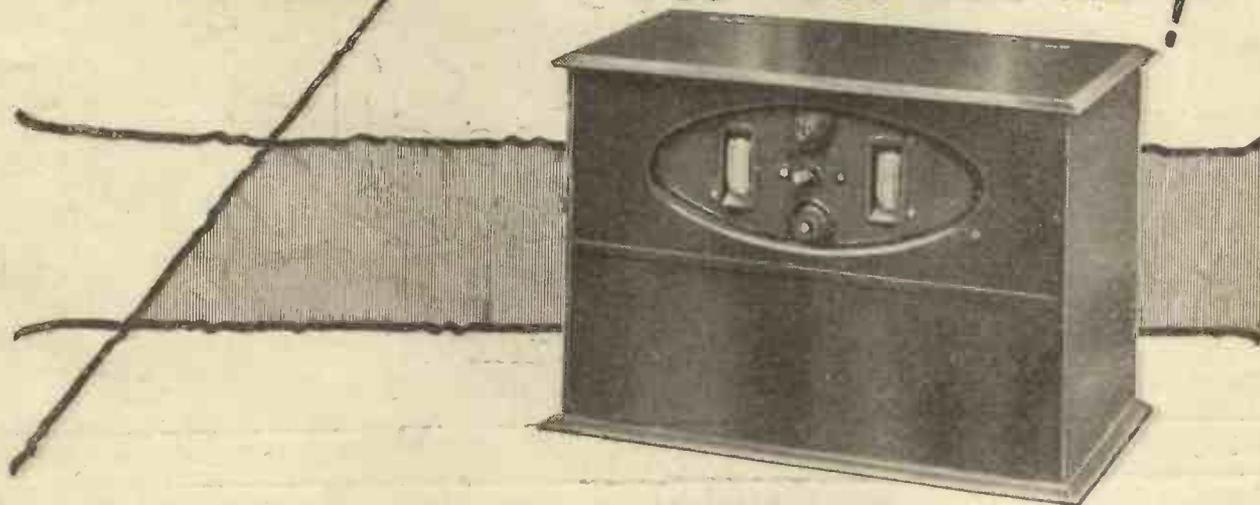
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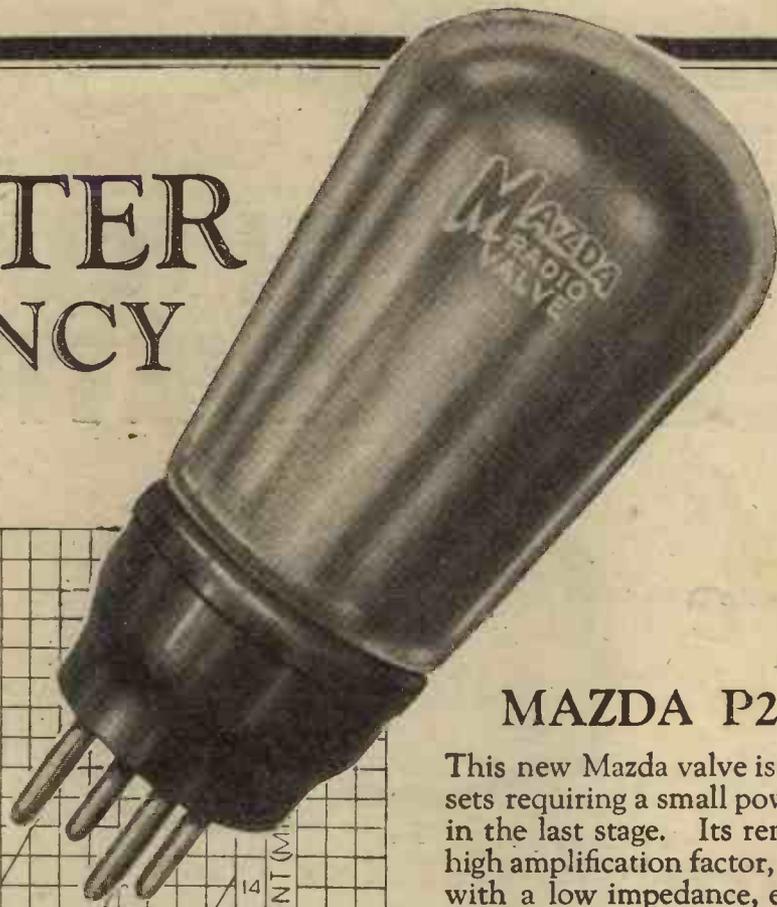
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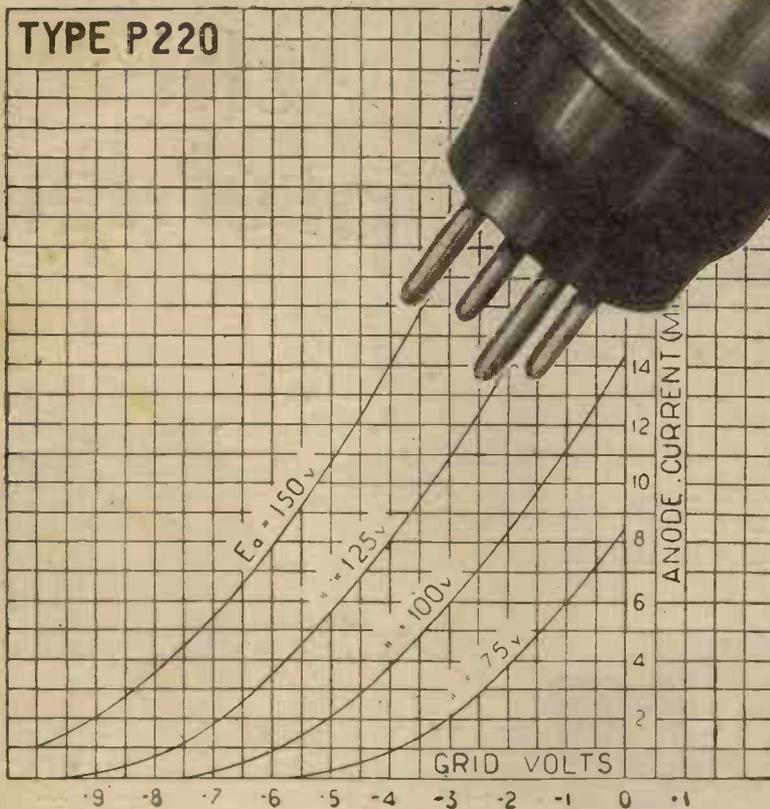
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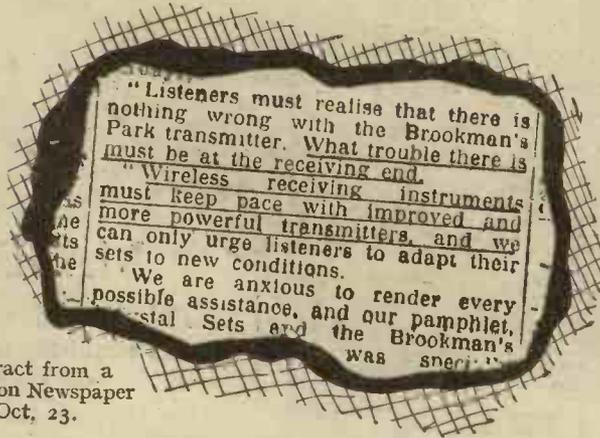
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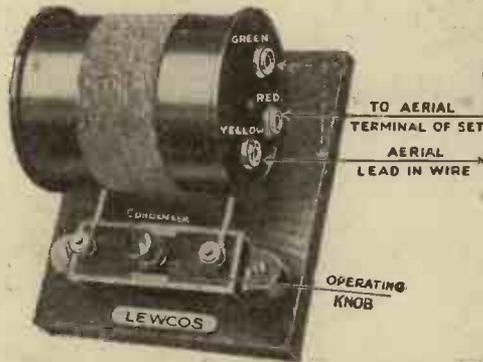
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Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Editor: BERNARD E. JONES

Technical Editor: J. H. REYNER, B.Sc., A.M.I.E.E. :: Research Consultant: W. JAMES :: Assistant Editor: H. CORBISHLEY

A New Station, and a Rumour—Can We Help Motorists?— EAJ8 versus Glasgow!—A New Radio “Thrill”

A New Station, and a Rumour—Rumours are ever current in our hobby, and the latest concerns the erection of a new short-wave station. The following report comes from a reliable source: “Short-wave broadcasting is being considered by the B.B.C. with a view to a reorganisation that will make it possible for the London programme to be heard all over the Empire by ordinary wireless listeners. The building of a new short-wave transmitting station is under consideration. True, dissatisfaction is expressed in many quarters with the present scope of 5SW. At present programmes are broadcast daily to the Empire from Chelmsford from Monday to Friday between 12.30 and 1.30 p.m., and from 7 p.m. to midnight.”

Can We Help Motorists?—In referring to safety-first propaganda, our contemporary, *The Light Car and Cyclecar*, says, “We plead that snappy reminders intended for the hearing both of those who ride and those who walk should be broadcast periodically by the B.B.C. If couched

in the right terms and sympathetically delivered, such reminders should prove a considerable benefit to the community.” It is not a question of whether they would be “sympathetically delivered,” but rather whether they would be sympathetically received. We doubt it. But undoubtedly if the scheme could be made to work in some way, the final result would be worth achieving.

EAJ8 versus Glasgow!—For some weeks past Glasgow listeners have been complaining that their reception has been interfered with by a high-pitched whistle, somewhat similar to that produced by a badly-handled valve set, but louder and steadier. This has been due to the heterodyne produced by the Spanish station, San Sebastian, EAJ8, which has been working on a frequency not allotted to it under the Prague Plan. The station has been identified and its frequency measured by the B.B.C. engineers and found to be 755 kilocycles per second, approximately; the frequency of the Glasgow station, which has been strictly adhered to, is 752 kilocycles per second (399 metres). The interference was at once reported to the Technical Committee of the Union Internationale de Radio-diffusion at Brussels. The identity and frequency of the interfering station was confirmed at the U.I.R. listening

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Through!

post at Brussels, and they immediately communicated by telegram with the Spanish authorities. Further, the B.B.C. requested the British Post Office to make representations to the Spanish administration, in accordance with the provisions of the Prague Plan. This request was complied with immediately by the General Post Office, who have telegraphed to the Spanish authorities. It is hoped that this will be effective, and that the grievance of Glasgow listeners will be removed.

A New Radio “Thrill”—Screams and cries of “Let me go! Let me go,” heard by some Kensington residents recently led them to believe that a murder was being committed. They telephoned to the police station, and three officers, a sergeant, acting-sergeant, and a constable arrived to make inquiries at a house whence the screams had been reported to be coming. They found there was nothing there, except a three-valve set, which had been reproducing a B.B.C. broadcast dramatised version of Mr. W. W. Jacobs’s story, *The Monkey’s Paw*. This is a “thriller,” and the screaming and shouting come at the end. The police department satisfied that no crime had been committed!

KESTON is no more! This doesn't mean to say that the B.B.C. has decided to scrap its relaying and testing station: rather the reverse, for these two activities, sidelines of broadcasting though they may be, are becoming more and more of importance. A new station, Tatsfield, has taken the place of the former experimental shacks at Keston.

The 1924 Days

Keston was opened towards the end of 1924, when there was a temporary "boom" in relays from America. How well we remember the times when U.S.A. relays were fished for on a clumsy multi-valve super-het, and when amateur DX "fans" vied with one another and the B.B.C. to pick up the transatlantic transmissions. Keston consisted of a couple of huts in a 30-acre field at Fairchild's, Kent, overlooking the valley to Biggin Hill Aerodrome. The main idea, at first, was to make Keston the experimental test laboratory of the B.B.C., for formerly relaying and work of this kind had been done with apparatus installed in engineers' private houses—a makeshift which could not last. As time went on the work of Keston became more and more important. Inter-house forms at Savoy Hill, relating to some or other activity, experiment, or discovery at Keston became increasingly common, and the Big Wigs had to sit up and take notice of the work which the engineers were doing in the "wilds" of Kent.



The Tatsfield testing station, to which the Keston apparatus has been removed

A Personal Account—By KENNETH ULLYETT

Gradually a new job evolved and settled itself on Keston's shoulders: that was the checking up of European stations' wave-lengths, and, later, the calibrations of international wavemeters. This necessitated the installation of very complicated gadgets, such as valve-controlled tuning-forks, and roughly-constructed wooden huts are not ideal houses for expensive apparatus of this ilk.

A Move

So, when a move became necessary, the engineers pressed for a comfortable esconce-ment for their valuable sets and wave-meters, and now, at Tatsfield, they have it.

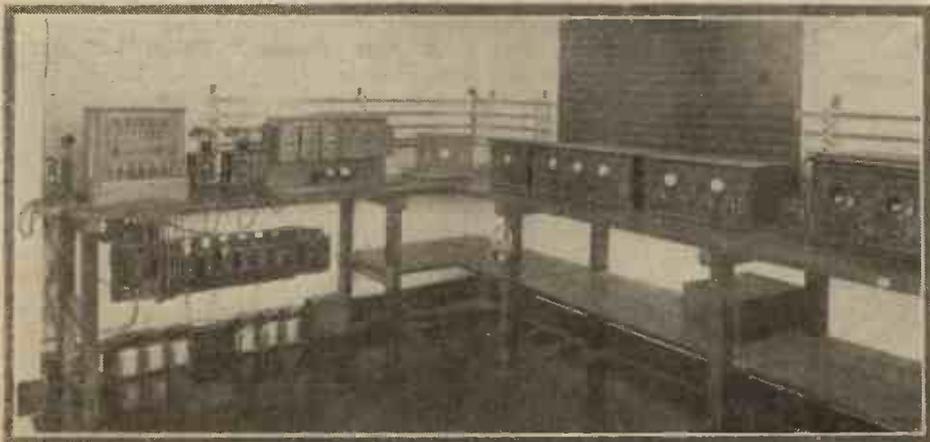
Tatsfield is only about three miles from Keston, that particular locality having been found entirely suitable. It is in Surrey, but on the borderline, and the nearest town is actually in Kent. The field chosen, I remember, is very close to that which was seriously considered, but subsequently turned down for various reasons, when the Keston station was being planned in 1924.

The site is 850 ft. above sea level, and is the highest local point, with the exception of course, of the famous Leith Hill. The

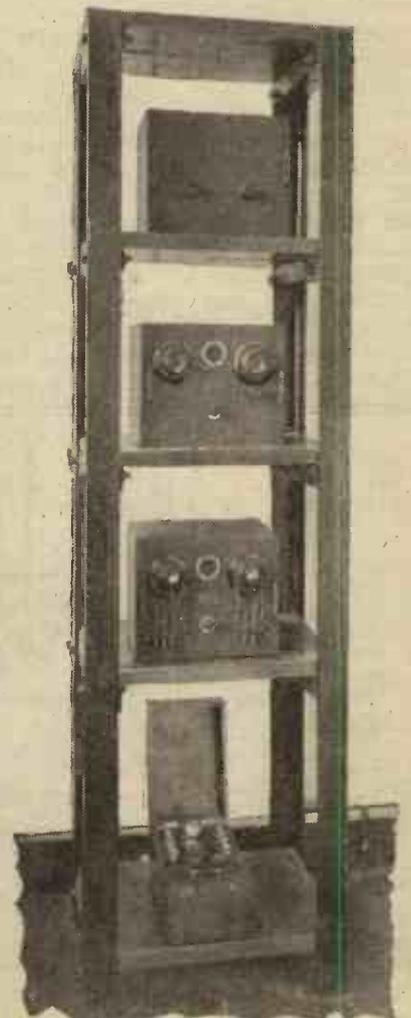
B.B.C. is fortunate in being able to choose its good positions for reception. The heading photograph to this article gives a very good idea of the station as I saw it a few days ago. As a matter of fact, everything is not yet quite ready, the change over from Keston having been made in a hurry, and no official "views" have yet been made.

AMATEUR WIRELESS is, therefore, the first to publish exclusive details of the new tester.

As you will see, there are two rooms, these housing the apparatus for the two entirely
(Continued on page 740)



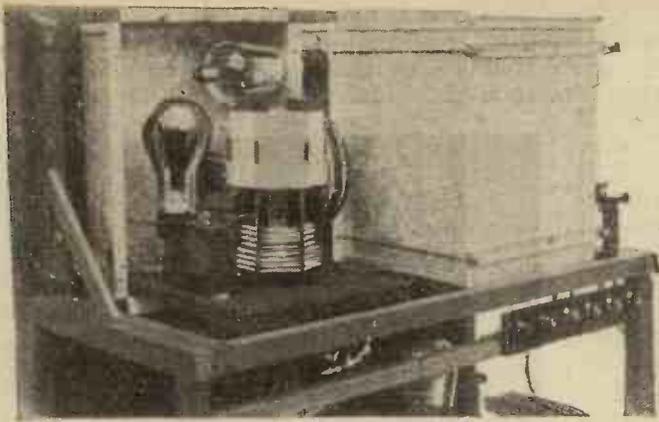
A corner of the instrument room, showing part of the L.F. apparatus, and the line termination equipment



The iron frame, bolted to the concrete floor, supporting the frequency sub-standard

MAKING YOUR OWN SCREENING BOXES

By F. W. RIDGE



Now that screen-grid valves have become so efficient and we are able to get an amplification of over two hundred times without back-coupling in the valve, it has become imperative to adopt thorough screening of the H.F. circuits to take advantage of this great advance in valve design.

components and when open giving accessibility to all wiring, etc., and thorough shielding when closed. The photographs show the H.F. and detector stages of a mains operated set and will make clear the general arrangement of the boxes. It will be seen that they are made in two halves, the fixed part being shallow (2½ in. deep) and through its side passing the S.G. valve, the spindles of the thumb-control condensers and the rod operating the wave-change switches, which in this case are of the push-pull type. As can be seen, ordinary dial-type condensers can be used equally well by passing the spindle through the bottom of the tray.

The boxes to be described are of a simple design, particularly suitable for standard long as the metal is clean at the time of making is electrically sound without soldering.

The size of the boxes described is 9 in. deep by 9 in. high by 7 in. wide. This is rather on the large size, but too close a proximity of metal to the coils will un-

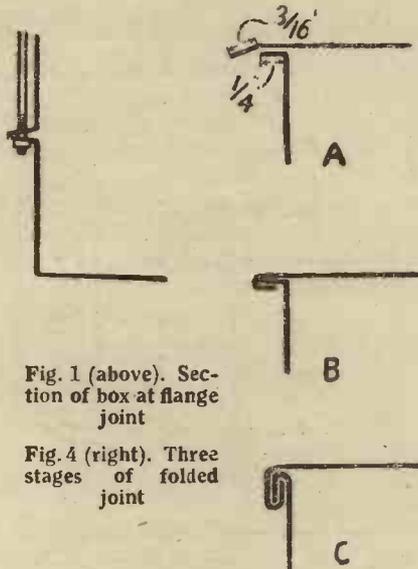


Fig. 1 (above). Section of box at flange joint

Fig. 4 (right). Three stages of folded joint

The screening boxes have, therefore, become the first consideration when designing a modern set.

Now it seems to be generally considered that whereas the average handyman can

The Cover

The coils and other components are mounted on the small baseboards which are fixed to the bottom edge of the tray.

The cover is a deep box (6½ in. deep) which can be drawn right off for wiring or making adjustments to the set. When the cover is on, contact at the joint is made by pressure between the flanges which are bent at an angle greater than 90 degrees so that as the long bolts are screwed up, the flanges press together and are bent slightly back making contact all round by their own springiness. This will be made clear from the sketch Fig. 1.

To make the boxes, aluminium or copper may be used. We shall also require two

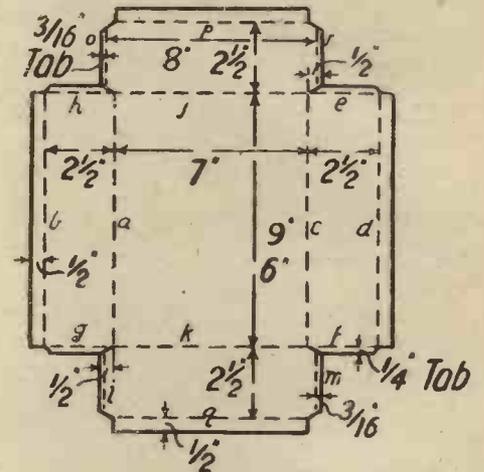


Fig. 2. Development of shallow half of box

doubtedly introduce eddy current losses and it is advisable, therefore, to err on the large side. Should it be essential to reduce the size of this box it will be a simple matter to adjust the dimensions given accordingly.

Commencing by making the shallow half of the box which is all in one piece; the sheet metal should be carefully marked out with a scriber, marking the lines for cutting and bending as shown in Fig. 2 and cutting the piece out with the shears.

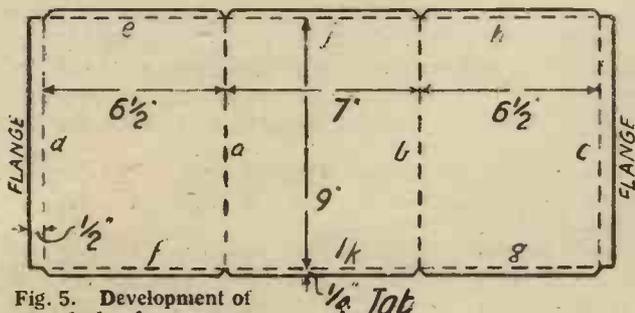


Fig. 5. Development of body of cover

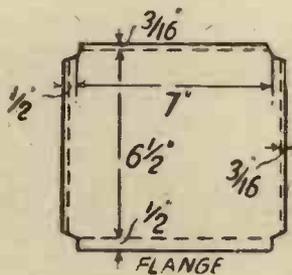


Fig. 6. Development of ends of cover

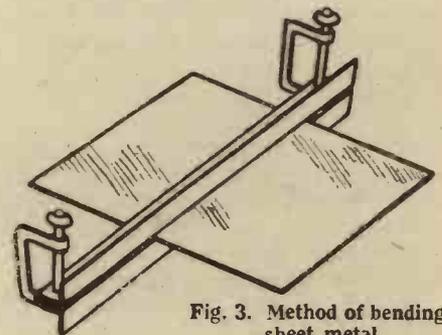


Fig. 3. Method of bending sheet metal

make a wooden cabinet he cannot make a metal one. This is not the case and from the following details any amateur with an aptitude for odd jobs should be able to make up boxes of his own or the particular design given.

pieces of about 1½ in. by 1½ in. angle iron about 18 in. long as a guide for bending and some odd short pieces of iron and the use of a vice.

All the joints are made by folding. This method makes a strong, neat joint, and so

The development drawing should be carefully studied so that it is quite clear just how the bends have to be made to fold up and form the finished tray; if a bend is made in the wrong direction it is difficult to rectify satisfactorily. Should one

be in doubt it is worth while making a paper pattern and folding this up, when the procedure will quickly be made plain.

The metal is very easily and accurately bent by placing the two pieces of angle iron on the top of the vice jaws and clamping the sheet between at the line where we require to bend and pressing over with the hands and tapping along with the hammer. If a vice is not available one piece of angle iron is placed in front and the other at the back along the line and they are held in position with the two "G" clamps while the bend is made. (See Fig. 3).

Making Bends

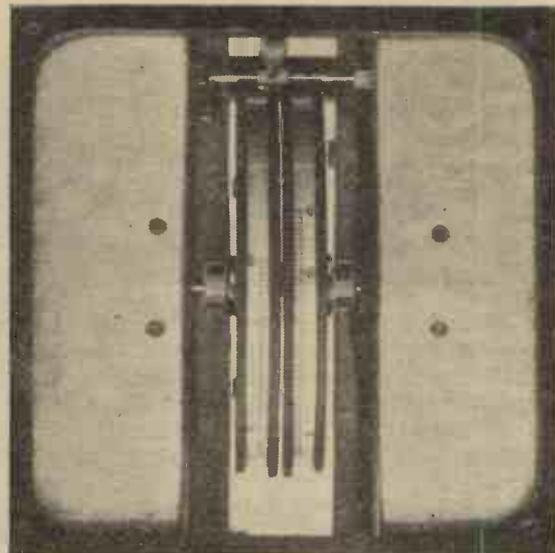
Unfortunately when a few bends have been made we find the sides already bent are in the way, but with a certain amount of ingenuity and some odd short pieces of angle- or bar-iron the difficulty can be got over quite easily.

The order of making the bends should be watched so that as many as possible can be made with ease in the vice. The best order of bending is indicated in the development diagrams by the letters. Taking up the piece which we have cut out for the shallow half, first bend up one of the sides marked (a) then its flange (b) outwards;

easier than attempting it in one piece. There should be no difficulty with this part; the joints are made in exactly the same manner and the best order of bending is indicated in the diagrams. It will be seen, of course, that as the ends are separate, the $\frac{5}{16}$ in. tabs can be bent up between the angle-irons first and then slipped on to the body and the tabs bent right down over the body tabs and the whole joint flattened back as before. The flanges of the two ends should not be bent up until the rest is completed so as to be sure to get them in alignment with the side flanges. It now only remains to provide a means of clamping the two halves of the boxes together. The most obvious method is to put small bolts through the flanges, but these will be difficult to get at and it will be found that they only press the flanges together locally. The method used, which can be seen from the photo-

rod already screwed and can just solder heads on.

The boxes seen in the photographs were fitted to an existing set of rather an unusual



Front of panel with finger plates removed



Arrangement of boxes at back of panel

These two illustrations clearly show how the screening boxes are mounted at the back of the panel

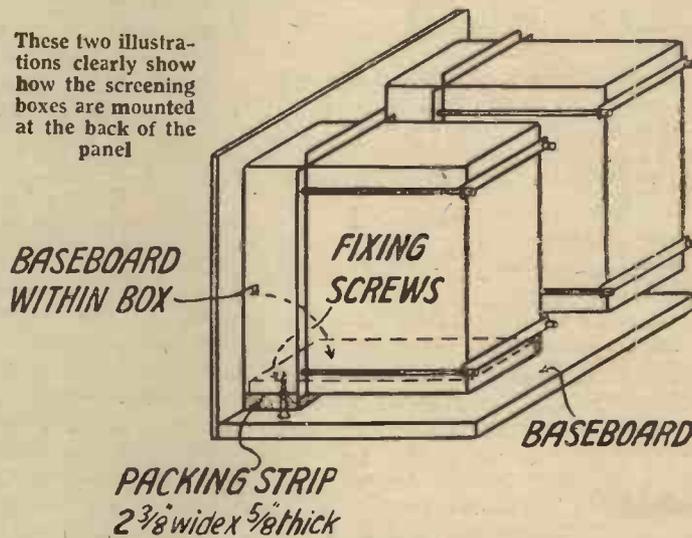


Fig. 7. Method of assembling boxes

then turning the piece of metal do likewise with the opposite sides (c) and (d). Now bend outwards the four $\frac{1}{4}$ in. wide tabs (e, f, g, and h) using the vice or the end of the pair of angle irons.

The other two sides must now be bent in and to do this a short piece of iron about 7 in. long must be used for clamping on the inside, as the sides already bent are in the way of using the longer piece. To join up the corners it now only remains to bend up bit by bit with the pliers the $\frac{3}{16}$ in. tabs and to tap them right down to engage the $\frac{1}{4}$ in. tabs of the other sides (Fig. 4 a and b). Then the corner of the box should be supported by a piece of angle-iron held in the vice while the fold is flattened down against the side of the box with the hammer (Fig. 4 c).

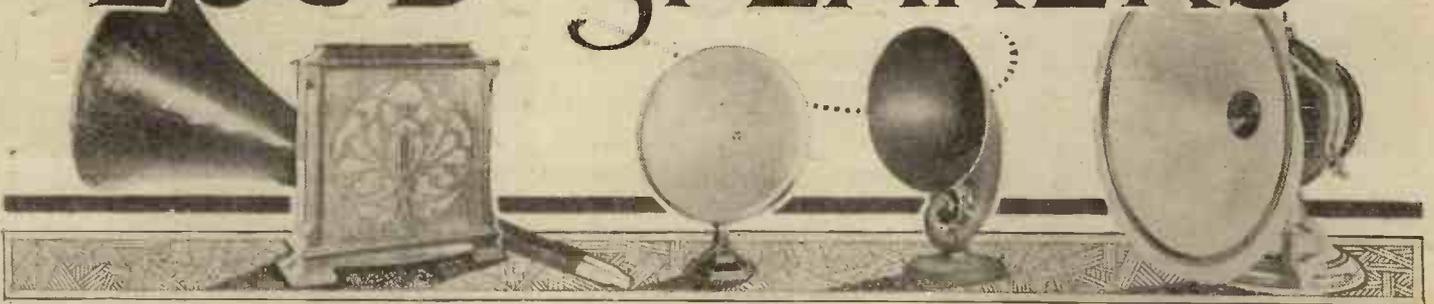
The covers are made in three pieces, the body (Fig. 5) and two ends (Fig. 6). This economises material and makes the job

graphs, is to press the whole cover forward by means of two straps across the back and four long bolts. The straps may be made from strips of 22-gauge sheet brass with the edges bent up to form a channel section for stiffness or strips of $\frac{3}{8}$ in. by $\frac{1}{8}$ in. iron may be used. Holes are drilled in their ends for the long bolts to pass through and they are secured to the box by two small rivets or screws. Clearing holes about $\frac{3}{16}$ in. diameter are also drilled in the flanges opposite the ends of the straps. Beneath the flange of the fixed half of the box and opposite the hole, a 4B.A. nut, or better, a piece of $\frac{3}{8}$ in. brass with a tapped 4B.A. hole in it, is soldered. The long bolts are made from pieces of brass rod $\frac{9}{64}$ in. diameter and $7\frac{1}{4}$ in. long with about $\frac{3}{4}$ in. of 4B.A. thread run on one end and a head of hexagon brass screwed and soldered on the other. Those people who have no dies can obtain 4B.A.

design having the L.F. stages beneath the H.F., but for those making sets of the more usual baseboard arrangement the sketch (Fig. 7) will show how this is done. Large holes such as required for passing the S.G. valve through can be cut out by drilling small holes close together all round a circle and clipping out the intervening pieces with wire clippers or by chiselling and trimming smooth with a half-round file.

When the condenser spindles pass through the box a hole about $\frac{1}{8}$ in. larger in diameter than the spindle should be drilled so as not to short circuit the bias battery; in the case of drum control a piece of ebonite about $1\frac{1}{2}$ in. by 1 in. by $\frac{1}{8}$ in. with a hole in it of the correct spindle size should be secured with two 6B.A. screws and nuts over the large hole in the box, thereby forming an insulating bush and also an extra bearing for the condenser.

MORE EXPERIMENTS WITH LOUD-SPEAKERS



"Thermion" describes some further modifications and improvements

THE many excellent driving units now on the market enable the wireless man to make up his own loud-speaker at remarkably small cost. They will appeal very strongly to those who want first-rate reproduction but cannot face the cost of a moving-coil speaker, as well as to those who like a rather smaller volume of sound than is necessary to enable many types of moving-coil speaker to do themselves justice. I have recently tried out most of the best balanced-armature or similar driving units at present available with a view to discovering the most suitable ways of using them for building up good loud-speakers and readers may find the results of these experiments of use.

Three Cone Types

There are various methods of employing these units, every one of which of course demands a cone or a diaphragm of some kind, though a baffleboard may or may not be used. Three possible ways of utilizing the balanced-armature drive are:

- (1) With fixed-edged convex cone of large size and no baffleboard.
- (2) With fixed-edged concave cone of medium size and a baffleboard.
- (3) With freely-suspended concave cone of small size and a baffleboard.

Experiments show that the results obtainable with the first system are inferior to those which either of the others will give. The large convex cone with fixed edge has distinct resonances, which make reproduction somewhat peaky, whilst the absence of a baffleboard makes it impossible to do much with the bass notes.

The second method is not altogether unpromising, but I do not think that any balanced-armature driving-unit is given a fair chance if it is called upon to operate a 12- to 14-inch cone of convex type with fixed edge. Such a cone must clearly be rather heavy, which means that inertia is present to an undesirable degree and the fact that its edge is fixed prevents just that unhampered movement which is most desirable for good reproduction.

It must be remembered that the balanced-

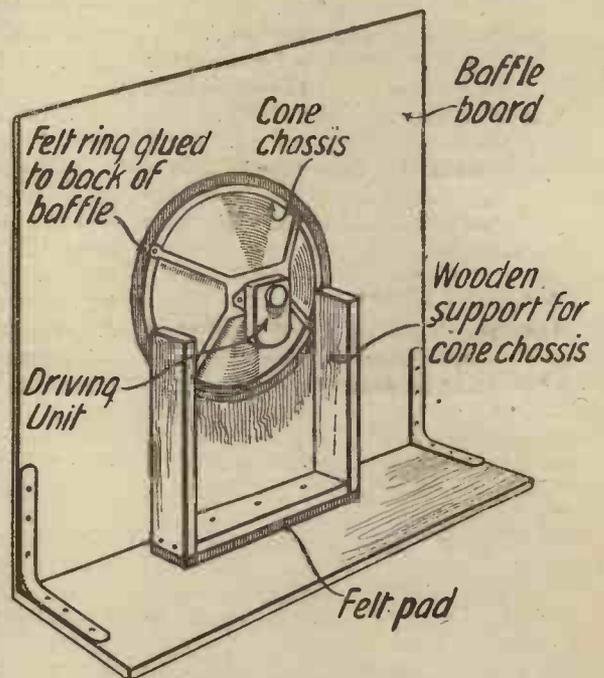
armature unit has not quite the "punch" of the moving-coil drive. With the latter a powerful atmospheric may cause the cone to move as much as a sixteenth of an inch or even more. The maximum movement possible for a cone connected to a balanced armature unit is only a minute fraction of this amount. It would seem, therefore, that to get the most out of a drive of this kind it is essential to use a very light cone and so to arrange it that its small movements are in no way hampered. If this is done a good driving unit will give an amazingly large volume of sound without any signs of chattering and one can obtain wonderfully good reproduction of the bass.

What I would recommend, then, with most balanced-armature units is the use of a simple chassis containing a light cone very freely suspended by means of a ring of flexible material. A chassis of this kind is made by several firms and an exceedingly handy one is the Baker, which will take almost any unit on the market. Another which I have found most satisfactory is the White Spot.

I think, however, that makers are not always wise in designing their cone chassis, with a view to their being attached by screws directly to the baffleboard. My reason for saying so is this. With many units when the volume of sound reproduced is great, very considerable vibration is set up. This must necessarily be communicated to the cone chassis and therefore to the baffleboard. The baffleboard is bound to have a natural frequency of its own and if the chassis is attached directly to it a resonance peak is most likely to be noticed whenever this frequency is reproduced by the loud-speaker unit.

I find it preferable on the whole to mount

the cone chassis on a support of its own so that it is quite independent of the baffleboard. The drawing indicates how this is done. The mount for the chassis is made quite simply from three pieces of 1 in. white wood fixed together so as to form a square "U." The chassis is secured to the front edges of the uprights by screws passed through the holes provided in it. The baffleboard is provided with a base attached to it by brackets and to this base



"Thermion's" own method of mounting the unit

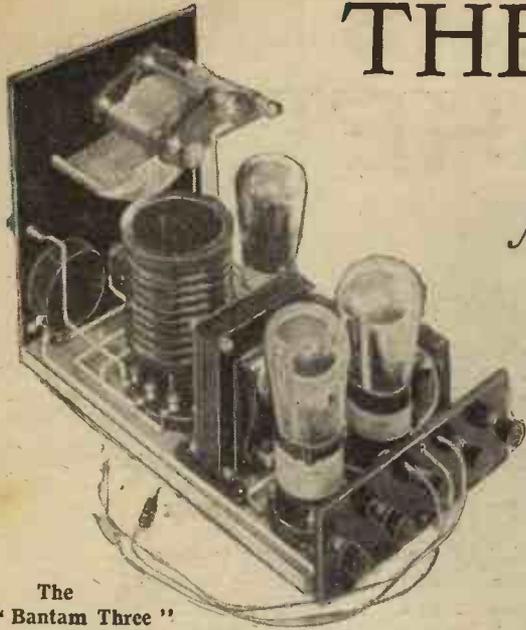
the wooden frame holding the cone chassis is fixed. Care is taken that the rim of the cone chassis does not touch the baffleboard; to prevent vibrations from being transmitted to it indirectly a pad of felt or rubber sponge is placed between the bottom of the wooden frame and the baseboard.

The supporting frame can be made in a few minutes and the job is well worth while.

(Continued on page 756)

THE "BANTAM" CROWS LOUDLY

An account of some amazing results obtained with a low-price three-valver



The "Bantam Three"

I HAVE been using your coils, plug-in and six-pin type, for some time and have found them very efficient. My present set, the 'Bantam Three,' incorporates your dual coil. Although I have been a short-wave enthusiast for the last five years, I have never had the same degree of success as I had during the past week, using one of your ultra-short-wave coils.

"I am still using the 'Bantam Three' on the short waves, simply by removing the dual coil and putting in the short-waver, without interfering with the circuit.

"Last Sunday evening, my wife and I listened to a church service broadcast from KDKA; the reception was excellent, considering that the aerial is old and badly screened.

On the Short Waves

"Last Tuesday night I had another go on the short waves, and the General Electric Co's station at Schenectady came over as plain as 2LO. The same night I picked up a very powerful carrier which turned out to be the New York end of the transatlantic wireless telephone service, the operator was calling London.

"To be quite sure that this was no freak reception, I was on the short waves again on Wednesday and last night, and on both occasions I succeeded in picking up one or more American stations, not to mention G5SW and hundreds of morse, amateur and commercial stations."

This striking letter was sent by a north London reader to Messrs. Turner & Co., the manufacturers of the Tunewell dual-range coil specified for the original "Bantam Three."

The "Bantam," one of the most successful sets which AMATEUR WIRELESS has ever published, was not specifically designed for the short waves, and it is therefore with the greatest interest that we publish this letter giving details of amazing short-wave reception on this simple three-valver.

As a matter of fact, the "Bantam" was first described at the end of last year, in AMATEUR WIRELESS No. 341. It attained immediate success because it opened up a new style of reception. The "Bantam" was the first "three" in which the designers had attempted to economise space, without sacrificing efficiency. The cabinet measures only 7½ in. by 8½ in. by 10 in. Notwithstanding these Lilliputian measurements, the set incorporates the popular detector, R.C. and transformer circuit, while long- and short-wave reception is possible, simply by the movement of a switch on the panel and, as our north London reader shows, ultra short-wave reception is extraordinarily good. We therefore think it opportune to reproduce the circuit diagram of this little three-valver, which really crows for itself! If you contemplate making it up then get the blueprint, which you will need when you start constructional work. This print, No. 160, can be obtained price 1s. post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. It really will be found invaluable not only to beginners, but to experienced constructors for it is a full-size combined wiring diagram and drilling template.

The panel carries a .0005 tuning condenser, .0001 reaction condenser, filament rheostat and wave-change switch. On the baseboard are the following: dual-range coil-holder, L.F. transformer, R.C. unit, H.F. choke, grid condenser and leak and the three valve holders. The little terminal strip at the back, measuring 2 in. by 6 in. (cut from a panel of 9 in. by 6 in.) carries terminals for L.S.+ and L.S.-, H.T.+ and H.T.-, and L.T.+ and L.T.-. The L.T.- lead is connected to the H.T.- terminal.

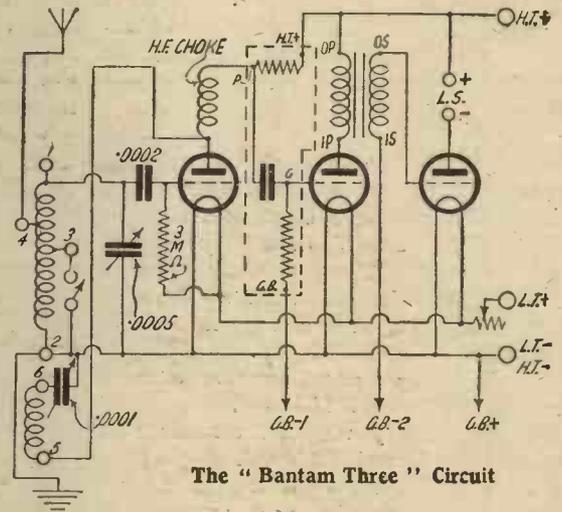
The blueprint can be used as a template and guide for drilling the panel and mounting the components. In addition it shows the positions and connections of each of the leads. When mounting the components it is advisable to leave the aerial condenser till a later stage, when wiring has been commenced. When the places have been marked on panel and baseboard, screw down the dual-range coil holder, transformer and the three valve holders. Attach the panel to the baseboard, but leave

the terminal strip unattached for the moment.

At this stage the following components can be wired up without difficulty; reaction condenser, wave-change switch, rheostat, coil base, transformer and valve holders. In some cases the wiring cannot actually be completed, but sufficient wire should be left attached to the accessible terminals, so that when the remainder of the components are added, the various circuits can be completed.

Next, add by degrees and in this order, the grid condenser and leak, H.F. choke, R.C. unit, terminal strip and finally the aerial condenser. Make a final check of all wiring when the job is finished, and there you have the "Bantam" all ready to crow for you on the long or short waves, or even the "wavelets."

It is a receiver to be most thoroughly



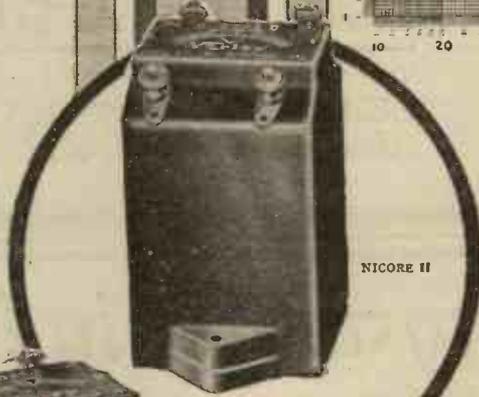
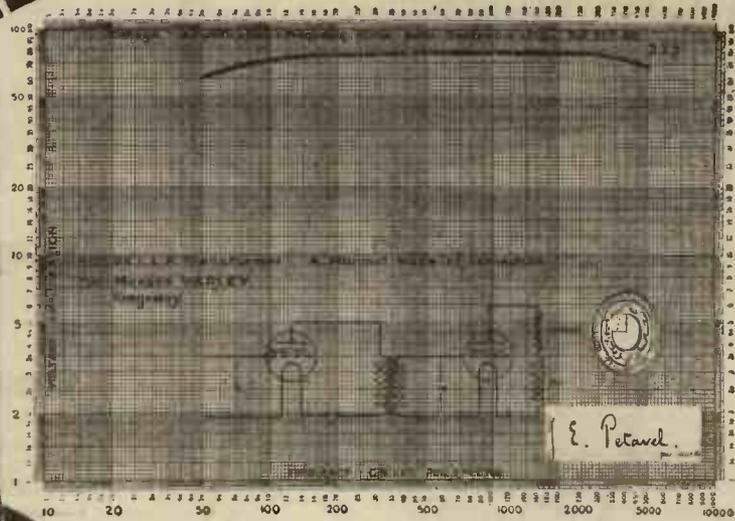
The "Bantam Three" Circuit

recommended, for its small size, the compactness of its layout and the shortness of its wiring are all conducive to the greatest efficiency.

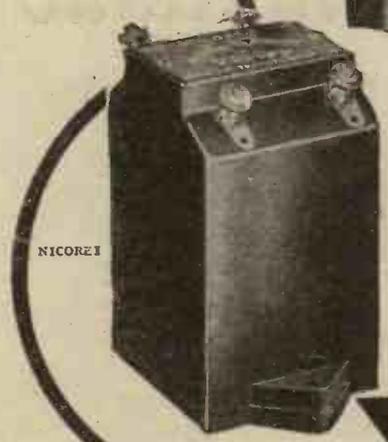
Colombia, the country said to have the world's worst radio climate, has just opened its first broadcasting station. Colombia is situated in the hottest corner of the Caribbean territory with difficult natural conditions.

The liners *Leviathan*, *Berengaria*, *Ile de France* and the *Majestic* have installed brokerage offices and special radio apparatus enabling a continuous flow of stock market quotations to be transmitted direct from the markets to the ship operator.

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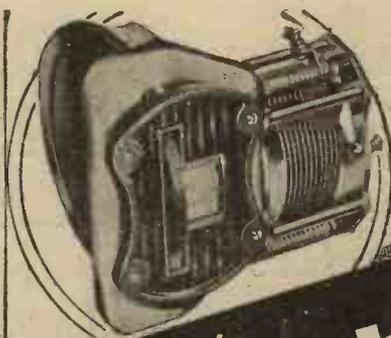
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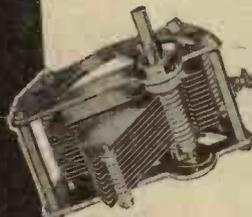
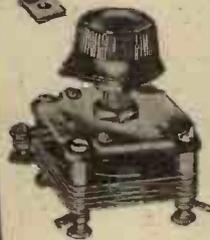
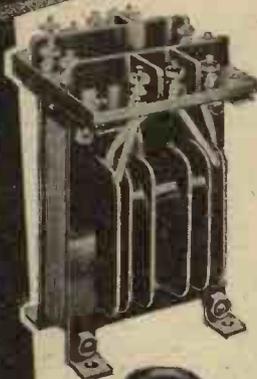
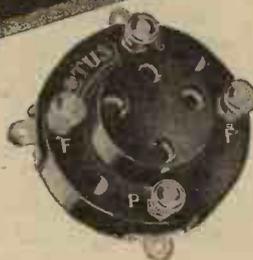
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VALVES

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Metal Panels

THE metal panel has become very popular during the last few months and it is highly probable that the next Radio Exhibition will see the final exit of the ebonite panel. The ebonite panel was very useful in its day, especially when all kinds of coils were hung around the front of one's set. It was so easy to drill and, when new, looked exceedingly "posh." However, exposure to strong light soon discoloured the beautiful blackness of the ebonite, and the prevention of hand-capacity effects necessitated the use of special internal screening.

When Mains are Used

Screened-grid valves, high-efficiency H.F. circuits and the tendency towards one-dial control have all contributed to the demise of the ebonite front or top panel. Users of metal panels who work their H.T. or filaments from D.C. mains should take care, especially if the positive main is earthed. In this case, the filament, H.T. negative and metal panel will all be two hundred volts or so above earth potential, so that if the floor is damp or you happen to be touching a water pipe or central-heating radiator, you will "collect" an unpleasant shock. In such cases, it is wise to put the L.T. accumulator (if used) in some place where it cannot be touched accidentally, and to cover the front of the metal panel with leatherette or some material that combines fair insulation with good appearance.

D.C. mains which are "positive earthed" are a nuisance to the radio user. Smoothing troubles are complicated, shocks are possible, extra condensers of high insulation must be inserted in aerial and earth leads, and other troubles crop up. D.C. mains with the positive side earthed are sufficiently unpleasant to warrant the use of H.T. accumulators.

America in Daylight

I wonder if readers often receive the low-wave American stations in daylight. When listening to a friend's set the other afternoon I was surprised when he tuned in 2XAD on 22 metres about half an hour before sunset. Speech was plainly audible fifty yards away from his moving-coil loud-speaker, although fading was very marked.

Sunset is well known as a very critical period for long-distance reception. There are many who hold that distant reception at this time is very difficult; yet I have often been able to receive distant stations at good strength with increasing clearness as it became darker. I noticed that when 2XAD was tuned in again at 11.30 p.m. the strength was no greater. I expect readers have had similar experiences.

A Puzzle

A friend, who is so bitten with "ultra-short-waveitis" that he regards anything over 20 metres as enormously long, tells me that he is at his wits' end just now. For some time past he has been endeavouring to construct a receiving set that will enable him to get down to 5 metres. Though he has removed the caps from his valves and done everything possible to cut down stray capacities to a minimum, he still finds that his single-turn tuning coil won't let him get below 6.8 metres. Can anybody extend a helping hand? I cannot, for I have never tried to get below 10 metres, which seems quite far enough down the scale for ordinary purposes. It is easy enough to get down so far, but the difficulties increase by leaps and bounds when you try to make a further reduction.

Work for the Grid Battery

One might suppose that the grid battery if under no load would last practically for ever. There are a good many reasons why it doesn't do so. In the first place, we have to remember that during reception very high peak voltages occasionally reach the grid of the low-frequency valves, carrying the grid potential over to the positive side and allowing grid current to flow momentarily. The battery may therefore come in for a certain amount of actual work. Secondly, no dry-cell battery is perfectly insulated; there are always small leakages taking place, particularly over the sealing at the top if this is allowed to become covered with a coating of dust. Thirdly, what is known as local action takes place inside the cells, with the result that the electrolyte is slowly impoverished and that the pot of the cell is eaten away. Fourthly, the electrolyte dries up in time. It has often been laid down that a grid battery should last nine months. One cannot be sure that it hasn't spent some time in stock when it is purchased. Half its nine months of life may, in fact, have been spent in the shop. My advice to readers is to make a special point of testing the grid battery cell by cell at the end of three months and to look it over at least once a month after that.

Eliminators

It is really astonishing, I think, to find what big strides have been made with eliminators and mains-driven receiving sets. I say "astonishing" because there is one very big handicap in this country. To begin with, less than 40 per cent. of British houses have electric light. Then those that are so provided have all kinds of different current supplies. "All kinds!" you say. "What's the fellow talking about? Some have A.C., of course, and

some D.C." Yes, dear reader; but the A.C. voltages are different in different places, and so is the periodicity of the current. And when we come to D.C. we find voltages ranging from 60 to over 200, and some of the so-called D.C. served up by antiquated plants has a horrid wobble in it. So, instead of being able to concentrate on one form of eliminator, the designer must make several, and this, of course, might be expected to cramp his style rather badly. But our manufacturers have risen superior to all difficulties, and we can say proudly that our eliminators and mains-driven sets are as good as can be found in any part of the world. This year's designs show a distinct advance on previous models, and we have now reached a time when the no-trouble receiving set is reality and not an impossible vision.

Beauty by Wireless

One of the American stations, I read, has added to its staff a beautician. . . . A what? A beautician, spelled exactly just like that. A beautician, I gather, is a lady who conducts what is described as a "good looks workshop." The station appears to have fitted her up with a suitable workshop, for I read that on a certain day she will broadcast the result of her laboratory experiments with sun-tan complexions, both natural and applied. Apparently she also answers questions by radio. This, I should think, must be a little embarrassing. Children love the Aunts and Uncles who call them by name and tell them to look in the coal-scuttle, but I should simply hate the whole world to hear: "Thermion, dear, the best way of curing the pimple on your nose, which you find so distressing, is to etc., etc." Still, I think that we really ought to have beauticians over here, for I am sure that it would be thrilling to learn how to acquire a sun-tan complexion, whether natural or applied. And don't you think that we poor men get rather left out in the cold in the matter of these beauty talks? I am sure that something ought to be done for us, for most of us stand far more in need of it than do the members of what for some queer reason is called the weaker sex.

A Safety-first Point

Here is a little safety-first point to which I would like to call readers' attention. Quite frequently I go to houses which are wired so as to enable the loud-speaker to be used in a number of rooms and find that there is no output transformer or filter circuit in the receiving set. In such cases, of course, the entire plate current flows through the extension wires on its way from the battery to the plate of the last valve. Now, modern output valves

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On Your Wavelength! (continued)

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demand high voltages, and frequently a very big dry-cell battery or an accumulator is used for supplying the necessary current. It may come as a surprise to some readers to know that on short-circuit a super-capacity dry battery will pass from 10 to 15 amperes for a short time. An accumulator H.T. battery will pass considerably more. Now, 150 volts at 10 amperes is $1\frac{1}{2}$ kilowatts, or as much power as is used in working a bigish electric radiator. A short circuit, then, might be productive of distinctly serious results.

The Television Position in the U.S.A.

The science of television has proved a very popular one for journalists and in every country we find opinions offered, criticisms made, defamatory remarks passed, etc., both about television as a whole and the various systems in particular. Unfortunately, many of the articles published are from individuals who are either out of touch with recent progress or who have failed to grasp the full significance of the developments now taking place in all parts of the world. On the other hand, one comes across reasoned analysis from those who can speak with authority and it was therefore refreshing to read the remarks of the Chairman of the Television Committee of the U.S.A. Radio Manufacturers' Association, as it gives the American point of view and incidentally proves that they are somewhat behind England in their development of the art.

He states that the present trend indicates that the first means of obtaining subject matter will be through the use of talking films, and bases his reasoning on the fact that films can easily be made of interest, can be readily handled, and permit of simplicity on the transmitting side. Then again, the sound can be taken directly from the side track on the film and thus permit of an easy simultaneous transmission.

Television or Tele-talkies?

The consensus of opinion in England seems to point to rather a different outlook, for the authorities concerned favour real television as being of paramount importance with tele-talkies as a second consideration. It will be interesting, therefore, to see which has the greatest public appeal. After dealing with the television receivers themselves and pointing out the advantages accruing from the allocation of a wider sideband frequency to television transmissions, he turns his attention to synchronising. To my mind this is the crux of the whole situation, and since Baird has recently successfully demonstrated and disclosed details of his automatic synchronising, I was rather astounded to learn that in America no satisfactory solution of this side of the question is

forthcoming. So far their only means of holding the picture steady is by the use of the *constant frequency* of the electric light current over wide areas, but of course this, even at the best, is very limited in its application and provides no universal solution to the problems.

Synchronising Unsatisfactory

He states that as the science progresses this method will be unsatisfactory, and in view of this there are plans now in hand to transmit on a separate wavelength a frequency standard to which transmitter and

signal would complicate matters enormously and do more to de-commercialise the project than anything else. On this score alone, then, we can pride ourselves on being ahead of the Americans, and this is a matter for congratulation to our own pioneer.

For Short-wavers

One of the difficulties in getting to know one's way about with the short-wave set has always been the lack of reliable calibration signals. The R.S.G.B. has always been very good in this matter, and they are now instituting a fresh series of calibration signals which will probably be of the utmost value to readers. On the second and fourth Sundays of each month the Society's Cambridge station will send out calibration signals at 10 and 10.5 a.m. At 9.58 a.m. the letter X will be followed by a telephonic announcement that the service is about to start. At 10 o'clock will come RSGB, RSGB de G5YK in morse, followed by a two-minute dash on 42.75 metres. At 10.5 a.m. the procedure will be repeated, and the wavelength will then be 41.38 metres. Anyone who has a short-wave set should check up its calibration by means of these signals. On other days at other times there are certain transmissions whose wavelengths can be relied upon. Amongst these are Döberitz on 67.25 metres, the Eiffel Tower on 32.5 metres, the relays of WGY, PCJ, and the Dutch stations at Bandoeng in Java. The American and Dutch stations mentioned are crystal controlled, so that there is no variation in the wavelength.

Another Point of View

Does the inclusion of reasonably controlled advertising lead to the production of better programmes? My talks with Americans rather lead me to gather that it does so over in their country. In the States no receiving licence is necessary, and therefore the broadcasting companies receive no subsidy except from radio manufacturers; but, for all that, they have enormous incomes. These are obtained in two ways. Some stations devote certain periods of the day to advertisers' announcements (leasing the use of the microphone at so many dollars a minute, or possibly a second!); others have agreements with various big concerns who agree to provide an hour's entertainment once a week or oftener. If you listen-in to American stations on your short-wave set you will often come across one of these hours. At the beginning of it the announcer says that the entertainment about to be given is provided by the So-and-So Company, whose products are well known. That is all. There then follows an absolutely first-rate programme, at no cost whatever to the broadcasting concern.

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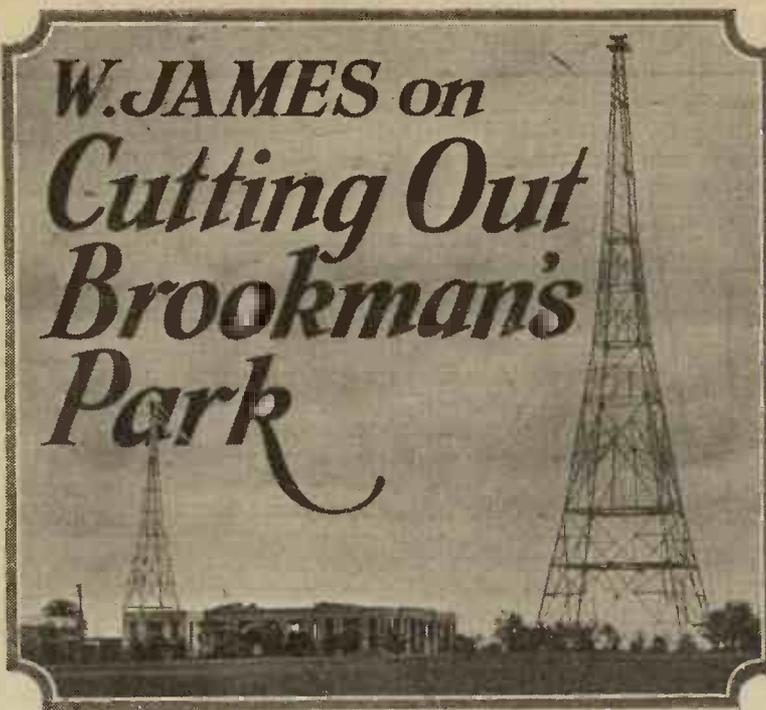
London, E.C.4.

receiver alike can be tuned in order to hold them in exact electrical step. A little reflection will show that this is rather illogical. Concentration on the reduction of the channels needed is surely preferable to any extension. At present in England the Baird system, with its own automatic synchronising, needs two channels, one for speech and one for picture, and we can, no doubt, look forward to the day when both these can be sent out on one wavelength, with, perhaps, differing methods of modulation to be separated at the receiver. The addition of a third to the existing two channels for the purpose of a synchronising

THOSE who were unable to take advantage of the test transmissions of London's new regional transmitter no doubt experienced something of a surprise when they switched on their sets a short while ago.

Some of those who normally take the London programme wondered why the volume was less than normal, but from the reports which have reached me, and my own tests in various districts, the majority are experiencing stronger signals. In fact, in many instances the new station is heard over the greater part of the medium wavelength tuning range.

This is, of course, due to two factors. The first, and probably by far the most important, is the greatly increased power of the new station in comparison with that of the old, whilst the second is the actual position of the transmitter. Thus we find that, although those listeners who used to have a very strong signal because of their good position with respect to the old



Suggestions for Making Sets More Selective

be troubled to such an extent. The fact remains, though, that many sets must be modified to suit the present conditions, and the question arises as to the cheapest and least troublesome ways of improving selectivity.

distant stations that it is desired to hear must not be too seriously reduced or the quality is bound to be poor. The earth, too, must, of course, be examined and made good if necessary. Many earth circuits are not the best that can be arranged either with regard to shortness or the effectiveness of the actual earth.

Having experimented in this direction, attention should be given to the set, and it is here, perhaps, that the greatest improvement is to be effected. Fig. 1a is a plain aerial circuit that may be improved by the addition of a fixed condenser C_1 , as in Fig. 1b. This condenser may be of .0002 or .0001 microfarad—the smaller its capacity, the sharper will the circuit tune and, let it not be forgotten, the greater the reduction in signal strength. A semi-variable condenser would be of advantage here, as one never can tell how much the signals will be cut down by a .0001-microfarad fixed condenser.

The point is emphasised because of what

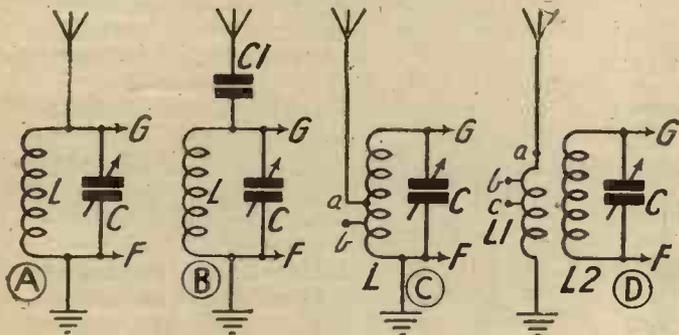


Fig. 1. Modifications that can be made to the aerial circuit

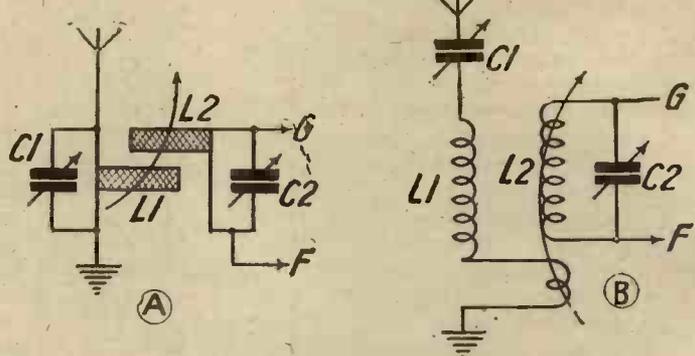


Fig. 2. Two types of coupled circuit

London transmitter in Oxford Street now receive less strength, many others are getting good signals for the first time.

Those who are receiving a signal of too great strength are, of course, in trouble, because they cannot bring in without interference a more distant station, such as Daventry 5GB, in London. In fact, it is correct to state that numbers of listeners can no longer hear a distant station on the medium wavelength band whilst Brookmans Park is broadcasting.

This is a sad state of affairs. As London listeners look to 5GB for their alternative programme, this station is received at such little strength in comparison with Brookmans Park by those instances which we are considering that it cannot be regarded as an alternative to London at all. If both transmitters at Brookmans Park were working a far different state of affairs would exist. London listeners would not

An amateur who is troubled should first examine his aerial and earth. Reduce the length of the top part of the aerial by a few yards and test the set, remembering all the time that the volume of the more

use is it seriously weakening the signals in order to obtain fair selectivity? Those having two-valve sets should remember this point.

Sets may also be improved by connecting the aerial to a point on the coil, as in Fig. 1c, instead of to the top, as in Fig. 1a. This method is to be preferred to employing a further condenser. One should note that point B is more selective than point A.

Some aerial circuits have a separate primary coil, as Fig. 1d. Then it is only necessary to tap down the coil to improve selectivity, and probably reduce signal strength as well, if the tap is made too low down, as at c, for instance. The tuning is more selective when the aerial is joined to B than A.

In order to avoid a distinct falling off in strength whilst improving selectivity, a coupled circuit, as in Fig. 2, may be tried. Fig. 2a shows the rather old-fashioned plug-

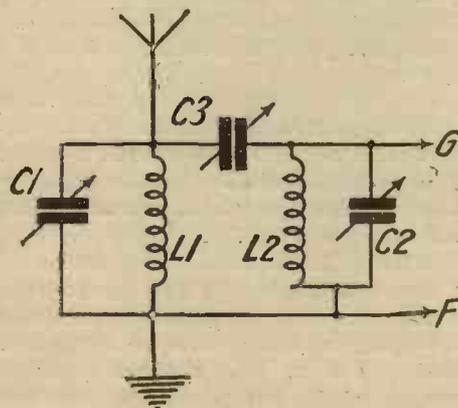
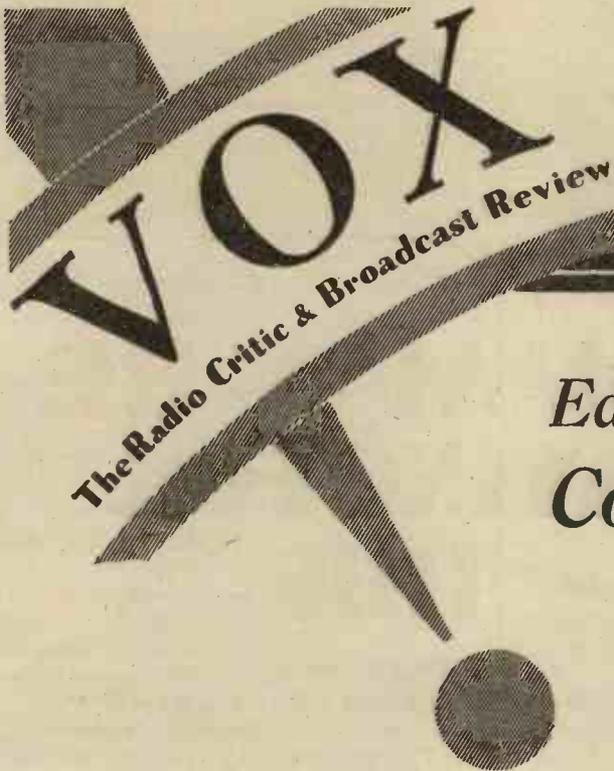


Fig. 3. A more selective coupled circuit



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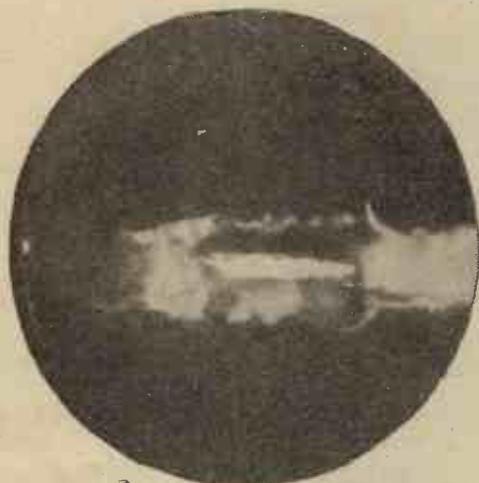
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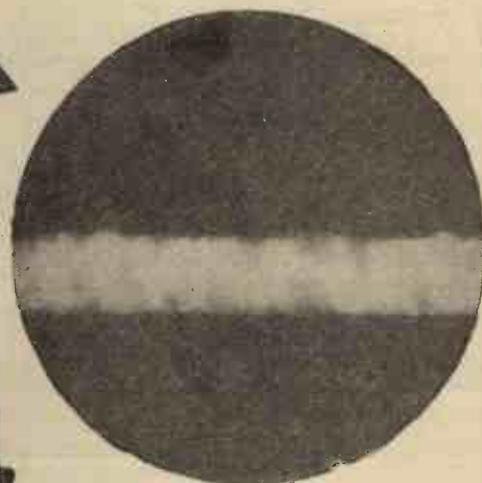
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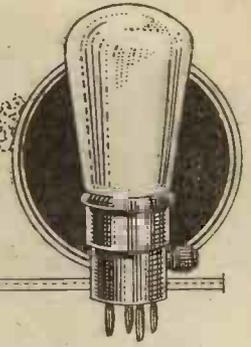
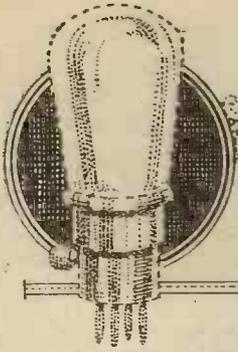
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THE PENTODE * * AS A * * DETECTOR



The possibility of using a pentode valve as a detector will be new to many readers. In this article J. H. REYNER indicates the advantages of so doing, and in a later issue it is proposed to give details of a practical "pentector" receiver

THE detector valve in a modern wireless receiver is a very vital point and one which affects the whole performance of the receiver. If the detector is not sensitive, then the reception of distant stations is impaired. If, on the other hand, the detector is made sensitive at the expense of the grid swing, it will overload very easily on a local station, and particularly will it give very unpleasant results if used anywhere near a regional transmitter. Finally, whatever arrangements are made, there is always the damping imposed by the detector on the tuned circuit, which may be small or large according to the circumstances.

Detector-stage Efficiency

With the standard three-electrode detector, which most of us use to-day, it is not possible to obtain the various desirable features at one and the same time. If we require sensitivity we must use a grid detector which is not capable of handling a large input unless we design the circuit constants specifically for this purpose. If we do this, then we have immediately lost the sensitivity. Moreover, we are seriously handicapped with the grid detector owing to the very heavy damping produced in the circuit by the presence of the grid current.

The anode-bend detector, on the other hand, is nothing like as sensitive, even although the detector damping is very much less. What is more, even with this detector we have to utilise different circuit constants, according to whether we require sensitivity or capability for handling large volume.

In short, the detector stage is a most unsatisfactory portion of a modern receiver, and it is surprising that this question has not received greater attention than it has. It is the most fruitful line of development and will repay research. In the circumstances, it is not surprising that one is always on the look out for new methods of detection, and the possibility of using the pentode as a detector has occurred to many investigators.

The screen-grid valve suggests itself at first, but its characteristics are not suitable and, moreover, the uneven nature of the

characteristic, due to the secondary emission effect, renders its operation possible only over a limited range. The pentode valve includes a fifth electrode in the form of a third grid, so placed as to counteract the negative emission, in consequence of which one obtains a characteristic similar to that of an ordinary L.F. valve, but

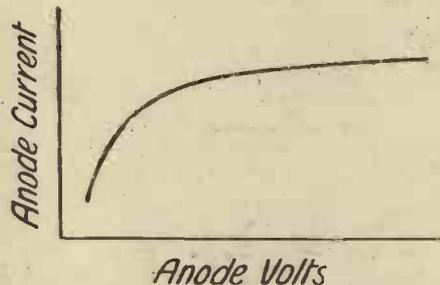


Fig. 1. Typical pentode characteristic

having a much higher amplification than is customarily possible.

The requirements in an anode-bend detector are high amplification factor and as low an impedance as possible. Consider, for example, 2-volt valves. We should use for anode bend a PM1A valve having a resistance of 72,000 ohms with an amplification factor of 36. Such a valve would only handle fairly small signals, but it will serve for purposes of comparison. The corresponding 2-volt pentode has a resistance of 62,500 ohms and an amplification factor of 82. Thus we have rather lower A.C. resistance with between two and three times the amplification factor; so

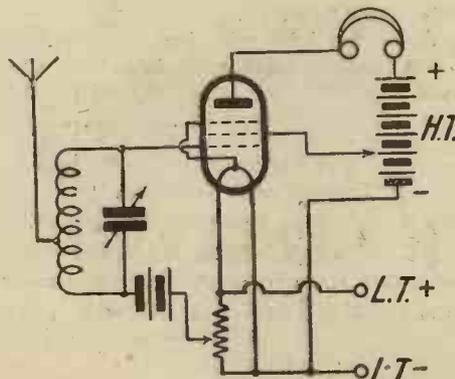


Fig. 2. Simple pentode circuit

that we might reasonably expect to obtain at least twice, and possibly three times, the sensitivity. Whether this is practicable or not is a matter which must be put to the test, and the correct position for obtaining the necessary results must be determined by experiment.

Several experiments have been conducted at the Furzehill Laboratories in order to devise circuits suitable for use with this class of detector, and sets operating on this principle will shortly be published in these columns. At the same time, acknowledgment is due to A. L. M. Sowerby, who has recently published a very useful review on the subject together with much useful data in this connection. It is proposed in this article to discuss briefly the conditions under which the pentode can be used as a detector rather than to go into any elaborate discussion of the theory and then to lead up to the introduction of the new AMATEUR WIRELESS "pentector" sets.

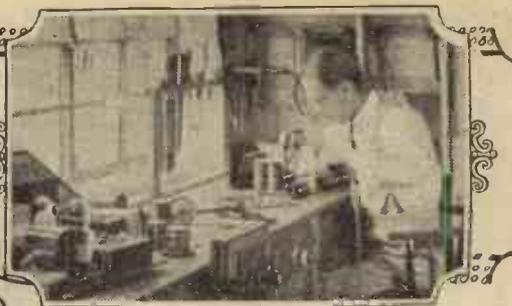
Pentode Advantages

One important advantage of the pentode detector is that with the normal anode voltages customarily in use, the anode current is not greatly affected by the actual value of the anode voltage. This is due to the typical characteristic of the pentode and screen-grid class of valve which is as shown in Fig. 1. This property proves valuable for the following reason. With the ordinary anode-bend detector the valve is biased to give a very small current. When a positive signal is applied to the grid the anode current increases, and this causes a voltage drop in the external anode circuit, which in turn reduces the anode voltage. With the ordinary valve this tends to reduce the anode current so that the increase in anode current due to the applied signal is not so great as it would be if this effect did not exist. With the pentode detector the anode voltage changes, but this does not appreciably alter the anode current, so that the full effect of the grid change is obtained.

The next point to determine is the best operating condition for the valve, and experiment shows that this is obtained

(Continued on page 754)

My Wireless Den



Weekly Tips—Constructional and Theoretical—by W. JAMES

A Strange Trouble

A FEW days ago I had an interesting experience with a set having a shielded valve stage of high-frequency amplification. The tuning had become very sharp, reaction was fierce, and the volume much below normal.

As a matter of fact, the results from this particular set had never been up to standard. Its owner always had the feeling that something was not quite right—yet the connections were correct and the parts themselves seemed to be satisfactory. All seemed in order, but a closer inspection would have revealed a dry joint in the coil unit.

Actually, the grid end of the aerial coil was not making a good contact. It locked all right, but a light touch moved the wire away from the soldering tag provided. When the wire had been properly soldered, the set behaved normally.

I always look for a bad contact when the tuning seems excessively sharp and the reaction is fierce, as they are nearly always due to a high resistance in the grid circuit which is, therefore, not properly loading the circuit. The annoying part about a fault of this description is that signals are still heard. Were the circuit broken completely at one point, no signals would come through and it would be easier to trace the fault.

Intermittent contacts and high-resistance joints usually take a little finding, and the best procedure to adopt is to commence with the aerial coil and to test every joint or contact, using, if possible, a milliammeter and dry battery. When a meter is not available, the wires should be gently pulled.

A Powerful Set

Now and again I receive an inquiry for an extra powerful set for use in a district where the signals appear to be somewhat weak in comparison with other parts. There are many such districts where, for example, Daventry 5XX is not heard at full loud-speaker strength on a good three-valve set.

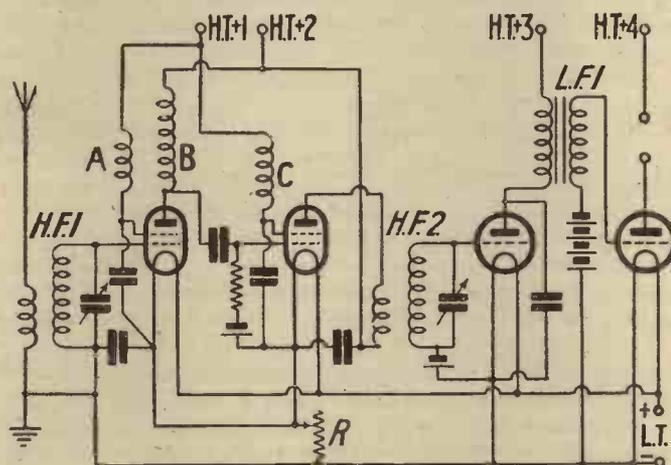
Selectivity is clearly not a matter of first importance in such cases, and it is,

therefore, possible to add a stage to improve volume without regard to selectivity. At the same time, however, the tuning must be considered, and I therefore recommend the adoption of a further choke-coupled stage as indicated in the accompanying figure. Here we have one tuned and one untuned stage of high frequency—a combination which provides much greater magnification than a single stage.

In the circuit is a high-frequency transformer to couple the aerial to the first valve (H.F.1) and an intervalve transformer (H.F.2) to couple the second H.F. valve

long waves. The tuning over the 1,000 to 2,000 metres band should not be so sharp that a clear space is heard between Daventry 5XX and Zeesen, for instance, as although their wavelengths are 1,554 and 1,635 metres respectively, the kilocycle separation is only 9.5.

Radio Paris, working on 1,725 metres, is only 19 kilocycles from Daventry, and will, therefore, interfere unless the tuning is sharp. But if the tuning is so sharp that they may be separated without a fair amount of reaction, the tuning is too sharp and quality suffers.



Circuit of a really powerful four-valver

and the detector. Choking coils A and C are small coils of 600 ohms, and choke B is, of course, of standard pattern. Volume is controlled by the rheostat R, and the L.F. coupling is a transformer, L.F.1. The high-frequency transformers may be the 1930 Binowave when reaction is available. No reaction is shown in the circuit, but it may easily be added.

Anode-bend detection is shown, but here again the more sensitive leaky-grid may be used when the maximum volume is needed and the selectivity is of no great importance.

Sharp Tuning and Strength

A fairly common fault with selective sets is, I find, that the volume is much less than normal. The craze for selectivity, using only two tuned circuits, is definitely harmful, as sets are produced to meet the demand and quality suffers.

This is particularly noticeable on the

Using and Misusing the Rheostat

The filament-resistance method of controlling the amount of high-frequency magnification, provided by a stage having an ordinary valve is, of course, not applicable when the filament of the valve is heated by an alternating current. But there is a simple method which may be applied to shielded valves of any type.

It consists of an adjustable resistance connected between the high tension and the shield of the valve. This resistance is used to fix the voltage at a suitable value, and may be adjusted to provide a range of voltages. Most shielded

valves show a reduction in impedance and magnification factor when the voltage is increased above normal and, of course, these factors increase when the voltage is reduced.

The adjustable resistance is, therefore, used to control the voltage and hence the electrical characteristics of the valve. They, in turn, vary the amount of the magnification.

The only disadvantage of this method is that the anode current may be increased by 2 or 3 milliamperes when the amount of the resistance included in the screen-grid circuit is reduced.

NEXT WEEK

Another B.B.C. "Official" Set—
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Make Sure of Your Copy

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

YOU may remember that I recently asked why we did not hear some of the good songs from "Sans Gene," by Carlyle. I was interested to hear Eric Marshall sing "Gentlemen of France."

I must confess I am always on my guard when this sort of thing is announced:—

"... And now Miss Ethel Bartlett and Rae Robinson are going to play a special piece by Bax" (or some other modern composer), "which was specially written for them and dedicated to them."

After hearing the first part I asked myself whether Bax was being kind to them or whether they were being kind to us.

I have formed what I may term "The Listener's Club," composed of all sorts of "brows," which meet sometimes to discuss the programmes.

Here, for instance, are a few diversified views to go on with.

A man we call "The General":—

"Until a certain evening not long ago, my knowledge of Norway was comparatively limited. Then along came the B.B.C. with a Norwegian national programme—designated, I suppose, to give us an insight into the musical soul of the people of Norway. The impression given me was that the Norwegians must be the most miserable, pessimistic people on

earth. Have they no humour in their lives? According to the Savoy Hill programme wallahs, they have not. At times I am inclined to think that the Savoy gentlemen themselves conform to this classification."

A flapper:—

"I listened to the film criticism by Mr. Ivor Brown. Although his chat was clear, unbiased, and comparatively free from that 'I know all' attitude which seems to be common to some of the other broadcast critics, I'm afraid that most of his time was wasted. First of all, he devoted too much time to individual films. Secondly, and more important, is the fact that he chose the wrong films for his criticism. Most of his talk was devoted to a comparatively minor film which will not be released generally until next June!

"Then he spoke about a talkie which has been shown already at most of the popular cinemas. Finally, he went on to another film which is having a 'try-out' in the West End, and will then be forgotten until its general release some time in 1930.

"Mr. Brown should realise that his criticism should be for the ears of the many, and not for the few who don't mind paying 8s. 6d. for a seat in a West End cinema."

Thus Silas:—

"Gee! Two solid hours of G.B.S.! I wonder how many listeners really sat it all out? *Captain Brassbound's Conversion* certainly was a gem of the kind we do not often get, but it was not for the masses, and therefore should not have taken up so much of one evening. One new feature about this play which earned my admiration and appreciation was the fact that those (at times) thorough nuisances—the 'effects people'—had a night off and left us in peace."

A musician:—

"Miss Gertrude Peppercorn could do justice to much more distinguished piano-forte music than Schumann's "Wald-scenen." This composition is, to my mind, one of Schumann's worst. To hear it played—no matter how clever the pianist—reminds one of the early days of the moving picture, when depressed solo pianists

tinkled out this sort of stuff on equally depressed pianos."

A dance fan:—

"What a queer idea to put Leonard Henry (or anybody else) in front of the microphone during a dance-music transmission!

"These broadcasts start late enough, as it is, if one can judge by the number of letters on the subject; in fact, they start so late that those who remain awake long enough to hear them do so because they definitely want to hear dance music. As a syncopation fan, I feel definitely annoyed with the intruder, no matter how many funny things he says."

All of which shows a keen critical faculty; but, in my view, much too negative. Listening to these views, you would think the B.B.C. never put on anything worth while; which, of course, is not the case.

The B.B.C. could easily make out a good defence. Good criticism should have its light and shade, and should not be wholly destructive.

When *Airy Nothings* was broadcast I remarked that the title was most fitting. Now, having heard *More Airy Nothings*, I should like to say once again how apt are some of these titles!

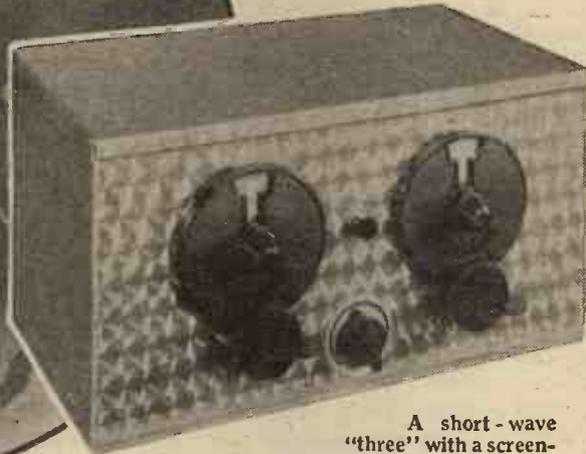
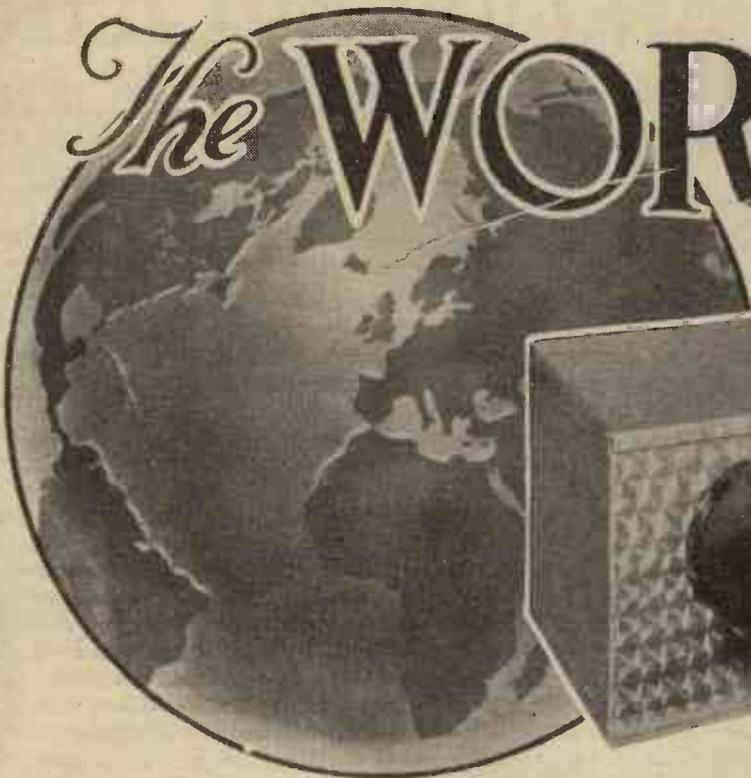


Jack Hylton—through Lissenden's eyes



A caricature of Bobbie Comber

The WORLD-WIDE



A short-wave "three" with a screen-grid H.F. Stage!

THE long dark evenings are here. Conditions are ideal for reception. The advent of winter makes one more than ever anxious to stay indoors and "tinker" with the wireless set. Congestion—and Brookmans Park—on the medium waveband make normal broadcast reception not an entirely perfect thing for the very keen enthusiast.

In brief, conditions are just ideal for

short-wave work. If you go down to the wavelets you can span phenomenal distances by the kindly aid of some freak Heavyside layer reflecting effect which exerts its beneficent influence only apparently on wavelengths below about 100 metres.

Time was when short-wave stations were not particularly worth while receiving because they were commercially controlled so that only "dots and dashes" were receivable from the European *postes* and, on occasions, a few of the bigger-power American broadcasters might be heard.

Stations

But now, if you take a glance down any list of short-wavers, you will find plenty of good targets at which to aim, and some don't need much hitting.

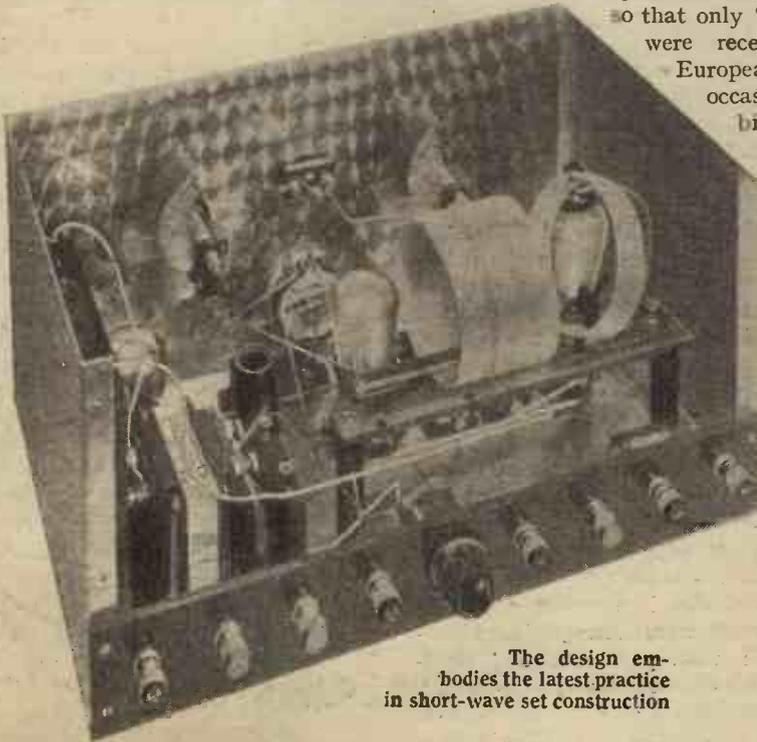
For instance, a casual glance down an abbreviated list gives East Pittsburg, W8XK (62.5 metres), the Eiffel Tower

(32.5 metres), our old friends the 10-kilowatt W2XAF at Schenectady and the 25-kilowatt PCJ (Hilversum), which latter broadcasts in practically every European language.

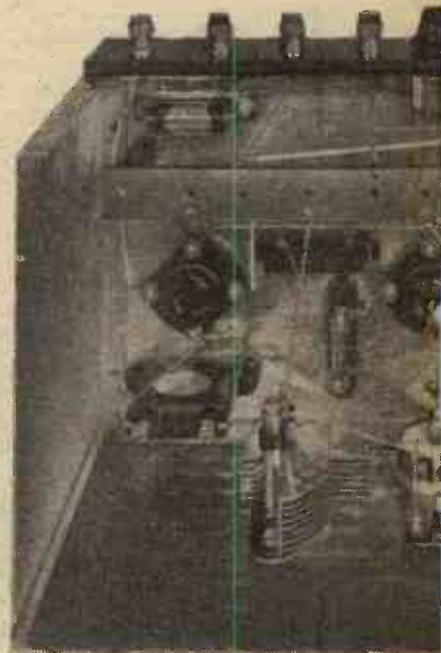
Lower down the scale still are our own 5SW, which works daily except Saturdays and Sundays on 25.53 metres, W8XK at East Pittsburg on 25.25 metres, W2XAD, the old Schenectady transatlantic companion now on 19.56 metres and that marvellous giant 40-kilowatts ultra-short-waver Huizen (Holland) which works on 16.8 metres and which you can hear between 3 and 5 p.m. on almost any day of the week.

Mind you, that is by no means the total sum of average short-wave reception. There are the more distant fellows to add spice, for instance, Bandoeng (Java), the Canadians such as CJRX (Winnipeg) and the Australians, such as 6AG at Perth.

You will agree that all these are really worth getting, and telephony station jamming is a thing yet to be experienced to any great extent on the short waves! Admitted that the possession of short-



The design embodies the latest practice in short-wave set construction



Particular attention has been

Short Wave THREE

wave apparatus opens up an entirely new gamut of stations to be logged, the question naturally arises which is the best way to receive them.

There are two courses available. Either one may temporarily adapt the ordinary broadcast receiver for short-wave working; or an entirely separate set may be made up. The first course is certainly not one to be turned down without feeling that it deserves further thought.

Short-wave Adaptors

As a matter of fact it was only a little while ago in AMATEUR WIRELESS No. 360 that a short-wave adaptor was described by means of which many ordinary types of broadcast set may be used on the short waves. This adaptor unit consisted essentially of a detector valve, with short-wave tuning apparatus, the whole replacing the detector unit of the broadcast set.

For sets of other types, such as the "Cossor Melody Maker" (old type) employing an H.F. valve, special coils are available so that by simply plugging in these new coils the H.F. stage may be worked on the short waves with a very satisfactory degree of efficiency.

But—and this is the point—the adaptation of the broadcast receiver to short-

conditions, it isn't necessary to sit up until the early hours of the morning. The Americans and the Dutchmen can generally be well received just after dinner time in the evening, and that is usually the time when the broadcast receiver is needed to be going all out. The possession of an entirely separate receiver for the short waves overcomes this snag. True, the aerial and earth are being monopolised by the broadcast set, if both are to be in action at the same time, but only a very small aerial is needed for short-wave working; often quite good results are obtained with an indoor aerial.

Dual Purpose

This present "World-Wide Three" opens up a new era in short-wave reception. It is, if such a thing can be possible, a dual-purpose short-waver. First, it is essentially the short-wave set for the enthusiast; this point will be proved a little later on when the technical whys and wherefores of the circuit are discussed. Second, it is comparatively such an easy outfit to operate, and it is so easy to log on it a wide batch of short-wavers, that no broadcast listener need have any fear of making it up and failing to get really good results.

The reasons for the results which may confidently be expected with this set are well shown from the circuit shown on page 734. The most striking fact is that a screen-grid valve is employed. The fact is striking because it is only a matter of just under a year since we could say in all good faith that for the average man H.F. amplification was certainly not a useful proposition for short-wave working. Several factors have contributed towards the downfall of this theory. The production of even more efficient screen-grid valves (that is, a greater emission with a

reduced internal electrode capacity) has been primarily responsible. The second factor has been the experience which has been gained in the "A.W." laboratory during the last season in trying out very many types of short-wave receiver.

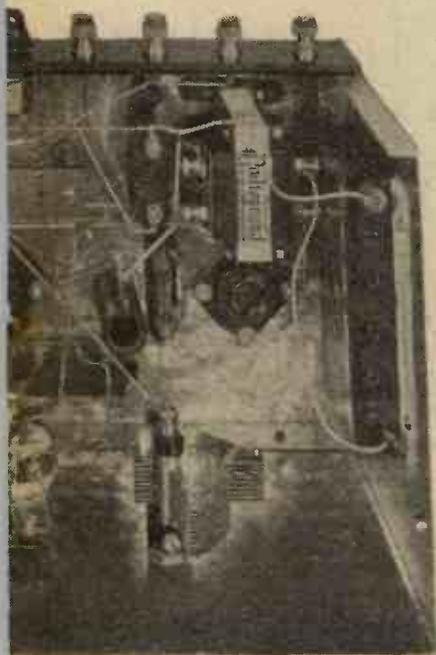
This "World-Wide Three" is the final result and every amateur who makes it up can feel confidently assured that the design is so modern that he will not be called upon to modify in any way for some years to come. The "World-Wide Three" is a happy compromise between the not-so-efficient receiver, consisting of one detector stage and two or perhaps three low-frequency stages, and the far more ambitious, expensive and rather tricky short-wave super-het set.

The Circuit

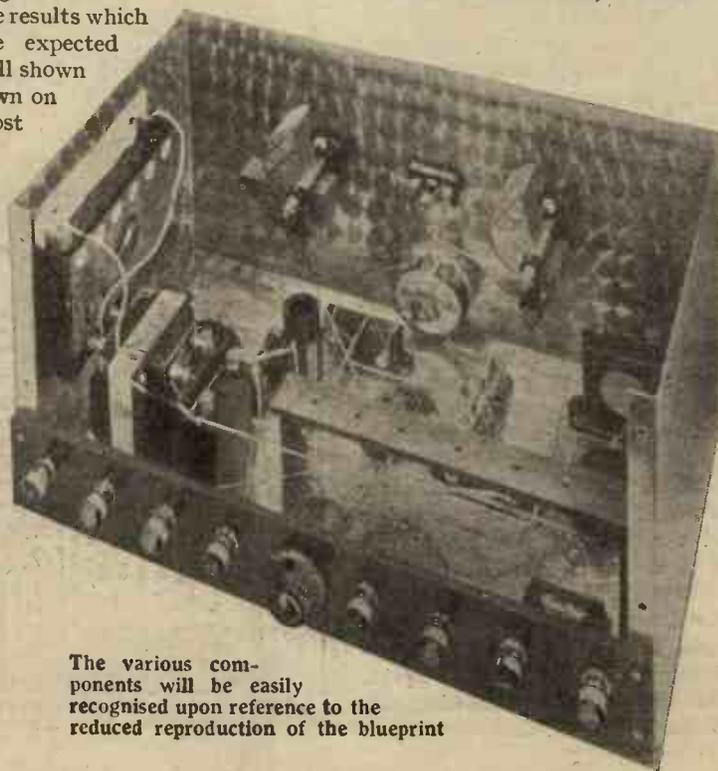
Neither of these remarks must be taken as a condemnation of the circuits concerned; the "det. and L.F." combination has been very popular in amateur hands in the last three or four years for short-wave working and the short-wave super-het. is still used extensively by the B.B.C. But this new set with one screen-grid stage is certainly a step forward in the right direction and is an advance on the det. and one L.F. arrangement.

This rather lengthy preamble is necessary to the introduction of the technical points of the circuit, because most readers naturally expect a promise of performance, and a reason, before being asked to delve into technicalities.

The set is an all-metal one, because so



paid to the layout and wiring



The various components will be easily recognised upon reference to the reduced reproduction of the blueprint

“THE WORLD-WIDE SHORT-WAVE THREE” (Continued from preceding page)

much trouble is experienced through lack of shielding unless the whole cabinet is of metal. The H.F. stage is arranged very

Components

Special stout aluminium cabinet, 14 in. by 7 in., complete with 8-in. baseboard (Parex).

.00015-mfd. short-wave variable condenser (Formo, Cyldon, Burndept, Jackson).

.00035-mfd. variable condenser (Formo, Cyldon, Burndept, Jackson).

400-ohm panel-mounting potentiometer (Igranic, Lissen).

Push-pull filament switch (Bulgin, Lotus, Trix).

Three valve holders (Benjamin, Vibrolders, Lotus, W.B., Formo).

Two 1-mfd. fixed condensers (Lissen, Dubilier, T.C.C.).

.001-mfd. fixed con-

denser (Lissen, Dubilier, T.C.C., Graham-Farish, Watmel).

.0001-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish, Watmel).

100,000-ohm grid resistance (Lissen, Graham-Farish, Ediswan).

Two grid-leak holders (Bulgin, Lissen, Ediswan, Dubilier).

Short-wave high-frequency choke (Igranic, Wearite, Watmel, Parex).

Complete set of short-wave coils, with base (Colvern).

Low-frequency transformer ratio 5-1, (Telsen “Radiogrand,” Lissen, Varley, Brownie).

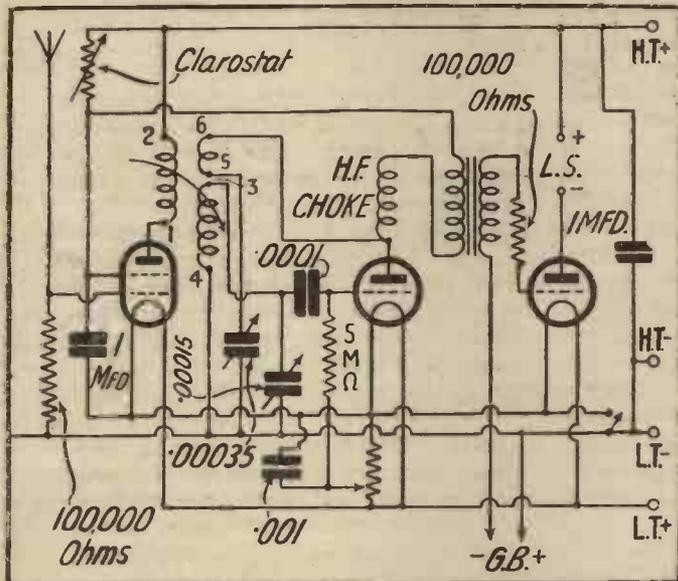
Ebonite strip, 14 in. by 2 in. (Raymond).

Variable resistance, 100 ohms to 5 megohms (Clarostat “Standard,” Volustat, Regenstat).

100,000 ohms wire-wound resistance and holder (Ready-Radio, Dubilier, Lissen).

Eight terminals marked: Aerial, Earth, L.T.+, L.T.-, H.T.-, H.T.+, L.S.+, L.S.- (Belling-Lee, Eastick, Burton).

(Continued on page 744)



The Circuit

much in the normal manner, a loose-coupled transformer being employed for interval coupling.

The grid circuit of the screen-grid valve is rendered aperiodic by shunting a 100,000 ohms fixed resistance between aerial and earth. This method of using a screen-grid amplifier on the short waves is most effective. The primary winding of the H.F. transformer is also aperiodic, the secondary being tuned by a .00015 variable condenser. The voltage on the screening-grid and detector valve anode is controlled by a variable high-value resistance.

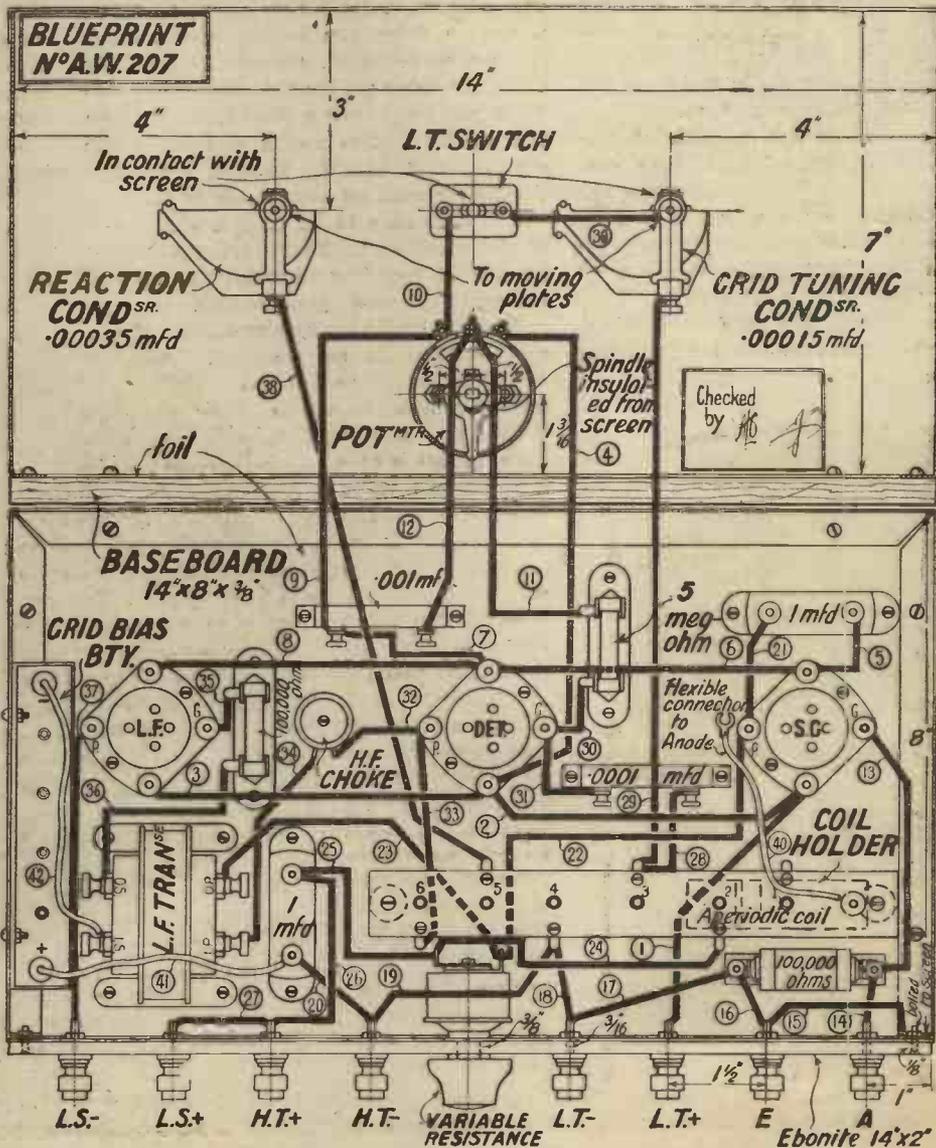
The Detector Circuit

The constants and arrangement of the grid circuit of the detector deserve notice. A .0001-mfd. grid condenser is used and the lower end of a 5-megohm leak is taken to a potentiometer, the winding of which is, of course, placed across the L.T. terminals. This potentiometer is placed on the panel and is a great aid in tuning.

There is nothing very extraordinary about the low-frequency amplification side of the receiver, except to note that a triode and not a pentode is employed, as a standard arrangement. A “Radiogrand” transformer is used to couple the detector to the power valve and the primary winding is not connected to the maximum H.T. positive terminal, but to the screening-grid tapping, so that the detector anode voltage is the same, minus the drop across the transformer primary as that on the screening grid.

The parts shown in the following list will be needed for the construction of the “World-Wide Three”:

A full-size Blueprint of this wiring diagram can be obtained from the offices of “A.W.” price 1/-



THE POWER PENTODE

YOU CAN DRIVE OFF BATTERIES BECAUSE IT ONLY TAKES 7 MILLIAMPS!

You want more power—the new Lissen Power Pentode Valve will give it to you. Your 2-valve set will give you strong loud-speaker signals when you fit a Lissen Power Pentode; distant stations that previously you could only hear on headphones now you hear at fine loud-speaker strength. In fact when you put the Lissen Power Pentode into any set with one stage of L.F. amplification it becomes at once tremendously more powerful.

Ask for a Lissen Power Pentode, and see how this new valve transforms your set.

LISSEN

POWER PENTODE

17'6

(2 VOLT)

THE ONLY PENTODE VALVE ON THE MARKET THAT IS ECONOMICAL IN BATTERY CONSUMPTION:

Most good radio dealers now stock the following types: (2 volt.)

- H.210 R.C. and H.F., 10/6
- H.L.210 General Purpose, 10/6
- L.210 L.F. Amplifier 1st stage, 10/6
- P.220 Power Valve, 12/6
- P.T.225 Power Pentode, 17/6

All other types available shortly.

No need to alter your receiver—you simply make a connection from the terminal of the Lissen Power Pentode Valve to the highest H.T. tapping you are using on your battery—just a piece of flexible wire connection. It seems like four times the volume you get when you put this new Lissen Power Pentode in your set without further change.

LISSEN LIMITED

WORPLE ROAD, ISLEWORTH, MIDDLESEX.

Factories also at Richmond (Surrey) and Edmonton. (Managing Director: T. N. Cole.)



"A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

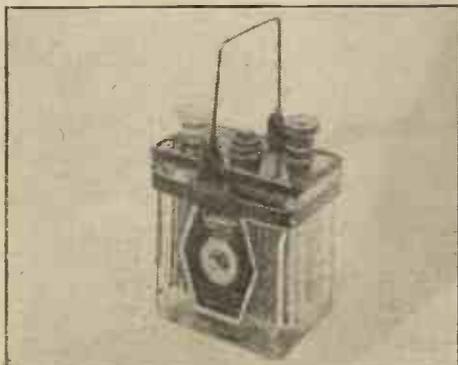
Oldham Accumulator

THE modern two- and three-valve sets are so economical in filament current consumption that there is little necessity to use large-capacity accumulators; in fact, those who have to carry these weighty articles to a charging station naturally prefer a small battery.

Accumulator manufacturers have therefore concentrated on the smaller-type cells, and by the use of specially-formed plates are producing batteries capable of standing up to small discharges for months on end. This is exactly what the amateur requires since he may only use his wireless set at infrequent periods.

We have recently tested a small two-volt Oldham accumulator with a rated capacity of 10 ampere hours actual. The two sets of plates are mounted in a glass container having overall dimensions of $3\frac{1}{4}$ in. by 3 in. by 6 in. high. The terminals fitted are substantial in size and one can rely on obtaining a satisfactory grip if by any chance corrosion should occur.

This accumulator is intended to be filled with acid and on leaving for twenty-four hours should be in suitable condition for use; in fairness to the battery, however, we discharged it first and then charged it again at the rated current value. A continuous discharge of a $\frac{1}{4}$ -amp. was then taken until the battery had fallen to 1.8 volts; this occurred after approximately sixty-eight hours test. Although the battery was rated at 10 ampere hours, it will be seen from the figures that we obtained as much as 17 ampere hours on the small discharge of .25 amps. which after all, is approximately that taken by a two- or three-valve set.



Oldham accumulator with carrier

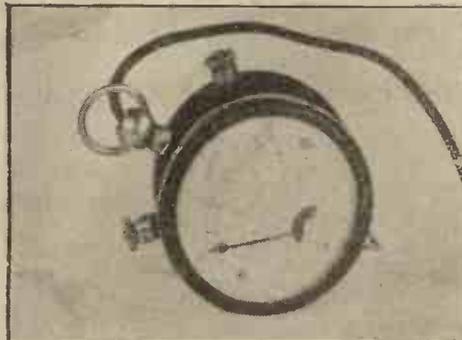
As one would expect from an Oldham product, the general construction of this battery is sound and it should give long and reliable service. The makers are Oldham & Son, Denton, nr. Manchester.

Handy Triple-purpose Meter

THERE are three test meters which the wireless amateur most often needs; he requires a voltmeter for measuring the low tension, a voltmeter for measuring the high tension, and a milliammeter for checking the milliamper consumption and testing whether the final valve is overloading. To combine these three meters in one instrument selling at 8s. 6d. is an achievement attained on the Wates voltmeter, marketed by the Standard Wet Battery Co., Ltd., 184-188 Shaftesbury Avenue, W.C.2.

One range extends from 0-6 volts, and the other from 0-150 volts. The additional terminals on the meter are used when measuring the anode-current consumption, which may be measured up to 30 milliamps, a useful range for normal purposes.

This meter is sufficiently correct for the needs of the average user who does not require a precision instrument, the average accuracy being about 5 per cent. The price is, of course, very reasonable. On the volt-



Wates pocket test meter

age readings, the resistance per volt is 33 ohms. Therefore, when measuring a 100-volt H.T. battery, the current consumption will be approximately 20 milliamps. As a milliammeter, the resistance is 200 ohms, and it would therefore seem advisable to bypass it with a condenser when it is connected in the H.T. supply, otherwise the resistance may cause back coupling and distortion, and so invalidate the reading.

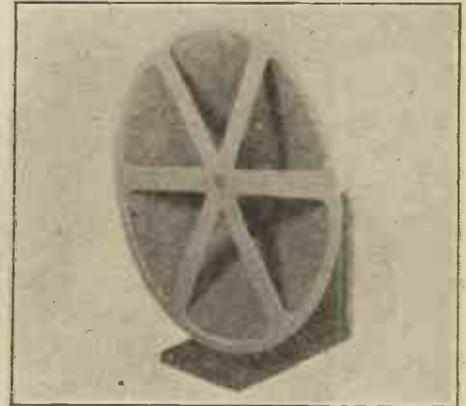
The instrument is well finished and should appeal to readers.

Novel Cone Kit

THE tendency of progress is towards simplicity and this is a maxim which, in general, can be applied to wireless. In the case of cone loud-speakers, the modern tendency is to float the diaphragm at the periphery but this does not necessarily entail the use of such flexible materials as leather or silk.

This week, we have tested a Sovereign

cone kit which is the very essence of simplicity. It comprises merely a piece of cone paper with a cardboard spider. The cone should be cut out by following with



J. R. cone kit partly assembled

a pair of scissors the full black line marked on the paper and then overlapped to form the correct shape after which it may be stuck together with the aid of secotone or glue and finally stuck to the cardboard spider. This spider is fixed to some chassis or cabinet at the centre and is sufficiently flexible to float the diaphragm. The scheme is both ingenious and effective, whilst the constructional work may be carried out by anyone who has no knowledge whatsoever of wireless or tools.

The cone can be completed ready for use in approximately one hour and fitted into a suitable cabinet with a good speaker unit will give quite satisfactory results. The paper has evidently been chosen to afford sufficient rigidity for the diaphragm and yet remain non-resonant in character.

The price of this kit is 3s., and it can be recommended to constructors.

The makers are the P. R. Wireless Co., of 6-8 Rosebery Avenue, E.C.1.

Another rumour!—At the close of the Motor Show at Olympia, there was a rumour current that a prominent French motor-car manufacturing concern was putting down vast plans for the mass production of a cheap three-valver to sell in this country at a very "cut" price. It is not possible for us to mention names, of course, but unquestionably there is no truth in the story. Probably the "wireless-set panel" appearance of the fascia boards of many foreign cars nowadays gave strength to the tale. Incidentally, there was at least one British car—in the luxury class, of course—fitted with a self-contained portable set.

Delivers all its stored up ENERGY



Serious experimenters as well as amateur constructors who realize the importance of the fixed condenser are turning to Lissen, because Lissen Fixed Condensers deliver all their stored up energy, are leak-proof and are accurate within 5% of their specified values.

YOU CANNOT AFFORD TO IGNORE CRITICAL AND ACCURATE VALUES

In almost every circuit volume and purity depends upon the precise making of a fixed condenser and a fixed grid leak. Select these from the Lissen range and you will get the utmost from your receiver. Any radio dealer will supply you with the correct values of Lissen Condensers and Lissen Grid Leaks.



LISSEN FIXED CONDENSER

Holds its charge and delivers it without leak or loss. In any R.C.C. circuit, the condensers you use should be absolutely leak-proof, otherwise 50 per cent of volume will be lost. Lissen condensers never leak, never vary, and they are accurate to within 5 per cent. of their marked capacity. .0001 to .001, price, each 1/- .002 to .006, price, each, 1/6. .01, 2/- each.

LISSEN FIXED GRID LEAKS

These resistances are absolutely unvarying, no matter what the conditions or the current load. All values, each 1/- With terminals, 1/3 each.

LISSEN R.C.C. UNIT

Embodies a .01 condenser, which delivers all its stored-up energy and resistances that will never vary, no matter what the current load, interchangeability of resistance values Price 4/-

LISSEN

LISSEN LIMITED Worples Road, Isleworth, Middlesex. Factories also at Richmond (Surrey) and Edmonton. (Managing Director: T. N. Cole)

Advertisers Appreciate Mention of "A.W." with Your Order

OPERATING THE "MUSIC LEADER"

Below are some notes on the operation of the extremely efficient self-contained four-valver which was the subject of a Free Blueprint presented with No. 384

THE "Music Leader" is the transportable receiver, constructional details of which have been given in the three previous issues of AMATEUR WIRELESS. The purpose of the "Music Leader," as explained in "A.W." No. 384, is to provide indoor reception without the necessity for unsightly wires, poles and other fixings in the garden.

There is a big difference between the "Music Leader," which is an indoor transportable, and one of the many AMATEUR WIRELESS outdoor portables which have been described during the summer season. For most purposes a portable has to be designed with lightness in weight as a prime factor always in view, and successful working over a long period may have to be sacrificed to this end.

On the other hand a transportable does not need to be very light. It needs, usually, to be carried from room to room or from one side of the room to the other. Avoidupois is therefore not of paramount importance. H.T. batteries and the accumulator have the greatest influence on the total weight of a receiver and, conversely, on the success it will work over a long useful period.

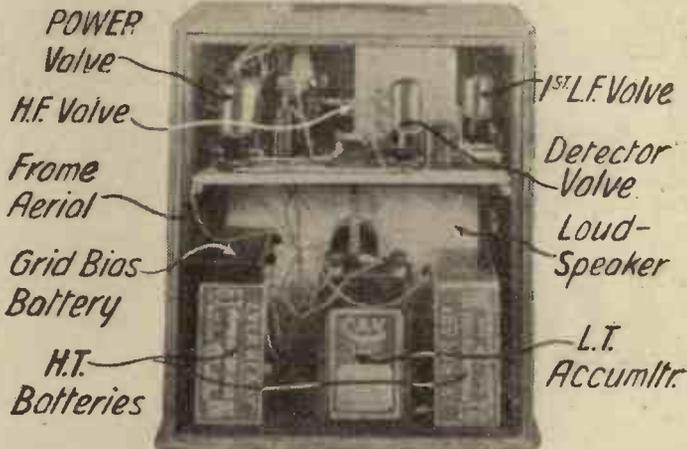
Plenty of Battery Space

In the "Music Leader" there is ample space for batteries of a suitable size. A photograph on this page shows a view of the interior taken from the back and this is a distinct guide to the battery space available. One of the merits of the linden-diaphragm loud-speaker, as used in the "Music Leader," is that it takes up very little space in depth. Consequently, the major part of the battery compartment, measuring approximately 15 in. by 9 in. by 7½ in. is available for the housing of suitable H.T., L.T., and G.B. As shown in the photograph, it is quite possible to place in the battery compartment two 60-volt units of the popular portable type, a 9-volt grid-bias battery or even one having a larger maximum voltage value and a very large accumulator, preferably of the non-spillable type. It would even be possible to place an eliminator in the battery compartment, provided that it was adequately shielded.

Frankly, however, this is not really to be advised, unless the eliminator is for use with D.C. mains and the mains are adequately smoothed, because interference is most likely to be experienced and this will quite spoil the reception. Of course, whenever the public mains supply is available it is recommended that an eliminator should

be employed in preference to any other source of H.T. supply.

In the event of an eliminator being used with the "Music Leader" it is no difficult matter to carry the H.T. battery flexes



This photograph will make clear the many excellent features of this successful receiver

from the set unit to a socket at the back of the cabinet. Then the cabinet itself can house the accumulator and grid-bias battery and the eliminator may be kept down near the mains plug, being connected by a length of multiple flex when required.

So far as valves are concerned, a normal four-electrode screen-grid valve should be used in the H.F. stage; if all the batteries are to be self-contained, it is recommended that 2-volt valves should be used throughout because in this way the size of the necessary accumulator is reduced.

Valves to Use

The detector valve should preferably be of the DEH type, or where a valve range is marked by general names only, then a general purpose valve having an impedance of approximately 30 to 50,000 ohms should be employed.

The L.F. valve should have a lower impedance, somewhat in the neighbourhood of 10 to 15,000 ohms and a valve of the DEH class is eminently suitable.

For the final stage, a valve having a low-impedance of approximately 5,000 ohms, such as the DEP and numerous other valves of the "P" variety should be used.

A maximum H.T. voltage of at least 120 is recommended and this value should be applied to the H.T. tapping, H.T.4. A value of 80-100 volts should be applied to tapping H.T.3, which provides the anode voltage to the first L.F. valve. Approximately the same voltage will be found suitable for the H.T.2 tapping which is connected to the anode circuit of the detector and the H.F. valve. The screening grid voltage is applied through

the H.T.1 tapping and according to the make of valve used should vary between 75 and 90 volts.

With most low-frequency and power valves a grid-bias battery having a maximum value of 9 volts will provide an adequate range, only if a mains eliminator and a super-power valve are used will a large G.B. battery be needed.

For the first tapping, G.B.1, 1½ to 3 volts will be needed, while 7½ to 9 volts should be applied to the second tapping, G.B.2.

When operating it will be found impossible to keep the two main tuning condensers very largely in step, although at the two extreme ends of the scale the readings will not exactly correspond. The right-hand condenser tunes the frame aerial and the left-hand condenser is the H.F. tuning

control. Usually the left-hand condenser will be found to give the sharpest tuning.

A Selective Set

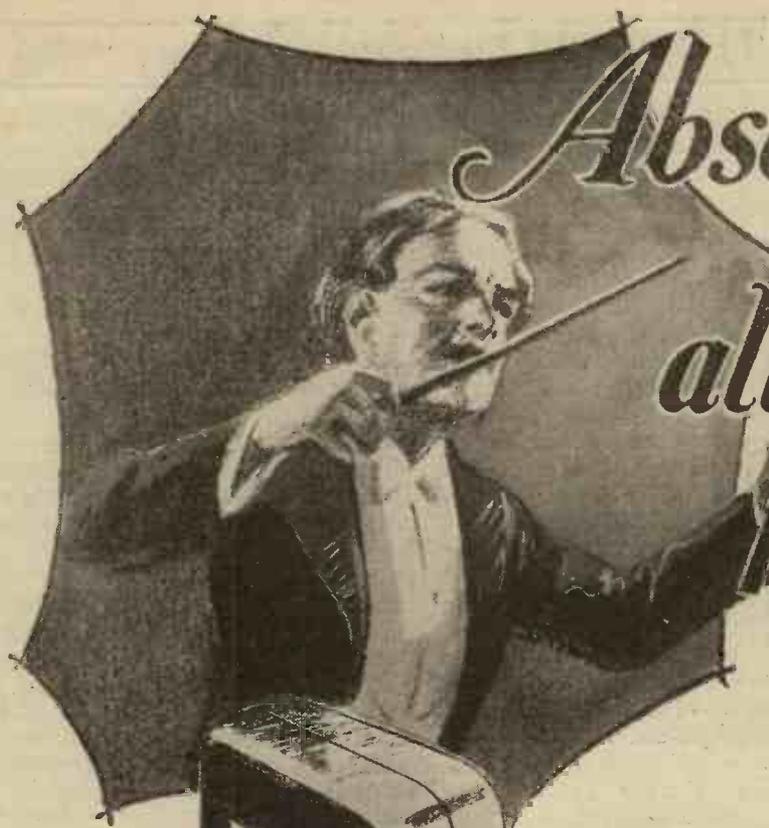
In order to get the utmost selectivity, advantage should be taken of the selective properties of the frame aerial. The set should always be turned so that a line drawn along the frame aerial winding is pointing towards the station which it is desired to receive. Conversely, if it is desired to cut the station out, then turning the receiver so that the frame aerial axis is at right angles to the direction of the station will result in an effective "silent point" from this transmitter.

A point which should be particularly noted by London readers is that when turning the "Music Leader" so that its frame is at right angles to Brookmans Park, the direction is then most favourable for the reception of foreign stations, and with the "Music Leader" it should be possible to put up a "leading" list of "D.X.-ers" despite the alleged wipe-out of Brookmans Park.

When you have made up the "Music Leader" let us know the results you get. We were so confident with the original model that we had no hesitation in making it form the subject of the free blueprint which was given with AMATEUR WIRELESS No. 384.

And we want to know your verdict!

HALF A GUINEA—is being paid for wireless Titbits. Turn to page 724 for full details



Absolute silence for the all-important pause—

The hush that comes before the downward sweep of the conductor's baton is all-important; it gives time to gather the instruments together for the burst of melody and it adds contrast to the intensity of the succeeding sound. These pauses are used to fine effect by great musicians and the silent background which you get when you use Lissen Transformers gives you amplification which is inimitably fine. Notice how the notes of music and the words of song and speech stand out in sharp stereoscopic relief when you use Lissen Transformers. In every circuit you can employ them—no matter what else is specified. They have brought a vast improvement to radio reproduction.

The LISSEN SUPER TRANSFORMER

This Super LISSEN Transformer is made in two ratios, $3\frac{1}{2}$ to 1 and also $2\frac{1}{2}$ to 1. The $3\frac{1}{2}$ to 1 is suitable for use in either the first or the second stage of an L.F. amplifier, or can be used in cascade for both stages, and with practically any valve. The $2\frac{1}{2}$ to 1 transformer is suitable for use after a high-impedance rectifier valve without fear of distortion or loss of high notes and overtones. The price **19/-** is the same for both ratios

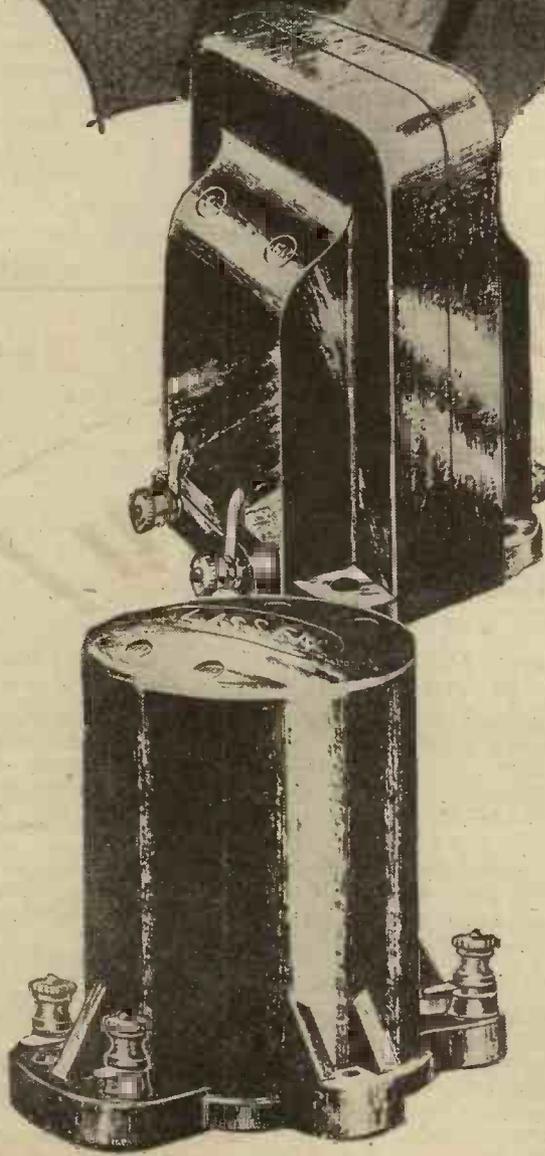
The famous 8/6 LISSEN TRANSFORMER is still supreme in price and will never break down—

The famous 8/6 LISSEN Transformer is suitable for all ordinary purposes, and its huge sale proves it still supreme value. It continues to earn high praise as "the transformer that never breaks down." **8/6** Turns ratio 3 to 1. Resistance ratio 4 to 1

LISSEN

TRANSFORMERS

LISSEN LIMITED Worples Road, Isleworth, Middlesex. Factories also at Richmond (Surrey) and Edmonton.
(Managing Director: T. N. Cole.)



To Ensure Speedy Delivery, Mention "A.W." to Advertisers

THE B.B.C.'s NEW TEST STATION *(Continued from page 714)*

different jobs of relaying and frequency testing. Two aerial masts have been erected, carrying single-wire aerials, but

lunch, that it had gone out of tune owing to a temperature change; that kind of thing is no good when serious work is attempted, as for the frequency testing for the Union Internationale de Radio-diffusion.

At Tatsfield the cavity walls and effective electric and hot-water radiators ensure a temperature maintained to within a few degrees Fahrenheit. The sub-standard used for frequency testing is supported on a four-tier iron stand rigidly bolted to the concrete

be employed. It is quite likely, however, that an idea mooted at Keston, namely, of using four or five sets on one aerial simultaneously—each tuned in to a *different* relaying wavelength—in order to minimise fading from some of the American transmitters, will form the subject of some interesting experiments to be carried out.

Tatsfield's Tests

The frequency-testing work carried out at Tatsfield is most interesting, even to those who haven't the vaguest idea of what is being done. The purpose of the testing, of course, is to check up the Brussels wavemeters, upon the accuracy of which depends the success of the new Prague wavelength plan. Accurate wavemeters have been designed by the Technical Committee of the U.I.R., and are made at the Brussels University.

It is interesting to note that the final frequency standard at Tatsfield has an accuracy of one part in 100,000, and measurements are made every day to obtain a correction factor.

A thing which disappoints me about Tatsfield is the neatness: essential, I suppose, to any *poste* which has to carry out accurate work, but so non-typical of the average amateur station as to be almost discouraging!



A corner of the wavemeter-testing room

five aerials will be the total when the station is finished.

Cavity walls have been provided to ensure that the interior of the buildings is not subject to sudden temperature changes. That was the great snag at Keston; an engineer might get a frequency-tester nicely checked up during the morning, after much peering at meters, calculation, and mild "cussing," only to find, when he wanted to make frequency tests after

floor; concrete pillars are used for supporting other parts of the apparatus, so temperature changes and vibration won't affect results.

The receiving and relaying gear is contained in the second room, and, apart from the apparatus brought from Keston, a number of new sets have been installed. There will be a total of ten sets, five of them for short-wave working. I am not yet able to publish the types of circuits which will

Turn the world your way!

The effect of placing Polar Condensers behind your panel is equivalent to turning the world round the way you want it.

The combination of Slow Motion and Direct Drive, as fitted to Polar Condensers, is the surest method of quickly bringing in those evasive stations.

THE POLAR "IDEAL"

This is one of the most popular types of condensers because it can be used most effectively with practically any modern circuit.

PRICES:

.0005, 12/6 .00035, 12/3 .0003, 12/-

Supplied fitted with the POLAR DRUM CONTROL Complete with Escutcheon and fixing screws for 2/6 extra.

Write for the new Polar Catalogue A/W in which the full range of Polar Condensers is illustrated and described.

Read this letter:

Headingley, Leeds.
Oct. 4, 1929

"Dear Sirs,
"A few words of appreciation for your 'Polar Ideal' condenser. I scrapped my old ones (another make) and placed two of your .0005 behind my panel together with .0001 Polar Volcon.

"The results after which were really and truly gratifying. They certainly 'turn the world your way.'

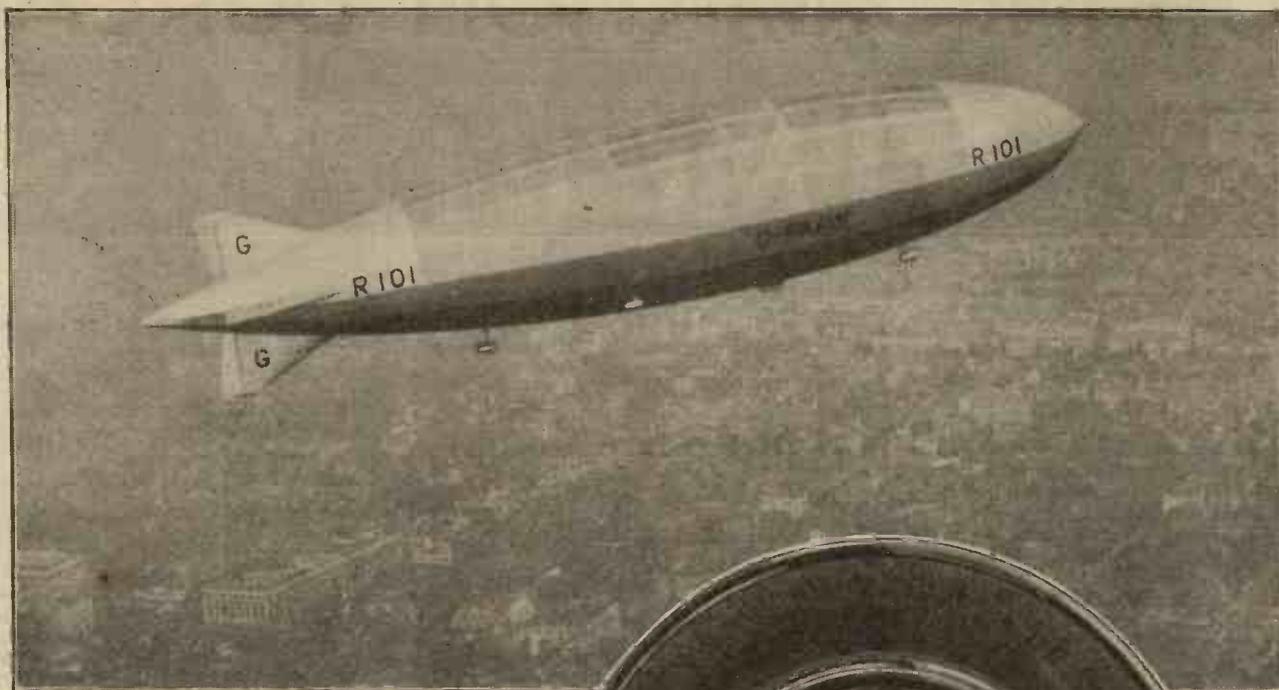
"The slow motion is of velvety smoothness and the condensers have, in my case, brought in stations hitherto feeble or unheard.

"My hearty congratulations to your products.

"Yours faithfully,"

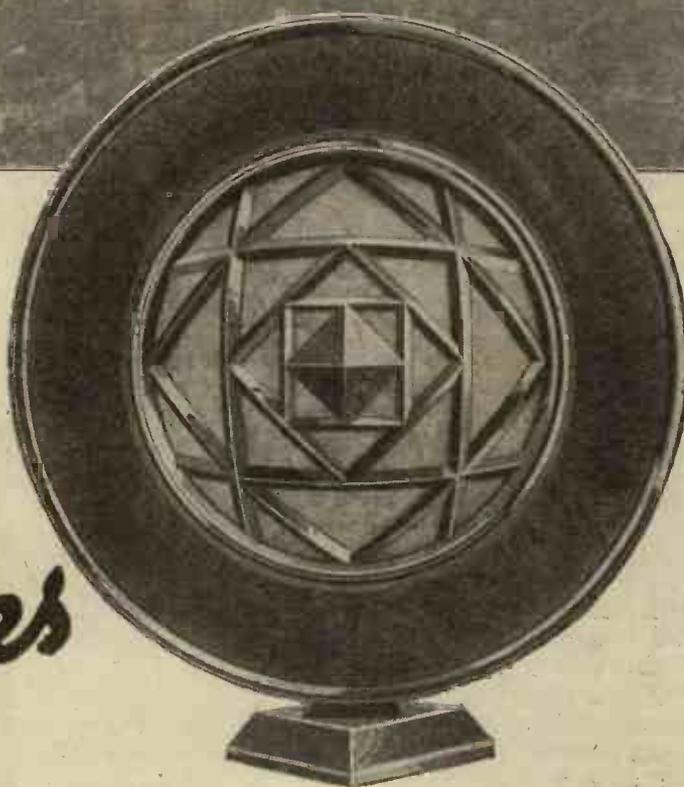
(The original letter may be inspected at our offices.)

WINGROVE & ROGERS, Ltd., 188/9 Strand, London, W.C.2



R101 Britains New Giant Dirigible

*The
two
invincibles*



**KINGS
OF THE
ETHER!**

**BLUE SPOT
101**

£4.4.0

F. A. HUGHES & CO., LIMITED, 204-6 Gt. Portland Street, London, W.1. Telephone: Museum 8630 (4 lines)
 Distributors for Northern England, Scotland and North Wales:—H. C. Rawson (Sheffield & London), Ltd., 100 London Road,
 Sheffield (Telephone: Sheffield 26006); 22 St. Mary's Parsonage, Manchester (Telephone: Manchester City 3329.)

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

OUR INFORMATION BUREAU



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See announcement below. Address Queries—AMATEUR WIRELESS Information Bureau, 53/61 Petter Lane, London, E.C.4

Testing Batteries.

Q.—What is meant by testing batteries when "on load"? Cannot they be tested "off load"?
—L. (Barking).

A.—After being disconnected from a circuit for some time a battery picks up some of the voltage it lost during discharge and consequently a reading taken is not a reliable indication of the state of charge of the battery. By testing a battery when on load we mean that the battery should be tested whilst it is in use and when it has been in use for some little time. In this way the real state of the battery can be found.—L. C.

Atmospheric Interference.

Q.—I am greatly troubled by atmospheric interference in this country and do not wish to restrict my reception of distant stations because of this. Is there a way of overcoming the difficulty without considerably affecting my reception of stations outside Africa? I use a very efficient outdoor aerial.—L. J. (Cape Town).

A.—The higher and more efficient the aerial you use the greater will be the amount of interference you experience from atmospheric disturbances. Underground aeriels minimise this

form of trouble, but they also considerably restrict the receiving range. In our opinion

*When Asking
Technical Queries*
**PLEASE write briefly
and to the point**

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

the most practical solution to the difficulty is to make use of a powerful receiver in conjunction with a frame aerial. The advent of

screened-grid valves opens up a field for research in this direction and we would strongly recommend you to try out a receiver in which there are two stages of screened-grid H.F. amplification, as a means of accomplishing that required.—A. L.

"Talisman Two"

Q.—I have constructed the "Talisman Two" receiver and in testing out I have come to the conclusion that there must be a mistake in the wiring. After the set has been switched on for some minutes the tuning coil gets warm and begins to smoke. Needless to say, I have not received any signals so far. Can you tell me if a mistake occurred in the wiring plan, or can you advise me where I may have gone wrong?—G. F. (London).

A.—We are of the opinion that you have not used the special insulated grid-leak clip which is attached to one side of the grid condenser. If you will refer to the list of components, you will see that a special grid condenser with series parallel clip is advised. Omission to make use of this special attachment will lead to the short-circuiting of the accumulator through the dual-wavelength tuning coil.—L. C.

ONE TO SEVEN

THE BIG-RATIO TRANSFORMER that has already set the Radio world talking of the new possibilities there are in receivers employing one stage only of L.F. amplification.

It is well known that "higher ratio" is synonymous with "greater amplification," and the Ferranti research laboratories have now provided the means whereby the extra amplification can be secured without that serious loss in quality which has been hitherto so detrimental.

The Ferranti AF6 transformer is particularly suitable for sets of the SG3 type. The new ratio is not intended for use in receivers employing more than ONE stage of L.F.

PRICE - 30/-



FERRANTI

FERRANTI LTD.

HOLLINWOOD

LANCASHIRE

M.P.A. COMPONENTS —BEST IN RADIO!



**MADE TO A STANDARD THAT
SETS A STANDARD!**

M.P.A. ELIMINATORS

Wide research and experience are behind these new components. Every Eliminator is tested to over 1,000 volts A.C. for breakdown and complies in every way with I.E.E. regulations.

UNIVERSAL MODEL A.C.—For input voltages from 200-250 volts. Supplies H.T. in 6 tappings from 200/60 volts, output at 200 volts 50 m.a., L.T. (A.C. 4 v.—4 amps.). Grid Bias in 20 one-volt steps. (Exclusive of Marconi Royalties). Price £12. 10. 0

GENERAL PURPOSE MODEL A.C.—For input voltages from 200-250 volts. Supplies H.T. in 6 tappings from 200/60 volts—output at 200 volts, 50 m.a. L.T. for ordinary (D.C.) valves variable 2/6 volts, and Grid Bias, 20 one-volt steps. Price £16. 16. 0 (Exclusive of Marconi Royalties).

POWER MODEL A.C.—For Public Address Systems and Power Amplifiers. For input voltages from 200-250 volts. Supplies H.T. 400 volts and six for 200/60 volts. Output at 400 volts, 100 m.a. Output at 200 volts, 45 m.a. L.T., (A.C.) valves, 4 volt, and 6 volt. Grid Bias, 20 one-volt steps and one variable supply to 150 volts. (Exclusive of Marconi Royalties). Price £23. 0. 0

M.P.A. CHOKES

Power Smoothing Choke (Type SM/500). EXCEPTIONAL EFFICIENCY! FIRST-CLASS WORKMANSHIP! Carrying capacity 500 milliamps, suitable for smoothing in power amplifiers. Tested to over 1,000 volts for breakdown. Complies in all respects with I.E.E. regulations. Price 60/-

M.P.A. Chokes, L.F.
Maximum inductance at full load. No increase in temperature. Comply with I.E.E. regulations. Tested to over 1,000 volts A.C. for breakdown.

"A" Series: Carrying Capacity		"B" Series: Carrying Capacity	
20 Henries ..	170 m.a.	30 Henries ..	55 m.a.
50 Henries ..	90 m.a.	50 Henries ..	28 m.a.
150 Henries ..	55 m.a.	150 Henries ..	12 m.a.
Price 37/6		Price 25/-	

M.P.A. MAINS TRANSFORMERS

High efficiency with first-class workmanship. Tested to over 1,000 volts A.C. for breakdown. Comply with I.E.E. Regulations in every respect. Blueprint of suggested circuit supplied with each transformer.

AMT/50.—Primary tapped for all A.C. voltages. Secondary 200+200 volts. Full wave. 45 milliamps output. Filament-heating, 2 volts+2 volts—4 amps. output. 2.5 volts+2.5 volts, 2 amps output. Price 65/-

AMT/100.—Primary tapped for all A.C. voltages. Secondary 400+400 volts full wave, 100 milliamps output. 200+200, 45 m.a. For G.B. or intermediate or both. Filament heating 4+4 volts—3 amps. output, 2+2 volts—3 amps. output, 2.5+2.5 volts—2 amps. output, 2.5+2.5 volts—2 amps. output. Price 105/-

M.P.A. CHANGE OVER SWITCHES

SILVER-GOLD ALLOY CONTACTS. HIGH-CLASS PRECISION WORKMANSHIP. Rotary cam switches of very low capacity. Positive contact in each position. Highly efficient.

TYPE "A"—3-pole 2-way switch with additional adjustable pair of contacts. Ideal for radio gramophone combinations. Price 9/-

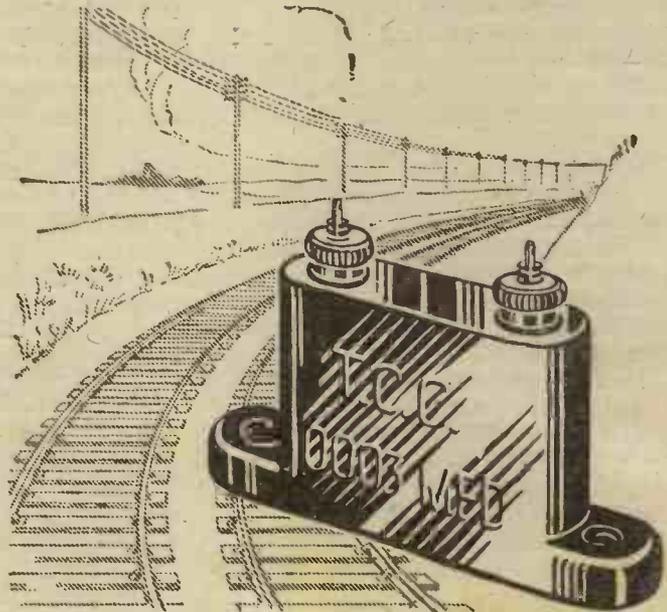
TYPE "B"—3-pole 2-way switch Price 7/6

TYPE "C"—2-pole 2-way switch Price 6/6

M.P.A. POTENTIAL DIVIDER

For H.T. and G.B. supply. Another product of the M.P.A. Research Laboratory. 20,000 ohms resistance for Grid Bias and 2,000 ohms (heavy duty) for H.T. supply. 8 values H.T., 20 tappings G.B. in one-volt steps. Carrying 50 m.a. on H.T. tappings. Price 7/6

STANDARDS

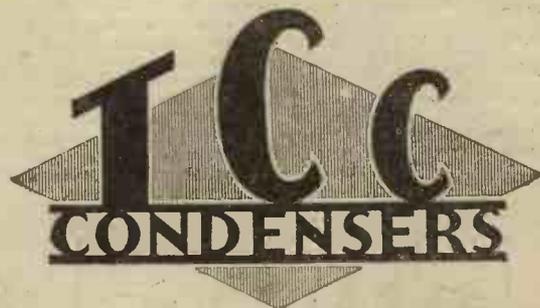


RAILWAY TRACKS and T.C.C.

ALL British railway tracks are of standard width or "gauge." To complete a journey without frequent changes—to run to schedule, to permit interlinking of the various groups, and to avoid chaos generally standardisation is essential.

It's the same with condensers—only by adhering to a definite standard can perfect working be assured. There can, however, be only one standard, and where condensers are concerned that standard is T.C.C. Whenever you see a condenser marked T.C.C. you know that it is a condenser designed and built to a standard—with a degree of accuracy and dependability approached by no other. It is, in a word, the standard by which all other condensers are judged.

Illustrated above is a .0003 mfd. T.C.C. Upright Type Mica Condenser. Price 1/6 each. Other capacities in this type are made from .0001 mfd. to .25 mfd. Prices 1/6 to 18/-



Advt. Telegraph Condenser Co. Ltd. Wales Farm Road, N. Acton, London, W.3.



2112



M.P.A. products above £5 can be purchased on easy deferred terms. Ask your dealer to-day. M.P.A. Wireless, Ltd., Dept. 19, Radio Works, High Road, Chiswick, W.4.

Please Mention "A.W." When Corresponding with Advertisers

"The World-Wide Short-Wave Three"

(Continued from page 734)

9-volt grid battery, with flap for securing in cabinet (Siemens, Ever-Ready).

1 ft. of flex (Lewcoflex).

Two wander plugs, marked: G.B. + and G.B. - (Belling-Lee).

Two vernier dials (Igranic Indigraph with micrometer adjustment, Burndept, Burton).

The receiver, being of the all-metal type, its construction naturally differs somewhat from that of the more conventional ebonite panel and baseboard type of set. For this reason the blueprint is of paramount importance. A print has been specially prepared for this short-waver and there are numerous points in it which will assist constructors, particularly those not well acquainted with a small amount of metal work. A reproduction of the print is given on p. 734, but the full-size edition may be obtained, price 1s., post free, from the Blueprint Department of AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. Just ask for blueprint; no correspondence is needed.

In next week's issue full constructional details will be given so that anyone with the aid of the usual set construction tools—a screwdriver, a few drills, a pair of pliers and a soldering iron, can make up the

"World-Wide Three" and get the results we claim.

The set is of rather striking appearance, owing to its all-metal construction and to the "instrument-maker" appearance of the panel. For this reason, seeing that the set is displayed as are other "A.W." sets, in the Somerset Street windows of Messrs. Selfridge and Co., Ltd., London readers are advised to see it for themselves and to note the way in which the neat all-metal construction is carried out without introducing any work above the capabilities of the average constructor.

THE PROPOSED SWISS BROADCASTING NET

DEFINITE plans have now been drawn up by the Swiss Posts and Telegraphs for the reorganisation of the broadcasting system. As the French, German, and Italian languages are used in that country, three separate high-power transmitters will be required. The German station will be erected at Muenster, in the neighbourhood of Lake Sempach, at about 20 kilometres to the north-west of Lucerne; its power will be 25 kilowatts and the wavelength 459 metres. The transmitter will

be fed by the Berne, Zurich, and Basle studios. The second high-power transmitter to provide a service to the French-speaking cantons is already under construction at Sottens, in a north-easterly direction from Lausanne. In this case the normal power will be 12½ kilowatts, with the possibility of doubling the energy if required. The transmitter will be connected by landline to the existing Geneva and Lausanne studios, and the station will operate on 403 metres. For the Italian-speaking population it is proposed to build a 3-kilowatt transmitter on the summit of Mount Cenero, lying in a triangle bounded by Lugano, Locarno, and Bellinzona; the wavelength to be used is 760 metres.

In addition to the three high-power transmitters, 1-kilowatt relay stations will be provided for Geneva, Berne, Basle, St. Gall, Zurich, Sion, and Covie.

In the new scheme all transmitters will be erected and operated by the Posts and Telegraphs administrations, the programmes being supplied by two separate companies, to which monopolies are to be conceded. An entirely new net of cables will link up all studios and broadcasting stations.

GRIDDA.

The San Francisco studios of the National Broadcasting Company estimate that £200 worth of new music is added to its library every month. The present value of the library is said to be £5,000.

HELLESEN DRY BATTERIES



"Another Hellesens, please"

DESPITE the results of the last Election, it is safe to say that we Britishers are a Conservative crowd.

When we have found a good thing, something we can trust, something that never lets us down, we stick to it. I do not need a new H.T. Battery at the moment, my present Hellesens has only been in use for three months, but when I do, I shall automatically ask my Dealer for "Another Hellesens, please." And if you like to say that this is largely a matter of sentiment, I can only reply that it is a sentiment that would never have had foundation if I had not proved Hellesens to be such rattling good batteries, and I'm only one of thousands who think the same.

PRICES	
Standard Capacity.	
"Wiray" 9-volt Grid Bias Type	2/-
"Wirin" 60-volt H.T. Type	10/6
"Wirup" 99-volt H.T. Type	18/-
"Wisol" 108-volt H.T. Type	20/-
Treble Capacity.	
"Kolin" 60-volt H.T. Type	19/-
"Kolup" 99-volt H.T. Type	32/6

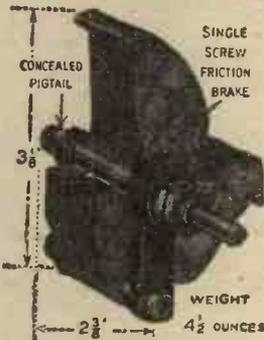
HUNTS

HELLESEN DRY BATTERIES.
ELECTRICAL MEASURING INSTRUMENTS.
POLYMET MICA AND PAPER CONDENSERS.
HANDLAMPS. TORCHES. ETC.

A. H. HUNT, LTD., CROYDON, SURREY



ARTHUR PREEN & CO LTD



"1930" LOG CONDENSER

(MID-LINE)

As specified for the MUSIC LEADER described in this issue.

In four Capacities

.0005	4/6	Each
.00035		
.00025		
.00015		

*Double spacing of vanes for Ultra Short-wave work. As used for the "World-Wide Short-Wave Set" described in this issue.

The Finest

VERNIER DIAL

obtainable.

MECHANICALLY PERFECT. POSITIVE BRASS CONTACT drive on SOLID BRASS SCALE ensuring smooth movement, with absolutely NO BACK-LASH. ROBUST in Construction and Trouble Free. SMALL. EXTREMELY ELEGANT. EFFICIENT.

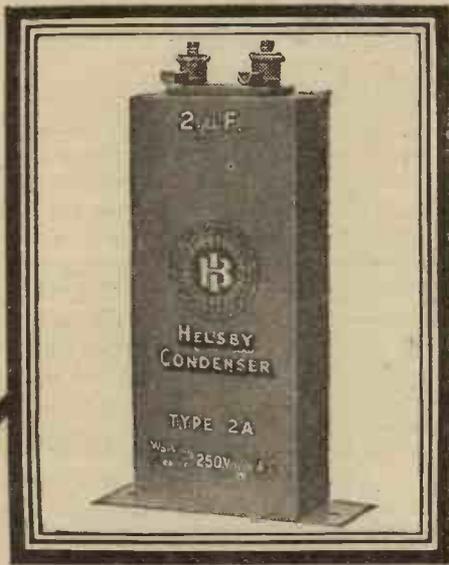
TUNING WITHOUT IRRITATING UNCOMFORTABLE CROUCH or STOOP



3/-

Full Catalogue sent post free on receipt of postcard

THE FORMO CO., CROWN WORKS,
CRICKLEWOOD LANE, LONDON, N.W.2



FOR ELIMINATOR CIRCUITS

You cannot afford to use any but the best Condenser in an eliminator circuit.

HESBY CONDENSERS

are made and guaranteed by a firm with 30 years' experience in condenser making, from small telephone and radio condensers to Power Condensers weighing upwards of 2 tons.

Guaranteed working voltages :-

Type M	-	-	150 volts D.C.
Type 2A	-	-	350 volts D.C.
Type 3A	-	-	450 volts D.C.
Type 4A	-	-	600 volts D.C.

All HESBY Condensers are vacuum dried and impregnated with a special non-hygroscopic material which renders them moisture proof.

If unobtainable from your dealer write to us giving his name and address.



BRITISH INSULATED CABLES LTD
 PRESCOT - LANCS.
 Makers of PRESCOT and HESBY cables

≡ GIVE ≡
 GENEROUSLY
 FOR
 YOUR POPPY



With Indicating
 Floats
 P.G.F.5 20 a.h. 11/9
 2v. (as illustrated)

P.G.F.7 30 a.h. 13/9
 2v.
 P.G.F.9 40 a.h. 15/9
 2v.

Non-Indicating
 P.G.5 20 a.h. 2v. 8/-
 P.G.7 30 a.h. 2v. 11/-
 P.G.9 40 a.h. 2v. 13/-
 P.G.11 50 a.h. 2v. 15/-

I wonder,
 is my Accumulator
 nearly discharged ?

A single glance at the Peto & Radford P.G.F. Accumulator tells you whether it is charged, half-charged, or run out. The indicating floats let you see how many more hours of programme you can depend on

as easily as
 telling the time

Further advantages of the P.G.F. are these. Plates are sturdy. Paste is held in by interlocking grids. Terminals cannot be reversed and have acid-proof glands. The lid is made of Dagenite and is hermetically sealed to the box. And the price is low—only 11/9 for a 2-volt 20 a.h. (true capacity) or 9/- without the indicating feature.

Moreover, the P.G.F., like all Peto & Radford Accumulators, is guaranteed for six months.

Send a postcard for full details of this and other P. & R. Batteries to :-

Peto & Radford, 93 Great Portland Street, London, W.1.

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PETO & RADFORD

ACCUMULATORS

The beginning and the end in

POWER

W.R.I

This announcement is issued by
THE NATIONAL ACCUMULATOR CO., LTD.

CAPTAIN ECKERSLEY ON SOLVING BROOKMANS PARK TROUBLES

Facts About the New Station—and Three Useful Hints

"SHORTEN your aerials. Make full use of the long waves. Don't be a knob twiddler."

These are the three basic pieces of advice which Captain P. P. Eckersley gave at a recent demonstration in North-west London, intended to prove that the new regional scheme now in operation at Brookmans Park does not preclude listeners from enjoying foreign-station reception provided a reasonably good but not necessarily expensive set is used.

In a most interesting talk, Captain Eckersley, who, of course, conceived the regional scheme before leaving the B.B.C. to take up a position with the Gramophone Company (H.M.V.), explained to an AMATEUR WIRELESS representative just what listeners should do, and could expect, under the new conditions.

"My Baby"

"I am not making any apology for the regional scheme," said Captain Eckersley. "It is my baby.

"The opening of Brookmans Park has brought about the *expected* widespread complaints which have always followed a change in broadcasting conditions. But changes are inevitable, and an increase of power is essential to ensure adequate service for the majority. It is only in that area immediately surrounding the station that trouble is experienced, and, while sympathising with those in that district, I do not think that their plight is so serious as at first supposed.

"In many cases an effective remedy is a reduction in length of the aerial. With any reasonably efficient receiver this will greatly improve selectivity without causing too serious a loss in range. When the set is obsolescent a little trouble spent on adapting it is surely not too much to look for, and where it is

entirely out of date, the improved results obtainable from a modern receiver—in selectivity, range, and reproduction—would seem to justify the change to a new instrument!"

Captain Eckersley then went on to analyse various types of listener, and lightly poked fun at the man who twiddled knobs and preferred "eighty noises to five programmes." "The knob twiddler," he said, "is a man who wrings from the resonant ether a most extraordinary cacophony of sounds!"

"After all," he continued, "if it were the aim of the broadcasting authority to enable everyone to listen to the foreign transmissions, the best thing would be to shut down altogether. The real responsibility lies in making the local programme so attractive that the enlargement of the service area becomes *welcome*."

Questioned as to the best methods to employ in cases where selectivity is bad, he reiterated his advice to make full use of the long waves. "The stations on the medium waveband are *always* susceptible to interference and fading, and even without Brookmans Park it is only on the long waves that we can obtain reliable reception under service conditions.

Use More Capacity

"Adjustment of the L.-C. values has a very great effect on selectivity, and it is recommended that less coil and more condenser should be used in any circuit where sharp tuning is lacking. A long aerial is a great mistake. Obviously if one lived within a few feet from Brookmans Park station, and one had a five-valve set with the aerial practically touching that of the new 2LO, the degree of tuning would be negligible. But, on the other hand, if the aerial were cut down to just a few inches, one would get selectivity; one would get

Brookmans Park, and one would *still* get the foreigners, despite the reduced aerial."

Regarding portable sets, Captain Eckersley stressed the importance of the natural "silent point" of the frame aerial. He explained, further, that most London listeners are in a fortunate position, for when the aerial is turned so that the new regional station is cut out, it is in the best position for the reception of cross-Channel stations.

Choosing the Programmes

"The greater the service area of Brookmans Park," he said, referring to programmes, "the greater is the responsibility of the B.B.C. The greater, too, is the listener's responsibility, for *he has a most marvellous thing called a switch!*"

The need for alternative programmes had caused him, four years ago, to consider the regional scheme. There was also the fact that the European situation was becoming serious, and foreign jamming was affecting broadcasting.

With the aid of a Marconiphone all-mains four-valver, he then showed how a large batch of foreigners could be received free of interference from Brookmans Park.

We have already explained that Captain Eckersley has taken up a position with the Gramophone Company, the activities of which already cover radio and talking films. Is it possible that, in the distant future, one of the alternative programmes may be given by private enterprise, in friendly co-operation with the B.B.C., who would be providing the other alternative? There are already several great combines in the musical world with equal funds and facilities to the B.B.C.

Such a new phase of British broadcasting, if it came about, would be a vastly interesting experiment. But Captain Eckersley would say nothing of this!



A. 3.

D.C. Output 9 volts.
1 amp.

23/6

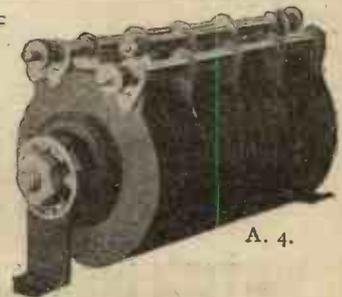
WESTINGHOUSE

METAL RECTIFIERS

TYPE A

FOR LOW TENSION D.C.

Send 2d. Stamp for our 32-page book "The All Metal Way 1930," giving full details of these and other units—high and low tension, and full instructions and circuits for making A.C. mains units of all types.



A. 4.

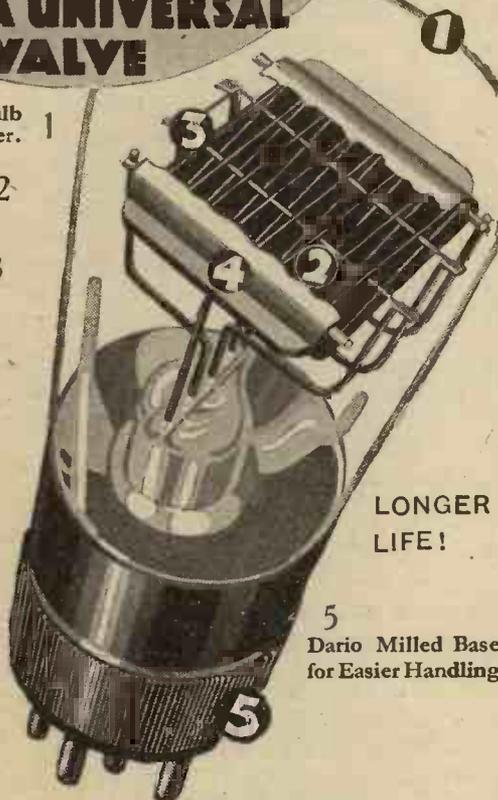
D.C. Output 9 volts
2 amps.



THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD.
82, YORK ROAD, KING'S CROSS, LONDON, N.1

WHY PAY more than 5/6 FOR A UNIVERSAL VALVE

- 1 New Glass Bulb Finer yet Tougher.
- 2 New Super Strength Grid.
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- 4 New Large Size Anode. Easier Flow of Electrons



LONGER LIFE!

5 Dario Milled Base for Easier Handling

NEW 1930 TYPES!

NEW 1930 PRICES!

WRITE FOR FREE FOLDER!

TWO VOLT		
Universal ...	.1 amp.	5/6
Resistron ...	.1 amp.	5/6
Super H.F.	.15 amp.	5/6
Super-Power	.18 amp.	7/6
Hyper-Power	.3 amp.	9/6
Pentodion ...	.3 amp.	18/6

From your dealer or direct:

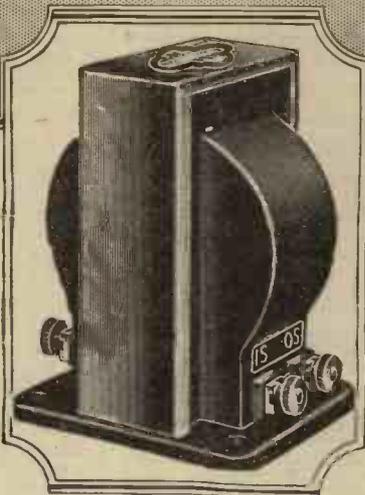
FOUR VOLT		
Universal	.075 amp.	5/6
Resistron	.075 amp.	5/6
Super H.F.	.075 amp.	5/6
Super-Power	.1 amp.	7/6
Hyper-Power	.15 amp.	9/6
Pentodion ...	.15 amp.	18/6



Best way to all Stations

IMPEX ELECTRICAL, LTD., DEPT. J
538 HIGH ROAD, LEYTONSTONE, LONDON, E.11

IGRANIC



IGRANIC TRANSFORMER

Ratio 1 to 7.2

The IGRANIC ELECTRIC COMPANY, LTD., produced a 1 to 7.2 ratio transformer two and a half years ago for single L.F. stage working.

The curve was and is still ahead of all others

The Igranic Electric Co., Ltd., were also the first to give to the public the real curve of interpretation of transformer performance, viz. voltage amplification plotted against frequency *under load*.

"PRIORITY is the EASIEST THING to DISREGARD" but the name of IGRANIC is invariably associated with pioneer effort and high achievement.

TYPE G, Ratio 1 to 7.2

PRICE 30/-

Get one at your dealer's, or write direct to Dept. D. 134.



Works BEDFORD

Build your New Set NOW!

PAY AS YOU LISTEN

Why be satisfied with your old set, when for a small monthly payment you can build the very latest set yourself, or bring your old Receiver right up to date. Increase your reception 100%.



COMPLETE KITS for all Circuits supplied—see the following examples of our terms—

- COSSOR 1930 KIT. CASH £8.15.0. Send only 16/-, balance by 11 monthly payments of 16/-.
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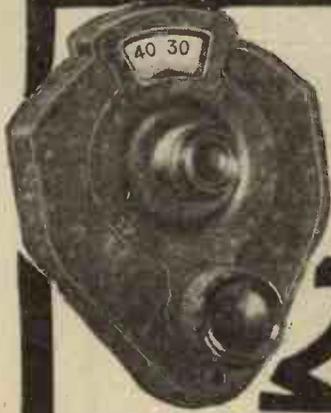
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BROWNIE are now producing 2,000 Dominion Vernier Dials a day. That is why it is possible to offer this high-grade dial at the wonderful price of 2/6.

The mechanism is a special non-backlash design with a reduction ratio which makes fine tuning easy without becoming tedious.

Obtainable from all wireless dealers in beautifully finished plain black or lovely grained mahogany bakelite.



Nelson Street Works, London, N.W.1

BROADCAST TELEPHONY

Broadcasting stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is aerial energy.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	
GREAT BRITAIN												
25.53	11,751	Cheimsford (SSW)	15.0	*286		Montpellier (PTT)	0.2	*385	779	Genoa (IGE)	1.0	
*200	1,500	Leeds (2LS)	0.13	288.5	1,040	Mont de Marsan	0.3	*441	680	Rome (Roma)	3.0	
*242	1,233	Belfast (2BE)	1.0	291.4	1,029.3	Radio Lyons	0.5	453	662	Bolzano (IBZ)	0.3	
*288.5	1,040	Newcastle (5NO)	1.0	304	986	Limoges (PTT)	0.3	*501	400	Milan (Milano)	7.0	
288.5	1,040	Swansea (5SX)	0.13	305.8	981.7	Bordeaux (PTT)	1.0	YUGOSLAVIA				
288.5	1,040	Stoke-on-Trent (OST)	0.13	309	970	Agen	0.25	304	976	Zagreb (Agram)	0.7	
288.5	1,040	Sheffield (6LF)	0.13	*314	950	Radio Vitus	1.0	429	004	Belgrade	2.5	
288.5	1,040	Plymouth (5PY)	0.13	329	974	Marseilles (PTT)	0.5	570	527	Ljubljana	2.5	
288.5	1,040	Liverpool (6LV)	0.13	331.4	905	Grenoble (PTT)	0.5	LATVIA				
288.5	1,040	Hull (6KH)	0.13	364	824	Paris (PTT)	0.5	*525	572	Riga	3.0	
288.5	1,040	Edinburgh (2EH)	0.35	368	825	Algiers	12.0	LITHUANIA				
288.5	1,040	Dundee (2DE)	0.13	Radio LL (Paris)				0.5	1,035	755	Kovno	7.0
288.5	1,040	Bournemouth (6BM)	1.0	*381	788	Radio Toulous	8.0	NORWAY				
288.5	1,040	Bradford (2LS)	0.13	411	729	Radio Maroo (Rabat)	2.0	140	1,250	Rjukan	0.18	
*301	995	Aberdeen (2BD)	1.0	447	671	Paris (Ecole Sup. PTT)	3.0	*283	1,058	Notodden	0.05	
*310	968	Cardiff (5WA)	1.0	408	640	Lyons (PTT)	5.0	*365	820	Bergen	1.0	
356	842	Brookman's Park 30		1,850	222	Tunis (Kasbah)	0.6	*304	761	Frederikstad	0.7	
*377	797	Manchester (2ZY)	1.0	1,458	205.76	Eiffel Tower	12.0	453	662	Tromsø	0.1	
*399	753	Glasgow (5GC)	1.0	*1,725	174	Radio Paris	12.0	453	662	Aalesund	0.3	
*479	626	Daventry (5GB)	25.0	GERMANY				493	608	Porsgrund	0.7	
1,554	293	Daventry (5XX)	25.0	*218	1,373	Flensburg	0.5	*493	608	Oslo	1.5	
AUSTRIA												
*246	1,220	Linz	0.5	*227	1,319	Cologne	4.0	1,071	280	Oslo (testing)	7.3	
*283	1,058	Innsbruck	0.5	*234	1,283	Muenster	3.0	POLAND				
*352	851	Graz	7.0	*239	1,256	Nurnberg	2.0	*313	959	Cracow	0.5	
*453	666	Klagenfurt	0.5	*248	1,220	Kiel	0.35	*335	896	Posen	1.2	
*517	581	Vienna	15.0	*246	1,220	Cassel	0.25	385	779	Wlno	0.5	
CZECHO-SLOVAKIA												
*283	1,139	Morava-Ostrava	10.0	*253	1,184	Gleiwitz	2.0	*408	734	Kattowitz	10.0	
*279	1,079	Bratislava	12.5	*259	1,157	Leipzig	1.5	*1,411	212.5	Warsaw	8.0	
*293	1,022	Kosice	2.0	*276	1,085	Kaiserslautern	0.25	ROUMANIA				
*342	878	Brunn (Brno)	2.4	*238	1,058	Magdeburg	0.5	*301	761	Bucharest	12.0	
*487	617	Prague (Praba)	5.0	*283	1,058	Berlin (B.)	0.5	RUSSIA				
BELGIUM												
*355.5	1,273.5	Charleroy (LL)	0.25	*283	1,058	Stettin	0.5	*351	855.5	Leningrad	1.0	
240.1	1,216.8	Schaerbeek-Brussels	0.25	*310	941	Dresden	0.21	*427	702.5	Kharkov (NKO)	4.0	
250	1,200	Ghent	0.5	*313	941	Bremen	0.35	*483	621.5	Homel	1.2	
270	1,112	Radio Binche	0.5	*325	923	Breslau	1.5	*825	364	Moscow (PTT)	20.0	
194	1,402	Liege	0.1	*380	833	Stuttgart	1.5	1,000	283	Tiflis	10.0	
312	961.4	Arlon	0.25	*372	806	Hamburg	1.5	1,000	300	Leningrad	20.0	
339	887	Louvain	8.0	*390	770	Frankfurt	1.5	1,100	272	Moscow Popoff	40.0	
*609	590	Brussels	1.0	*418	716	Berlin	1.5	*1,304	230	Kharkov	4.0	
DENMARK												
*281	1,067	Copenhagen (Kjobenhavn)	0.75	*453	662	Danzig	0.25	1,431	202.5	Moscow (Kon)	40.0	
1,153	260	Kalundborg	7.5	*458	657	Aachen	0.35	SPAIN				
ESTHONIA												
*297	1,010	Reval (Tallinn)	0.7	*473	635	Langenberg	1.30	251	1,793	Almeria (EAJ18)	1.0	
FINLAND												
*221	1,335	Helsingfors	0.9	*533	563	Munich	1.5	314	956	Oviedo (EAJ19)	0.5	
*1,796	167	Lahdi	40.0	*560	536	Augsburg	0.23	*349	860	Barcelona (EAJ1)	8.0	
FRANCE												
31.65	9,479	Radio Experimental (Paris)	1.0	*580	536	Hanover	0.35	*368	815	Seville (EAJ5)	1.5	
175	1,714	S. Quentin	0.1	575	521.7	Freiburg	0.35	403	743	San Sebastian (EAJ8)	0.5	
211.3	1,420	Béziers	0.1	*1,635	183.5	Zeesen	30.0	428	700.9	Madrid (EAJ7)	2.0	
212.8	1,410	Recamp (Radio Normandie)	0.5	2,100	142	Norddeich	10.0	403	662	Salamanca (EAJ22)	1.0	
237	1,265	Nice (Juan-les-Pins)	0.5	2,290	131			465	645	Barcelona (EAJ13)	8.0	
238	1,260	Bordeaux (Radio Sud-Ouest)	1.0	GRAND DUCHY				SWEDEN				
239	1,256	Radio Nimes	0.25	223	1,340	Luxembourg	3.0	231	1,301	Malmö	0.6	
*255	1,175	Toulouse (PTT)	1.5	HOLLAND				*257	1,160	Hoerby	10.0	
*265	1,130	Lille (PTT)	0.7	31.4	9,554	Eindhoven (PCJ)	25.0	270	1,112	Trollhattan	0.45	
268	1,121	Casablanca	0.5	*293	1,004	Hilversum (untit)	5.40 p.m. G.M.T.	*322	932	Goeteborg	10.0	
268	1,121	Strasbourg	0.3	*1,071	880	Hilversum	6.5	322	932	Falun	0.5	
*272	1,103	Rennes (PTT)	0.5	*1,011	880	Scheveningen-Haven	5.0 (from 10.30 a.m. to 5.40 p.m. B.S.T.)	*438	689	Stockholm	1.5	
ITALY												
*274	1,094	Turin (Torino)	7.0	*1,875	160	Huizen (after 5.40 p.m. G.M.T.)	6.5	*542	554	Sundsvall	0.6	
*330.3	908	Naples (Napoli)	1.5	550	545	Budapest	20.0	*770	389	Ostersund	0.6	
ICELAND												
*1,200	250	Reykjavik	1.0	HUNGARY				1,200	250	Boden	0.6	
IRISH FREE STATE												
*225	1,337	Cork (IFS)	1.0	ICELAND				*1,348	222.5	Motala	30.0	
*413	725	Dublin (2RN)	1.0	ICELAND				SWITZERLAND				
ITALY												
*274	1,094	Turin (Torino)	7.0	680	442	Lausanne	0.6	*403	743	Berne	1.0	
*330.3	908	Naples (Napoli)	1.5	790	395	Geneva	0.23	*459	653	Zurich	0.83	
TURKEY												
*1,200	250	Stamboul	5.0	468	644	Zurich		(during afternoon) 0.63				

All wavelengths marked with an asterisk have been allotted according to the Plan de Prague.

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

- Nov. 11 Armistice Day Service and *Journey's End*.
- 13 *Up to Scratch*, third edition, by Ronald Frankau and his Cabaret Kittens.
- 14 Peace Commemoration Dinner speeches, relayed from the Guildhall.

DAVENTRY EXPERIMENTAL (5GB)

- Nov. 11 Service from the Cenotaph.
- 16 A vaudeville programme.

CARDIFF

- Nov. 10 *The Coming of Arthur*, a cantata by David Evans.
- 15 A Welsh variety programme.

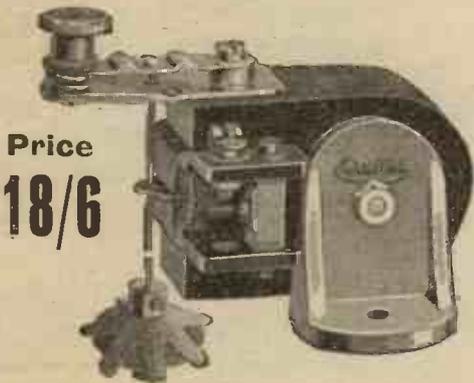
MANCHESTER

- Nov. 14 Hallé concert.

At a recent broadcast in America, Al Jolson, the talkie film star, received the sum of £1,500 for ten minutes' singing. While £150 a minute seems to be pretty fair compensation, it is not quite up to Sir Harry Lauder's mark, who on his recent U.S.A. appearance received £3,000 for broadcasting three songs—£1,000 a song.

Radio Belgique, Brussels, has concluded arrangements with Amsterdam for a regular relay of entertainments from the famous concert-hall in that city. These broadcasts, which took place weekly in October, will also be transmitted from the Belgian station on November 11, 14, 21, and 28.

SEE IT!
HEAR IT!



Price
18/6

ASK your dealer to let you see the Watmel Balanced Armature Unit. Note the heavy magnet of Cobalt Steel, the pole pieces and Armature of specially selected soft iron. See how the Armature is balanced between the pole pieces, and how, at any given moment during working, the Armature is being acted upon by two pole pieces at once.

It is this true differential action that makes the Watmel Unit so famous for its sensitivity. Now ask your Dealer to connect it to a suitable Chassis and Cone. If possible, get him to compare it for you with any other Unit, irrespective of price. Notice particularly the sonorous way it handles the bass frequencies, and notice also that it does not "cut off" the upper registers either. No finer Unit is turned out either in this or in any other country, and from none will you get better reproduction.

□ We shall be glad to send you on request our Folder No. 103, showing you how to make up a very fine Loud-speaker from a Kit of parts, also Folder and Blueprint for building up a modern 3-Valve Set.

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ROTARY BATTERY SWITCH

An attractive alternative to the usual Push and Pull type of Switch. All insulated, with indicating "On" and "Off" dial, pointer knob, double contact and suitable for use with panels up to 3" thickness. Each **1/9**



PENTODE

The famous Benjamin Clearer-Tone Valveholder, with flexible connector for attaching to the terminal cap on the pentode valve. Price, each **2/3**

Pentode attachment only for use with existing Clearer-Tone Valveholders or Vibroliders, 3d. each.



5-PIN VALVE-HOLDER

Designed for use with the new 5-pin valves with centre leg. The well-known Benjamin anti-microphonic feature is incorporated, and also patented contact, which ensures perfect contact for all types of valves. Price, each **1/9**

**NOT
FORGETTING
THESE**

The original CLEARER-TONE VALVEHOLDER in face of considerable low price competition has more than held its own and will be continued at the price of **2/-**

The BENJAMIN VIBROLIDER was last season's most successful accessory, the self-aligning feature ensuring positive contact with all types of English 4-pin valves. Price each **1/6**

The popular Push and Pull double-contact Battery Switch. It's "off" when it's "in." Price with terminals, each **1/3**
Without terminals each **1/-**

**BENJAMIN
RADIO PRODUCTS**

**THE BENJAMIN ELECTRIC LTD.
BRANTWOOD WORKS, TOTTENHAM, N.17**

BAKELITE CASED

Fixed MICA CONDENSER

UPRIGHT or flat mounting in moulded Bakelite case with grid leak clips arranged for either series or parallel connection. Every one subjected to breakdown test of 700 volts. .00005 to .002, 1/-; .003 to .006, 1/6; .007 to .01, 2/6

GRAHAM FARISH



BROMLEY

KENT

CLIX

The only panel Terminal entirely insulated when connected or disconnected.

No. 15. The Clix All-in Plug and Socket Terminal



No. 15

Supersedes all other types of panel terminals. Shorts and burnt out valves are impossible when it is used. Supplied engraved in all standard markings, each one for its particular use; also H.T.+ and G.B.—plug-in sections vary in size and safeguard your valves. Wherever a terminal of any sort is required, the Clix Plug and Socket can be utilised. With it you will obtain safer, speedier and better contact.

Write for descriptive leaflets of Clix 21 Varieties for perfect contact.

Price **8d.** Complete Panel Portion 4d. Flex Portion 4d.

LECTRO LINX LTD.

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RADIOGRAMS

A GREAT effort is being made in Paris to secure authority for the erection of a 25-kilowatt transmitter in one of the eastern suburbs, to replace one of the private stations at present operating in the capital. It is stated that the new 10-kilowatt PTT transmitter for the Ecole Supérieure will not be working regularly before January, 1930.

From October 28 last, Radio Toulouse, at 8.45 p.m. G.M.T., has carried out daily transmissions of pictures on the Belin system. A similar service is to be inaugurated by Petit Parisien, Radio L.L. (Paris), and Bordeaux-Sud-Ouest.

WABC, New York, the key station of the Columbia broadcasting system, is to increase its power shortly to 50 kilowatts; it will continue to broadcast on 349 metres. Authority has also been granted to KNX, Los Angeles (Cal.); to work on an equal power. Other 50,000-watt stations in the United States at present operating are WEAJ (New York), WJZ (Roundbrook), WTIC (Hartford, Conn.), WGY (Schenectady), and KDKA (East Pittsburgh).

On November 9, Earl Jellicoe will broadcast the annual Poppy Day appeal; a short address will also be given by one of the V.C.'s gathered in London for the dinner given by the Prince of Wales.

We Are Seven is the title of the 2LO birthday programme to be broadcast on its seventh anniversary (November 14). The title has no reference to the number of the artistes taking part in the performance, or to the number of the staff, which is roughly 100 times that figure!

Listeners to 5GB on November 18 will hear one of the favourite concert stars of Paris, namely, Mdle. Valentine Chausson, soprano; who will give a recital of old and new French chansonettes.

On November 23, the Birmingham Station Players will present two plays: *A Man of Ideas*, by Miles Malleon, and *Money Makes a Difference*, a well-known West Country comedy.

The "anglicising" of Scottish broadcast programmes is still a sore point across the Border. It is declared to be obvious that ordinary literary criticism for Scottish listeners is one of the programme features which should be relayed from a Scottish station by a Scotsman, while the general news bulletin for the North should be sent out from a Scottish station.

GFA (Air Ministry, London) will transmit henceforth on the short wavelength of 32.29 metres, in addition to the other wavelengths of 4,100, 40.43, and 20.21 metres, which are already in use for the

(Continued on next page)

THE MODERN MODE IN HOME MUSIC



RADIO OR GRAMOPHONE MUSIC AT THE TOUCH OF A SWITCH!

The Instrument which converts your existing Radio Receiver into a modern Radio Gramophone

Specification: Garrard double spring motor with 12 in. Turntable, B.T.H. Pick-up, double balanced Armature Speaker, handsome Oak Cabinet, french polished antique finish. Height, 3 ft.; width, 23 in.; depth, 17 in.

PRICE £12 19s. 6d.

The Adaptagram is also supplied as a complete Radio Gramophone, incorporating our famous 3-valve Screened Grid Receiver in the following models:—

Model B.D. for Battery Operation	£27 15 0
Model D.C. for D.C. Mains Operation	£30 0 0
Model A.C. for A.C. Mains Operation	£35 0 0

Stocked by all good Dealers. Supplied on Hire Purchase terms.

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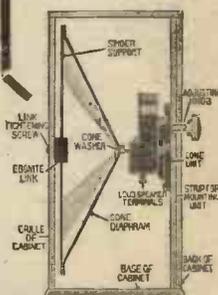
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A NEW IDEA IN RADIO

for LOUDSPEAKER CONSTRUCTION

THE SOVEREIGN CONE KIT
COMPLETE 3/-

NO CONE CRADLE IS REQUIRED with this new product—thus a complete saving of at least 10/- is effected. Utilises a new patent, and is the compromise between



the fixed and free edge cone principles. Easily and quickly assembled at a very low cost to give perfect reproduction. Sold complete in an attractive envelope with full instructions. Obtainable from your local dealer or the manufacturer—THE J. R. Wireless Co. (Dept. A.W.) 6-8 ROSEBERY AV. LONDON E.C.1

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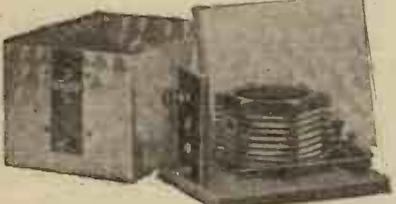
The Big British Wireless Monthly

1/-

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"WORLD-WIDE SHORT-WAVE 3"
Special Cabinet with baseboard as specified
21/-

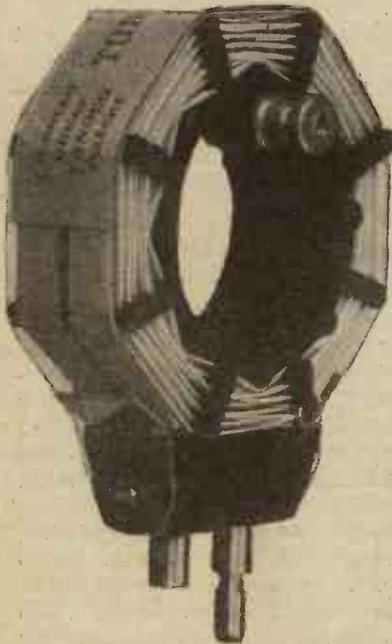
THE MUSIC LEADER
Special box as specified 4½" x 5" x 4½" 5/6
Single S.G. Valve Holder 2/-



"PAREX" WAVE SELECTOR
CUTS OUT BROOKMANS PARK
Improves selectivity 100%. Entirely screened
12/6

DIRECT FROM
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TUNEWELL COILS



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SIZES AND PRICES

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30, 40, 60, 100 "	1/8	250 "	3/3
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Wave-trap Coil, 2/6 Tunewell "Cut-out," 10/6
Centre tapped 9d. each extra, X type 1/- extra
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**"WIRELESS
MAGAZINE"**
The Big British Wireless Monthly
1/-

"RADIOGRAMS"

(Continued)

regular meteorological service carried out by that station.

Radio versions are to be given of two prominent Scots novels, "Huntingtower" and "Weir of Hermiston," in addition to two productions by the Scottish National Theatre, viz., *The Glen is Mine* and a verse play, *Gruach*.

The Spanish station, San Sebastian EAJ8, has been traced as the source of a high-pitched whistle which for some weeks past has been interfering with reception from the Glasgow station.

The new super-power transmitter to be erected in the neighbourhood of Warsaw by the Polish broadcasting authorities will work on 1,111 metres.

The short-wave transmission so frequently picked up by British listeners under the Dutch PHOHI broadcasts on 16.88 metres is that of PLE (Bandoeng) on 15.93 metres. On one or two occasions PLE has relayed the 17-metre transmissions made by PLF (Malabar).

The 20-kilowatt Bangkok (Siam) transmitter, which up to the present has only been used for telegraphic communication with Europe, will shortly undertake the broadcast of musical and other entertainments.

The Berlin Broadcasting Company has concluded arrangements for the relay to the German transmitters of performances from the Paris Opera House.

Many listeners, no doubt, will have picked up the transmissions on 339 metres of the new Belgian broadcasting company, Katholieke Vlaamsche Radio Omroep. Although concerts have been transmitted every Sunday and Thursday from 8.15 to 10.15 p.m., as the Velthem transmitter has not yet officially taken over the duties, the broadcast is carried out from the works of the S.B.R. at Forest, near Brussels. The call in some instances couples the name of the suburb (Forest, pronounced *Four-ay*), with the words "Radio Belgie" or "Radio Omroep K.V.R.O.," and does not always mention either Louvain or Velthem, the small village in its immediate neighbourhood, at which the actual station is installed.

Direct radio telephone communication between New York and Madrid was opened on October 21.

Telephone subscribers of the North-Western Telephone Company at Defiance, Ohio, are now getting radio programmes over their telephones. The radio programme service was started just recently.

A musical programme broadcast from Huizen, Holland, on an extremely short wave was successfully rebroadcast throughout America recently. The programme lasted for about an hour. The Dutch announcer spoke in English.

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LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

Dance Bands

SIR,—I am glad Mr. Moseley mentioned the old Savoy Orpheans under Somers. Yes, those were dance bands. What about his symphonic renderings of "No, No, Nannette" and "Rose Marie"? What arrangements, too; also "Langes" arrangement of "Oriental Phantasy"! Today the cry seems to be how few players can be engaged; so we get five or six pitifully trying to sound like a band. Then folks say: "Oh, that horrible jazz!"

Of the list given, I should unhesitatingly put Bertini on top. I was unfortunate enough to write and tell the B.B.C. so.

Finally, I do not know of anything that annoys me or lowers the standard of dance music more than bands (or apologies) that play choruses only. When one hears the lovely arrangements Bertini used to play, it is awful to have to hear bare choruses thrashed through again and again—often without change of key, even. I wonder what people would say if they bought a record playing all choruses? Yet they put up with it from the B.B.C.

F. E. W. (Hitchin).

Simplicity

SIR,—I was much impressed with a letter published in a recent issue of AMATEUR WIRELESS under the heading "A Plea for Simplicity." Your correspondent "hits the nail" in his remarks concerning the almost prohibitive cost of the up-to-date set (kit or otherwise).

I have a three-valve set, two years old, not factory built, that will give ample volume for a B.T.H. C2 type loud-speaker, on a maximum of 60 volts H.T.

Regarding purity and ease of handling, I believe it to be superior to a well-known S.G. set employing a voltage of 120.

My aerial is not more than 45 ft. in length, and 90 per cent. of this is indoors.

B. (Gosport).

Are We Progressing?

SIR,—In reply to L.M.B. (Romford), the V24's were G.P. valves of 20,000 ohms resistance and an amplification factor of 6; poor according to modern standards, but remarkably sturdy, and not subject to the tantrums of modern "hot-house" valves. I did not give any particulars of the transformers, for the simple reason that I never knew any; they were lifted *en bloc* from an R.A.F. (?) instrument panel. The prudence of overloading (if any) of the Primax was not in evidence, because I was not, and am not, one of those who think that

quality is dependent upon volume. I have heard M.C. speakers that appeared, at a distance, to be most attractive on orchestral items, but which on speech resembled nothing so much as the "wufflings" of some prehistoric half-man, as one might imagine them: a sure sign that the quality on music was illusory.

Granted that there are amplifiers and speakers capable of giving superior reproduction to the arrangement which I described (which I did not, nor do I, deny), L.M.B. himself says that "they are few and far between." I was naturally referring to the output of the average set, which I still maintain is poor, due to too much theory and too little practice, too much striving after amplification and too little attention to the real value of the final product.

I am prepared to admit that my present set—S.G., det., L.F., and push-pull output, using 150 volts H.T. accumulator, and a special speaker of my own design with balanced armature unit—approaches very near to the old ideal; but it was the manifest disparity between the two sets and the actual results obtained which inspired my previous letter.

P. (London, S.E.).

Interference

SIR,—Regarding "Thermion's" paragraph, "A Heterodyne Question," in AMATEUR WIRELESS of October 19, I find things in my locality quite as bad as his friend finds them from the south coast.

The Prague Plan, from my point of view, is far worse than the older one. Radio Toulouse, as mentioned, is heterodyned, faded, and munched badly. Turin, which I used to receive first class, is blotted out completely; in fact, it is almost impossible to get any station clear on the medium band.

My last set was the "Bantam," on the dial of which I logged twenty-nine foreigners at full loud-speaker strength, clear of all interference. Now, on the "Britain's Favourite Three" (which I consider is an even better set) I cannot log four with any degree of certainty and free from mush, etc.

Now for the titbit. 5GB is smashed to smithereens for about half an hour each night and afterwards messed up with morse. I have had P.O. engineers, and their diagnosis is "German amateur" whose C.W. and gramophone records, etc., cause an appalling wipe-out round about

5GB. Surely something could be done to stop it. B. (Nottingham).

The Regional Scheme

SIR,—I have read the article headed "Is the Regional Scheme Possible?" in a recent issue of AMATEUR WIRELESS, by R. W. Hallows.

This and many other articles I have read which deal with the effect of the Brookmans Park transmitter appear to be written solely by listeners in the London area.

Mr. Hallows stresses the great strength of the new transmitter and the wipe-out effect on Continental stations, and suggests already that a decrease in power is the solution.

Do these writers ever spare a thought to the many listeners in places remote from London, who, like myself, have for years been largely confined to transmissions from 5XX, with occasional rare reception from one or two of the main broadcast-band transmitters, and who have noted as time went on how these stations have been wiped out by the ever-increasing power of Continental stations? How often we have hoped that in time our own stations will increase their power, and so permit us some share of the opportunities that our London friends have enjoyed since wireless transmission began.

Now, after waiting patiently, and incidentally paying just as patiently, to realise some of these advantages, we read that these same London listeners may be prevented from listening-in to a few Continental stations, and that, as outside listeners apparently do not count, the real attempts which the B.B.C. is now making in the interests of all should be squashed almost before they begin.

I would strongly suggest that if Mr. Hallows finds difficulty in tuning-in other stations between 356 and 479 metres without background from either 5GB or Brookmans Park, then his receiver must be decidedly unselective and that it must be just as impossible for him, to tune in either of the two English stations mentioned free from interference from the French and German stations working on the wavelengths mentioned.

I suggest, sir, that you invite the opinions of your many readers who live remote from London on these questions and consider this is necessary in fairness to the B.B.C., which is making a genuine attempt to give satisfaction to so many of their listeners who in the past have been handicapped by the low power of our stations on the broadcast band.

I ought, perhaps, to mention that the new transmitter is received here at splendid strength using a five-valve receiver with two H.F., det., and two L.F., although subject to occasional fading and that even while this is being received at full loud-speaker strength it is easily possible to tune in Graz at 352 metres and Stuttgart at 260 metres with only a faint background from Brookmans Park.—H. H. (Carlisle).

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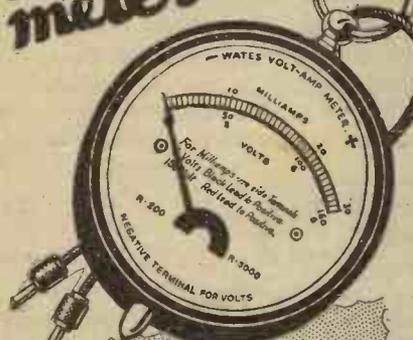
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"THE PENTODE AS A DETECTOR"

(Continued from page 729)

with a relatively small voltage on the detector. This may be obtained in two ways. We may either place the full voltage on the anode of the valve and reduce the voltage on the priming grid or, alternatively, we may reduce the voltage on the whole valve, connecting the priming grid to the anode as usual. Of the two methods, the former is preferable, since it gives us rather sharper characteristics, and a voltage of about 15 volts is found to give suitable results with 100 to 120 volts on the anode. A suitable pentode detector circuit, therefore, is as shown in Fig. 2, and details will be given next week of a simple testing set which may be easily made up.

Sensitive as Leaky-grid

The discussion of the merits of the pentode valve will be continued further next week, when the operation of this testing panel will be described. Some points, however, may be given at this stage to indicate whether the pentode is a desirable detector or not. Experiments indicate that, used under proper conditions, it makes a very suitable class of detector. It has a sensitivity comparable with that of the grid detector, i.e., several times as great as the anode detector. At the same time, it does not introduce anything like as much damping into the tuned circuit preceding it. The damping, indeed, is of the same order as is customarily introduced with an anode-bend detector, so that we have in the pentode an arrangement which enables us to compromise between the two types of circuit and to obtain the sensitivity of the grid detector with the relatively small damping of the anode-bend arrangement.

There is one point which, although comparatively small, is worth making clear. One is accustomed to associate the word pentode with high current consumption. Used as a power valve, this is usually the case, for with the average run of pentodes the current consumption is in the neighbourhood of 20 milliamps. Some readers, therefore, may feel chary of utilising such a valve as a detector, particularly if perhaps they are already using a pentode in the last stage as an output valve.

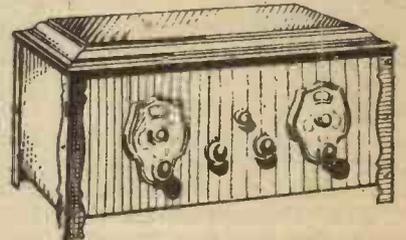
There is no reason for this fear, however, because, in order to use the valve as a detector, we place such a large negative bias on the valve that the current is reduced to something less than 0.1 milliamp. under the steady conditions; so that the pentode detector takes no more current than a grid detector, even allowing for the small current taken by the priming grid.

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Index letters "A.W." refer to "Wireless Magazine" sets.

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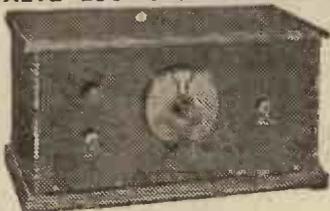
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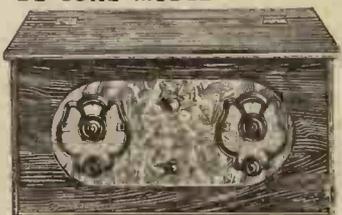


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(Continued from page 717)

for if the chassis is mounted in the way suggested very much better reproduction is obtainable as a rule than when it is fixed directly to the baffleboard.

With units, however, such as the Blue Spot and Wates' "Star," vibrations are so powerful that resonances may still be noticeable, due to the vibrations set up in the ring in which the cone is suspended and the struts that connect it to the plate upon which the driving unit is mounted. These can be prevented to a very large extent by taking two pieces of thin india-rubber such as is used in schools, drilling a hole through each and using them as absorbent washers between the driving unit and the frame when the fixing screws are driven in.

It is perhaps inadvisable to leave an air gap between the ring of the cone chassis and the baffleboard, for this may give an opportunity for circulating waves to make their unwelcome way round from the front to the back of the cone. This difficulty is easily overcome by cutting out a ring of thick felt, such as is used for laying under carpets, and glueing it to the back of the baffle.

In a following article various types of driving unit will be considered and we shall see how important it is that the receiving set itself is capable of giving them a fair chance of showing what they can do in the way of reproduction.

The General Electric Co., Ltd., opened a new branch at Magnet House, 3 Campbell Street, Leicester, recently. Mr. W. J. Hodgkins, of the Birmingham branch, has been appointed manager. The telephone number is Central 58778 and the telegraphic address "Electricity."

With reference to the advertisement of the P.D.P. Company in "AMATEUR WIRELESS" for October 26 and November 2, the address of this firm should read 121 Cheap-side, London, E.C.2, and not 21 as inserted.

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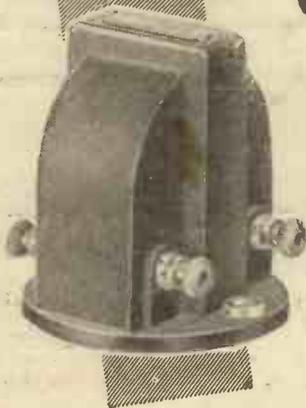
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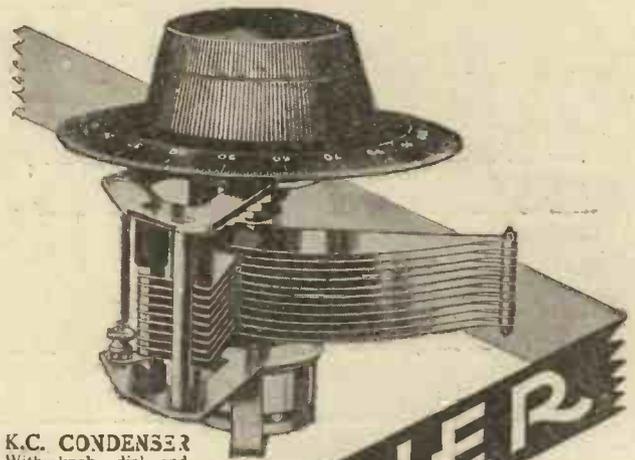


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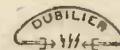
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HEARD FULLY, NATURALLY

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SENSITIVE—YET FULL OF POWER

A special one-piece diaphragm gives full value to high and low notes, without over-emphasis. Highly accurate centring of the moving coil means improved sensitivity. Yet there is strength and freedom of control enough for far more than normal requirements.

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THE FIRST AND GREATEST NAME IN WIRELESS

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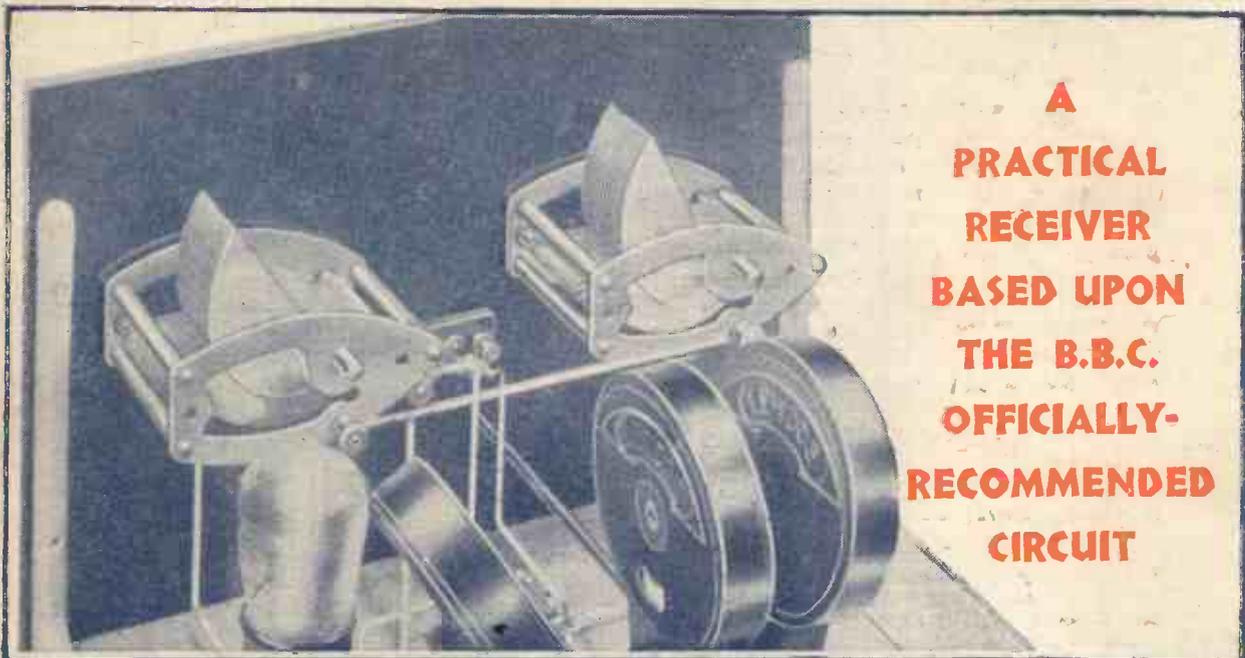
Amateur Wireless

and
Radiovision

Every
Thursday 3^d

Vol. XV. No. 388

Saturday, November 16, 1929



**A
PRACTICAL
RECEIVER
BASED UPON
THE B.B.C.
OFFICIALLY-
RECOMMENDED
CIRCUIT**

B.B.C. Official ONE-VALVER



£11 worth of WIRELESS for £9



THE Brown Receiver could have been sold a few pounds cheaper—if price—and not performance had been our consideration. But the name Brown demanded nothing but the best apparatus. Performance comes before price, because performance lives after price is forgotten.

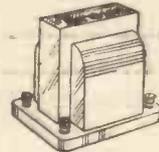
Consider what you get for your money in the Brown Receiver! A 30/- Brown Transformer—high precision Polar Variable Condensers—the world-famous T.C.C. Condensers—highly efficient Brown Dual-wave Coils—a handsome *ready-made* oak cabinet. Even the simple tools necessary for building are included. Over £11 worth of Wireless for only £9!

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The Brown 3-Valve Screened Grid RECEIVER

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Dept. C, S. G. Brown, Ltd., Western Ave., N. Acton, W.3



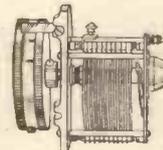
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THE PERFECTED ELIMINATOR

A FINE PROPOSITION FOR RADIO USERS WITH ELECTRIC MAINS.

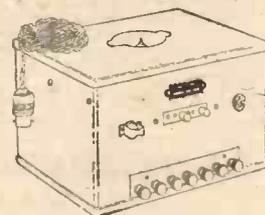


MET-VICK MODEL "BS" ELIMINATOR for A.C. Mains Operation (Combined L.T., H.T., G.B., and S.G.V. Eliminator A.C. Type). Price—40/100 cycle Model, £8 (complete with valve); 25 cycle Model, £10 (complete with valve).

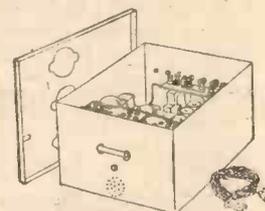
Cut out the L.T. and H.T. batteries and the attendant bother and expense of replacing or recharging at frequent intervals. First cost will be last cost if you get a Met-Vick Eliminator.

In the wide range of Met-Vick Eliminators there is one to suit every need—there's the model "D" for the man with the big power valves and moving coil loud-speakers and there is the model "B.S." for the listener with the modest 3-valver.

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SUPERIOR
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9 volt ... 1/6
63 .. 7/6
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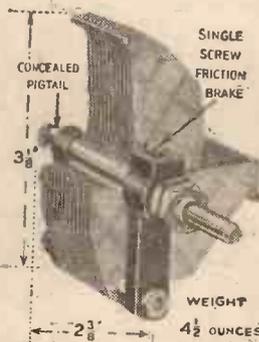
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**Guaranteed—
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Although we guarantee it for six months the Peto & Radford Accumulator costs no more than the ordinary battery.

Just think of this for 9/-. A 2-volt 20-ampere hour (actual capacity) accumulator; with sturdy plates, interlocking grids to hold paste, terminals with acid-proof glands, glass key-ways in the box to hold the plates, a crack-proof, hermetically sealed Dagenite lid, non-reversible terminals, a screwed, splash- and - spray-proof vent, ample acid space—all as we say, for 9/-, and guaranteed for six months.

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ACCUMULATORS

The beginning and the end in

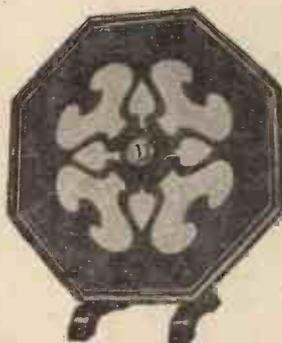
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M.P.A. RESEARCH DEPARTMENT OFFERS YOU THESE 3 NEW M.P.A. SPEAKERS. SCIENTIFIC MASTERPIECES! EACH ONE A TRIUMPH OF GOOD LOOKS, TONAL PERFECTION AND VALUE! HEAR AND COMPARE!



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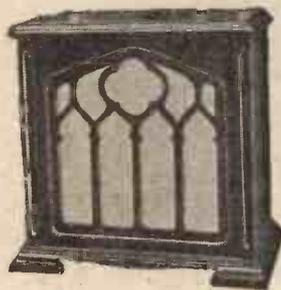
A BETTER INSTRUMENT THAN EVER BEFORE—and AT A LOWER PRICE! Fitted with the wonderful new Mark VI unit; with new robust protecting grille at back; mounted on wooden base. Remarkably sensitive, clear and loud! Even response over wide range of frequencies, attractive mahogany or oak finish. **25/-** And look at the price!

★ Don't forget also to hear the new Mark VI Speaker Unit. It is only 12/6, chassis with 14" wood baffle and 9" cone costs 10/-; full mounting instructions are given.

THE NEW M.P.A. POPULAR CABINET

ANOTHER EXAMPLE OF M.P.A. VALUE! An attractive speaker with a first rate performance. Yet low in cost! Like the Popular Plaque, it has the unique Mark VI movement. Extremely sensitive. Splendid reproduction. Exceptionally wide range. Handsome polished oak cabinet. Box resonance eliminated. Hear **45/-** it and you'll buy it! Price

Mahogany Cabinet 47/6



THE NEW M.P.A. MOVING COIL SPEAKER

SEE AND HEAR THIS AMAZING NEW SPEAKER! Whatever price you are prepared to pay, you will not get anything better! Here indeed is "Hearing that is almost seeing!" Built on entirely new principles. Permanent magnet. No separate energising current required. Patent baffling system eliminates box resonances. Glorious tone! Dignified design in polished oak. A delight for the eye and the **15 GNS.** Complete ear!

Unit only on base, 12 Gns.



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200. Price - -

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the same price.

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Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

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Rough on Bridges!—The B.B.C.'s Birthday—More Scandal—Transatlantic Radio—Armistice Loud-speakers—Can You Hear It?—"Oswald" Again

Rough on Bridges!—The Archbishop of York, Dr. Temple, is a recent convert to the utility of radio in connection with adult education. His opinion carries a deal of weight, but it probably won't convert those who are hardened abstainers from radio highbrowism. For instance, in a recent speech, the Archbishop of York said that listeners "are probably familiar with that list of occupations to which men betook themselves to avoid the pain either of activity or of vacuity of mind, which

November 14, is to be given a broadcast birthday programme from all stations. Enough jokes have been made on the fact that the title of the programme is "We Are Seven," and that it is not intended to disguise the fact that the staff numbers seven hundred. We will refrain from adding still further humour, and just hope that the programme is a good one!

More Scandal—Now that the names of dance music numbers are given and the B.B.C. has made a serious attempt to prevent "song plugging," a new little scandal has arisen regarding what one daily paper calls "radio music pickings." Apparently this paper has just discovered that many singers receive bonuses from firms of publishers whose songs they sing. Of course, it isn't right, and of course it is still a greater wrong that the B.B.C. should be an innocent party to this form of bonus-getting. But it's nothing new! A firm of music-publishers, when approached on the subject, said: "Blame the B.B.C. If they paid artistes more we shouldn't get the advertisement in this way."

Transatlantic Radio—It's an ill wind that blows nobody any good, and one of the results of the trouble on the New York Stock Market has been an increasing number of frantic wireless telephone conversations, on which the fate of fortunes has depended. On one day, when the Wall Street crisis was at its height, all the available channels of communication were filled and probably on no other occasion has so great use been made of the rather expensive transatlantic radio service. The Post Office made as much as £360 an hour during the height of the trouble.

Armistice Loud-speakers—A noticeable feature of the Armistice Day celebrations this year was the great use to which

public address systems with radio-type amplifiers were put. The Marconiphone people had public address speakers relaying services at places so far apart as London, Weston-super-Mare, Glasgow, and Belfast. For work of this kind, travelling vans are

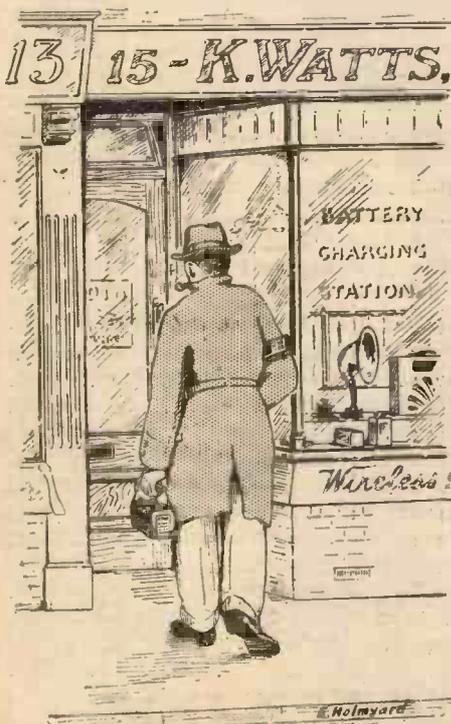
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generally used, and each contains a motor generator for supplying H.T. and L.T. juice, and a bank of power valves looking like a young transmitter.

Can You Hear It?—A good many people nowadays are able to get the American stations so consistently, that they can listen fairly regularly to U.S. programmes. Therefore, it is worth noting that the Westinghouse folk are putting out, every Wednesday at 7.30 p.m. (Eastern standard time), on a coast to coast chain of broadcasting stations, a programme of special interest. On each occasion the programme will be in connection with some special industry. Some of the best artistes in America are being engaged for this series of programmes, and they really should be worth listening to. WJZ, New York City, and all the stations of the National Broadcasting Company's chain will relay the programme.

"Oswald" Again—"Oswald" the



"Current" Events—This "re-volting" business—Amperes going "ohm"

ended with reading magazines and spitting over bridges!" There was a period, he continues, when he wondered whether listening-in would have to be added to this list. He thanks the Adult Education folk for averting this ill, but, of course, there are thousands who won't agree with him.

The B.B.C.'s Birthday—To-night,

"CURRENT TOPICS" (Continued from preceding page)

oscillator is still, apparently, very much alive, despite the increasing popularity of the screen-grid valves and the death of reaction-in-the-aerial circuits. It is common knowledge that the Post Office van is at present in Scotland cutting out unlicensed listeners. It is, perhaps, not so well known that the van is also on the look-out for those who have not the highest regard for the reaction control and who squeal to other listeners' discomfort.

The "Discovery"—Some time ago, in "A.W.," a Correspondent gave a description of the radio equipment on board the barque *Discovery*, which has set off for an Antarctic expedition. News has been received that the *Discovery* is now well down in the southern regions just off Kerguelen Island, and it is in constant radio touch with several headquarters. It may be recalled that the extensive scientific equipment being carried includes a small scout aeroplane. This, too, is radio equipped, so that it can be in radio touch with the mother ship.

Those Sunday Programmes—"Those who complain—and there are many—that Sunday broadcasts should be brighter and lacking in all tribute to religion deserve the silence with which their lamentations are received. . . . I agree that for those people who seek excitement seven days a week the Sunday broadcasts must be an affliction. I give them little sympathy." So says a critic in the *Daily Express*. He must have picked a good Sunday!

5SW's Utility—Although the B.B.C. short-wave station is still officially classed as "experimental," it does on some occasions perform duties which should lift it into the ranks of a main station. One such occasion was when 5SW enabled the whole of the Empire, and, indeed, the whole world, to hear the Armistic Day celebra-

tions in England. Probably in the Dominions more short-wavers were tuned to 5SW, 24.4 metres, than ever before, and it really is remarkable, when you come to think of it, how little attention is paid in the daily Press to the fact that here is a most romantic triumph of radio, and a firm chain between the Dominions and the mother country. If 5SW could give a twenty-four-hour service, a weak link would be strengthened.

HAVE YOU NOTICED

— that there are many wireless retailers who do not know even the first thing about the rudiments of wireless and electricity? To illustrate this, I would relate how one day I entered a shop and asked for a 120-volt H.T. battery; on being shown one of the standard-capacity type, I requested one of bigger capacity, whereupon the dealer said, "You won't very often see a bigger capacity battery than 120 volts, sir." Of course, this may have been momentary forgetfulness; on the other hand, it may not.

— that the French term for the passing of a circuit into oscillation is accorcharge, which means literally "hanging up"? How this has originated, it is hard to say, as there appears to be no direct relation between the translated French word and the condition of a set in a state of oscillation.

Heard This One?—An old lady went into a gramophone shop and said she wanted a record of a tune she had heard on the wireless. "I think it's called the 'Song of the London Milkmen,'" she said. Rather dubious, the attendant searched through current catalogues, without avail. "Are you sure that's the title, madam?" he asked. "It isn't the 'Song of the Volga Boatmen,' I suppose?" "Oh, dear, no!" she replied, confidently. "I really can't remember the full name, but I'll hum the tune for you." And the tune she hummed was—"The London—'dairy' (Londonderry) Air"!

Two new direction-finding stations for shipping are to be put into operation at Epichel and Sagres, Portugal. These transmitters will use the call-signs CTE and CTS respectively, and both will be equipped for working on the wavelengths of 600 and 800 metres, the latter being the wavelength used for the actual D.F. work when communication has been established by an initial call on 600 metres.

"JUST ONE MOMENT, PLEASE—"

"THIS is a rotten set, Lavender," I said.

"Tisn't a rotten set," she retorted. "Jolly good set, bit out of date, topping tone though."

"Yes, tone's all right," I admitted. "But—"

"Plenty of volume, too," she went on. I shuddered affirmatively.

"And it's as selective as anything," she concluded. "So, what's the grouse?"

"Such mouldy noises come out of the loud-speaker thing," I sighed. "Doesn't matter what you select, someone's always talking. It's everlasting—Meine Dames und Herren—Mesdames—Messieurs—Just one moment, please—or a row like a soda-water factory blowing up from Spylsm, or Jloytz, and it all leads to the same thing in the end—Talk!"

"Rubbish!" she snapped and flounced out.

Lavender is inordinately proud of that set. She made it herself, and won't let anybody forget it. You know the sort of thing—Full-sized Blueprint—no previous knowledge—just a screwdriver and a pair

of pliers—any fool—but I don't mention that bit to her.

What she actually used was no knowledge, previous, or otherwise, the blade of my favourite penknife, the tin opener, a button hook and the fire tongs. After she had finished—(Lavender allows people to forget this bit)—I took the whole box of tricks round to the Wireless Dealer and begged him to disentangle all the thingummies with the outlandish names.

I'm sure it's a dud set though, because, although I have never heard another playing jolly things like Dance Music, I've seen pictures of them in full blast. When I gaze at the happy groups gathered round the cosy fireside with Music—real Music, pouring into the room from all the corners of the globe, it makes me feel sad. I mean to say, who ever saw a picture of a wireless set booming out a talk on "Edible Fungi" to a jolly party with funny caps on their heads? The thing simply is not done.

"It is a dud set, Lavender," I repeated for the umpteenth time, as we sat glumly gazing into the fire after a riot of Fat Stock Prices—New York Closing Prices—Fore-

casts of Sea Passages—Herr Otto Dum-worst reading from his own works and several other orations in strange tongues. "I'm going to put it in a sale and see what we get."

Lavender made no objection, at least, not in my hearing. I had logged it for the auction rooms. The voice of the speaker was stilled in our home for a week, and then, one day, I handed over to Lavender thirty shillings—the price of our salvation.

It was a pity I did, really, as she trotted it round to the Wireless Dealer as a deposit on a terribly posh outfit, for which I shall continue to owe for many moons.

The set was installed. We sat round the crackling fire. I switched on.

"Just one moment, please," came the old familiar voice. "We are just taking you over to the Playfair Hotel—"

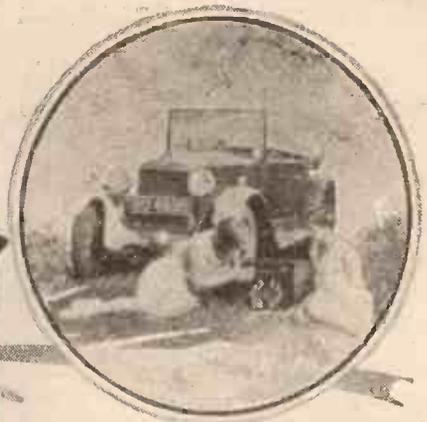
"Cheers! Dance music at last!" I shouted.

The voice went inexorably on—"For the speeches at the dinner in aid of the Indigent and Superannuated Oboe and Saxophone Players Society—Just one moment, please."

HERBERT HAMELIN.



Using the Portable Indoors



A good portable set is not cheap and it is hardly an economy to have an expensive set in use only during the summer months, and wasting its batteries during the indoor reception season. With a little modification a portable set can be used indoors, and will give results equally as good as a standard receiver. The accompanying article gives some useful hints on adapting an outdoor set for indoor working.

WHEN you come to think of it, it is not a great economy to have a four or five-valve portable set which, owing to the Heinz-like fifty-seven-variety type of English weather, can be used probably only during July and August, and then has to remain idle for the other ten months of the

year while an equally expensive set of a different type is used for indoor working. Meanwhile, the H.T. battery in the portable set runs down and the accumulator sulphates through sorrowful lack of use.

H.T. Considerations

The reason for both these conditions is a good proposition without modification of some kind. Moreover, the results obtained with a portable set, while satisfying enough for outdoor work, in many cases really do not compare with the very best results that can be got from a good indoor set, or from the portable set itself when the necessary changes have been made.

A good indoor set may be provided with as much as 150-180 volts H.T., has a greedy power valve and a total anode consumption of perhaps as much as 20 milliamperes. A portable set on the other hand usually cannot accommodate anything greater than two 60-volt midget H.T. batteries, and to

ensure a reasonable working life valves have to be chosen so that the anode consumption is not greater than about 10 milliamps.

It is regarding batteries then that the first modification must be made if a portable set is to be worked indoors with due regard to economy.

The receiver case is usually of fixed dimensions so that it is impossible to accommodate therein batteries of greater

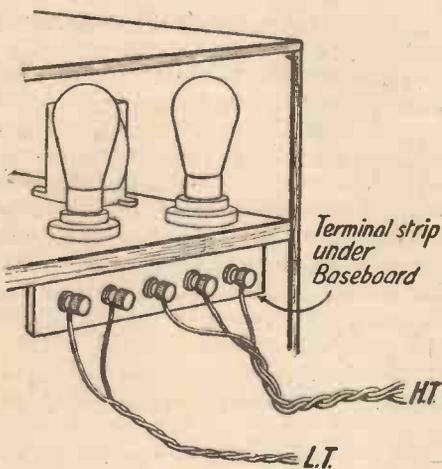


Fig. 2. Simple method of providing connections for external batteries

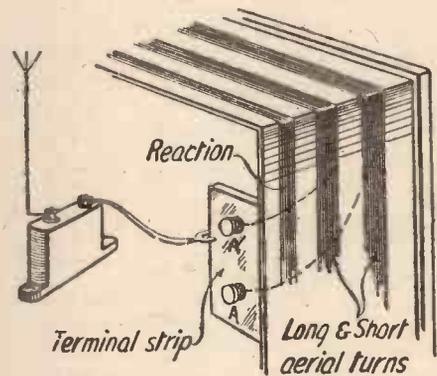


Fig. 3. Two separate aerial tapplings may be needed for the long and short waves

With a little modification, most portable sets can be used for all-the-year-round working, and the purpose of the following few notes is to show how a summer portable may be utilised as a "hardy annual."

It may not, off-hand, be obvious why a portable set cannot be used just as it is for full-time indoor working throughout the winter season, but a little consideration will show that if one respects one's pocket and takes into account the remarkable economical working obtained from an ordinary set, then an ordinary portable is not

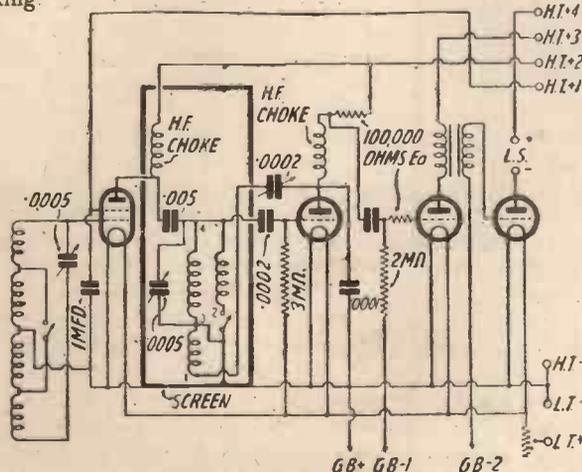


Fig. 1 A portable set circuit showing how separate H.T. tapplings are provided

capacity. Two courses therefore are available. Either one can fit an adaptor so that external batteries may be used, either of the dry or accumulator type; or a mains eliminator may be employed either in the set, or placed as a separate unit.

First, however, it need hardly be said that the set should be worked until the existing H.T. battery has run down. It won't last until the next summer season! Most portable sets incorporate four or five valves and for efficient working of a set of this type the H.T. battery should be of the triple capacity variety and the total volts should be in excess of 120.

If the voltage is put up to 150 or even more (which is all to the good in the endeavour to get better results), then it may be necessary to fit an extra

"USING THE PORTABLE INDOORS"

(Continued from preceding page)

H.T. tapping or two, say for the H.F. valve group and for the detector valve, the greatest voltage will need to be applied to the power valve and, usually, the least to the detector.

There is really no harm in having a separate H.T. tapping for each anode circuit and an accompanying diagram (Fig. 1) shows the circuit of a recent AMATEUR WIRELESS portable, the "Music Leader," in which a number of separate H.T. tappings are provided. This circuit is typical of many portables, and may help you to provide the necessary separate high-tension tappings, so that a greater total voltage may be used, and cut down for each valve. The most important part is that it should be easily possible to change from the existing batteries in the set to the additional external batteries for indoor use.

Another sketch, Fig. 2, shows how a terminal strip can be arranged at the back of the baseboard and the flex leads from the receiver unit carried to the terminal shanks instead of direct to the batteries. It is then only a matter of a minute or two to connect up either set of H.T. and L.T. batteries as required.

In parenthesis it may be mentioned that it is hardly worth while fitting terminals for an external G.B. battery, because most portable sets are capable of accommodating a 9 or 14-volt G.B. battery. This will be sufficient for most needs, and it is only if one is entirely altering the purpose of the set that it is necessary to fit anything larger, say a 24-volter.

Mains Working

If an eliminator is to be used, A.C. or D.C., then the best plan is to place it a fair distance from the set, say, down near the mains plug, and to carry the H.T. leads thereto. There is a distinct danger that if the eliminator itself is placed in the set, the current fluctuations in the smoothing circuit may interact with the low-frequency side of the set and cause a ripple audible in the loud-speaker.

With direct-current mains, in the supply of which there is not a too-noticeable commutator ripple, then the trouble may not be serious and, if it is really necessary in the interests of tidiness, then the eliminator may be housed in the portable cabinet. Still further to reduce interference, it can be contained in a metal case.

With A.C. mains, however, this is simply asking for noisy reception. It is very simple to use a triple or quadruple cable to connect up the H.T. leads, and a great advantage is that the two mains wires are kept very short if the eliminator is placed near the plug.

So far as the L.T. is concerned, it is possible that the standard accumulator in the portable set may suffice. It is usual nowadays to find a non-spillable type of

accumulator fitted in most portable sets. The latest non-spillable accumulators are entirely satisfactory, but some of the "cheap-and-nasty" Continental-manufacture jobs do not have anything like the capacity to be expected from their size. They may work well enough for a week-end, in a portable set, but it may be a more economical proposition to use an external accumulator of some well-known make when the set is being used indoors. This will cut down the number of trips to the charging station.

External Earth and Aerial

So much for the battery supply to the receiver. There are yet two other factors to be considered when the set is worked

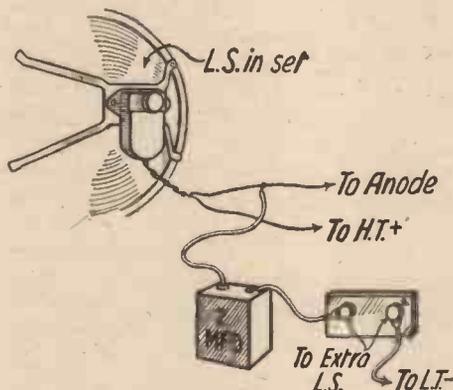


Fig. 4. Showing how the existing speaker may be used as an output choke

indoors, namely the possibility of using an external aerial and earth, and also the need for connecting one, or perhaps two, additional loud-speakers.

The addition of an earth is usually an easy matter. In nearly all "straight" circuits, it is satisfactory simply to connect the earth lead to some point on the low-tension or high-tension negative wiring. Beware, however, of doing this in a very few commercial sets which embody a kind of reflex circuit and, in which the addition of a large earth capacity to the filament side of the circuit would render the thing quite unstable.

Adding an aerial, however, is not quite so simple. There is really only one very simple method, and this is not very tidy: it consists of winding the aerial lead once or twice round the cabinet, over the frame-aerial part, and carrying it down to earth. This, in effect, inductively couples the external aerial to the frame. If one cared slightly to modify the inside of the set, it might be possible to wind on the frame aerial former an extra one or two turns near the aerial section. The ends of this additional winding, which should be only very small, should be brought out to two insulated terminals conveniently placed at the side of the cabinet. The external aerial and earth can then be connected to these (usually it does not matter which way round) when the set is being worked indoors.

It should be pointed out that almost any method of adding an external aerial tends to destroy the directional properties of the frame aerial. So far as indoor working is concerned, this is all to the good, because if the set has a marked directional effect, it may need to be turned facing in an awkward direction in the room in order to receive the local station. When the external aerial is added, the set can be turned in almost any direction without causing any change in strength.

The aerial can be directly coupled if desired, but the lead should always include a fixed condenser, or a condenser of the pre-set type, having a value not greater than .0003-microfarad. The easiest way to find the correct position for the aerial tapping on the frame aerial is to connect up the earth to one side of the .0003 condenser, and to connect the other side to an ordinary sewing needle. The needle can then be threaded and poked into various parts of the aerial section of the frame.

When the best position is found, the wire can be bared for an inch or so at this point, and a short flex soldered to the aerial turn, and the other end taken to an insulated terminal on a conveniently placed little strip, carrying also the external earth terminal.

A point to notice is that with some of the new methods of wave-changing, in which separate windings are used, which are brought into circuit, either jointly or separately for the two wavebands, it may be necessary to have *two* tappings. Therefore when prodding with a needle make tests on both the medium and long waves and find the optimum points in each case. If the need for separate tappings for long and short waves appears justified, then take the two flex leads to two terminals as shown in Fig. 3.

External Loud-Speakers

It is quite possible that the loud-speaker contained in the portable set will not be entirely satisfactory for indoor working. For one thing, it may not be quite so good as one made regardless of weight: for another, the position in which it is desired to work the set may not be the best for the operation of a loud-speaker. When adding one or more external speakers, two courses are available. The most obvious is to provide two terminals at the side of the cabinet, together with either a double-pole, double-throw switch, or a single double-pole, double-throw switch. Then either the internal or external loud-speaker can be used simply by the movement of a switch.

A somewhat better plan, though, and one which has a distinct advantage if the loud-speaker leads are very long, is to use the winding of the portable set speaker as a choke for a simple and reasonably efficient choke output system for the external speaker. The connections for this arrangement are shown in Fig. 4.

The WORLD-WIDE Short Wave THREE



II.—THE METAL CABINET : ASSEMBLY : WIRING : FIRST TESTS

THAT there is wide scope for an efficient yet simply-operated short-wave receiver was clearly shown last week, when was given an abbreviated list of the more prominent short-wave transmitters which can easily be picked up in this country. It was explained, in addition, that the "World-Wide Three" opens up an entirely new era in short-wave reception.

Previous short-wavers have generally been of the "detector and one L.F. type," a receiver which has, true, proved very useful both for the broadcast band work and for reception on the wavelets. The reason why this type of circuit has been so successful on the ultra-short waves is simply that in past years it has not been possible to operate any kind of H.F. stage efficiently on wavelengths below about 150 metres. The inter-electrode capacity of H.F. valves, and the stray capacities brought about by short-wave H.F. circuits of the past, have combined to make H.F. reception very inefficient on the short waves.

Only within the previous years have developments resulted in improved methods of H.F. amplification at higher frequencies, and work carried out in the AMATEUR WIRELESS laboratories has resulted in the present "World-Wide Short-wave Three."

The technical details of the circuit were discussed last week and all who contemplate making up this short-wave receiver are advised carefully to read through the circuit analysis given last week.

All-metal Construction

This week we deal more specifically with the constructional details. An accompanying panel gives the components required. It will be seen, that the list is not very lengthy, nor does it entail many expensive parts. Generally speaking, short-wave receivers are cheaper to construct than broadcast receivers, although usually a little more care is required.

The salient feature about this present set is the all-metal construction. The cabinet, measuring 14 in. by 7 in. by 8 in., consists of metal sides attached to 14-in. by 8-in. baseboard, which is covered with foil.

In this way all the components are completely screened in. The construction of the receiver is seen clearly in the blueprint, copies of which can be obtained, price 1s., post free, from the Blueprint Department. No correspondence is needed, simply ask for blueprint No. 207, from AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4.

The construction of this receiver differing a little from normal practice, the blueprint is of even greater than usual importance. With its aid no difficulty should be experienced in making up the metal cabinet and carrying out all the other usual constructional work. The cabinet and baseboard may be obtained complete from Messrs. Paroussi, with all the drilling done.

The first job, if the cabinet is not bought complete, is to attach the one section of the cabinet consisting of the three sides to the foil-covered wooden baseboard. The foil is simply attached to the board by means of small tacks along the rear edge of the baseboard, and is held down along the three other edges by placing the triple side of the cabinet on top and screwing it down with the holes already drilled. Do not, at this stage, attach the rear and lid portions of the cabinet.

Drilling can next be undertaken. On the panel are mounted the two variable condensers, with their special slow-motion dials, the potentiometer, and the filament on-off switch. The condensers are of the one-hole fixing type, and particular attention should be paid to a detail which is clearly shown in the blueprint, namely, the fixing of the condenser bushes. The spindles are electrically connected to the metal panel.

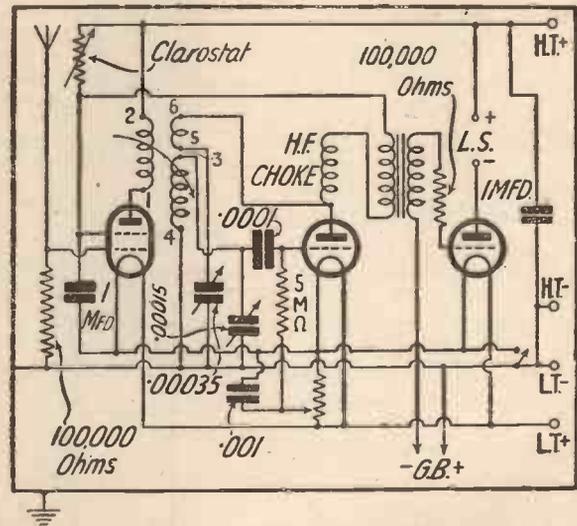
The slow-motion dials necessitates the drilling of one hole each in addition to the main hole in the panel for the condenser spindle. The Indigraph slow-motion dials specified are very simple to mount and the only point that needs attention is the exact location of this extra fixing hole.

General Assembly

An important point to notice is that the potentiometer arm must not touch the panel at any point, and this is assured by drilling so large a hole that no slight play in the potentiometer movement allows the spindle to come in contact with the panel. Two holes have to be drilled, in addition, for mounting the potentiometer and the special bolts provided also hold down the indicating tablet under the potentiometer control knob. The heads of the bolts should be on the outside of the cabinet and the nuts on the inside.

Next, the terminal strip at the back may be drilled. This consists simply of a long strip of ebonite, measuring 14 in. by 2 in. Two extra holes should be drilled at each end so that bolts may be passed through to attach the strip to the cabinet. The strip carries in the centre the standard Clarostat, which regulates the voltage both on the detector valve anode and on the screening grid of the screened-grid valve.

In addition the strip carries terminals for L.S. positive, L.S. negative, H.T. positive, H.T. negative, L.T. positive and negative, and aerial and earth. All these terminals can be mounted and a strip attached. One may then go ahead with



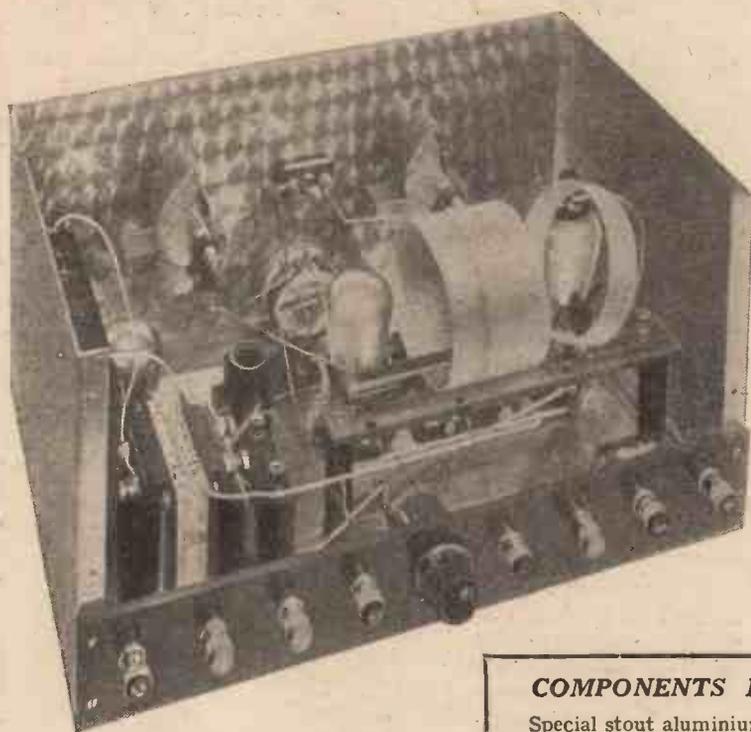
The circuit of the World-Wide Short-wave Three

mounting the components inside the box, on the floor of the cabinet.

The three valve holders, the H.F. choke, the two small and one large fixed condenser, and the two grid-leak holders should first be placed in situ. Ascertain the correct positions of all these components from the blueprint. Correct spacing is very essential,

and on no account is any amateur advised to modify the design of this set. The components on the panel and the nine com-

ponents just mounted on the baseboard can now be wired up so far as possible.



ponents just mounted on the baseboard can now be wired up so far as possible.

Wiring

Bare wire is best used, except, perhaps, for the long positive L.T. lead, and also that which passes from the screen-grid terminal of the screen-grid valve holder to the O.P. terminal on the "Radiogrand" transformer which latter should not yet be mounted.

It will be found possible to wire up some of the terminals on the strip, mutually and to some of the components. Note, in particular, the short lead which is connected between the earth terminal and a small soldering tag placed under one of the nuts on the bolts securing the terminal strip to the cabinet.

When all the wiring so far is completed, then the four remaining components can be added, namely, the 100,000-ohm resistance between aerial and earth, the coil-socket strip on its two pillars, the Mansbridge-type condenser, and the "Radiogrand" transformer.

Now add to the wiring, using bare wire for the most part. There are three flexes, one being a short lead from one of the terminals on the plug-in coils to the anode of the screen-grid valve, the other two connect up to the grid-bias battery. This battery, it should be noted, is supported from one side of the metal cabinet by means of a flap forming an integral part of the battery. Two little holes drilled in the side of the cabinet allow small bolts to be passed through for securing the flap. A red and a black wander plug should be secured to

Make a Check

This actually completes the construction of the "World-Wide Three," but before making a test of the receiver it is advisable in the interests of "safety first," to make quite sure that all the wiring is correct and that there are no short circuits. Do this, of course, before connecting up the batteries and plugging in the valves.

Using the blueprint as a guide, check over each lead in turn, marking on the blueprint each lead as the actual wire is checked as O.K. Obviously the large amount of metal work embodied in the construction increases the possibility of a short circuit. Particular care has to be paid to soldering the connections to the valve holders, for there is not a very great clearance between the undersides of the soldering tags and the metal-foil floor of the cabinet.

Quite a good tip when checking over the wiring is to connect up the H.T. and L.T. batteries, switch on, and place an old valve in each valve socket in turn. If the valve glows satisfactorily, then it may be taken as doubly sure that the wiring is O.K.

Suitable Valves

An ordinary screen-grid valve is suitable for use in this set. The detector valve should be of the H.F. type, and an ordinary small power valve is suitable in the third valve holder. Plenty of H.T., up to about 120, is advisable, for loud-speaker working will be possible on many stations. For phones use as little as 80 volts. Nevertheless, if one does not wish to miss the very distant short-wavers, it is still advisable to make occasional use of a pair of phones.

If a mains eliminator is employed, then care must be taken that the wearing of phones, with the chance of possible short-circuit between the head and some metal part of the phones, does not introduce any danger. The makers of the eliminator used will generally be able to assure one on this point, and indeed the large majority of the present commercial eliminators are entirely suitable.

For really distant work batteries are probably to be preferred in place of an eliminator, for with many eliminators a very small amount of ripple is audible when wearing phones, although of no account whatsoever when a loud-speaker is used.

Radio Catalana (EAJ13), which had closed down for some weeks, resumed its broadcasts on October 15 last. Some indecision appears to have existed as to its proper wavelength, and although allotted 268 metres, it has broadcast on 465 metres. The power is 10 kilowatts in the aerial.

Work on the reorganising of the Polish broadcasting net is proceeding rapidly and the new Lodz transmitter will carry out its first tests early in February next. In July, 1930, it is hoped to bring the Lemberg station into operation. The high-power transmitter destined to Warsaw is not expected to work before the end of next year.

The design of this special short-wave set is a distinct departure from ordinary practice. Note the all-metal cabinet and wide spacing of components

the lid. The lid is attached to the rear portion by means of a long brass hinge.

COMPONENTS REQUIRED

Special stout aluminium cabinet, 14 in. by 7 in., complete with 8-in. baseboard (Parex).

.00015-mfd. short-wave variable condenser (Formo, Cyldon, Burndept, Jackson).

.00035-mfd. variable condenser (Formo, Cyldon, Burndept, Jackson).

.400-ohm panel-mounting potentiometer (Igranic, Lissen).

Push-pull filament switch (Bulgin, Lotus, Trix).

Three valve holders (Benjamin, Vibrolders, Lotus, W.B., Formo).

Two 1-mfd. fixed condensers (Lissen, Dubilier, T.C.C.).

.001-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish, Watmel).

.0001-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish, Watmel).

100,000-ohm grid resistance (Lissen, Graham-Farish, Ediswan).

Two grid-leak holders (Bulgin, Lissen, Ediswan, Dubilier).

Short-wave high-frequency choke (Igranic, Wearite, Bulgin, Parex).

Complete set of short-wave coils, with base (Colvern).

Low-frequency transformer, ratio 5-1 (Telsen "Radiogrand," Lissen, Varley, Brownie).

Ebonite strip, 14 in. by 2 in. (Raymond).

Variable resistance, 100 ohms to 5 megohms (Clarostat "Standard," Volustat, Regentstat).

100,000-ohms wire-wound resistance and holder (Ready-Radio, Dubilier, Lissen).

Eight terminals, marked: Aerial, Earth, L.T.+, L.T.-, H.T.-, H.T.+, L.S.+, L.S.- (Belling-Lee, Eastick, Burton).

9-volt grid battery, with flap for securing in cabinet (Siemens, Ever Ready).

1 ft. of flex (Lewcoflex).

Two wander plugs, marked: G.B.+ and G.B.- (Belling-Lee).

Two vernier dials (Igranic Indigraph with micrometer adjustment, Burndept, Burton).



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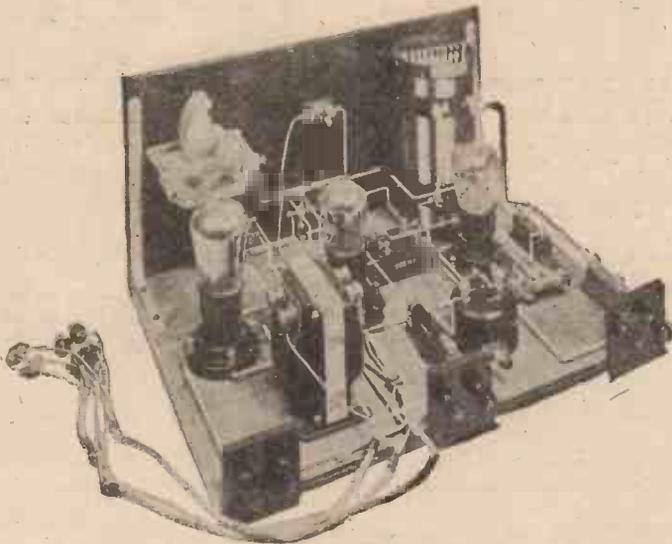
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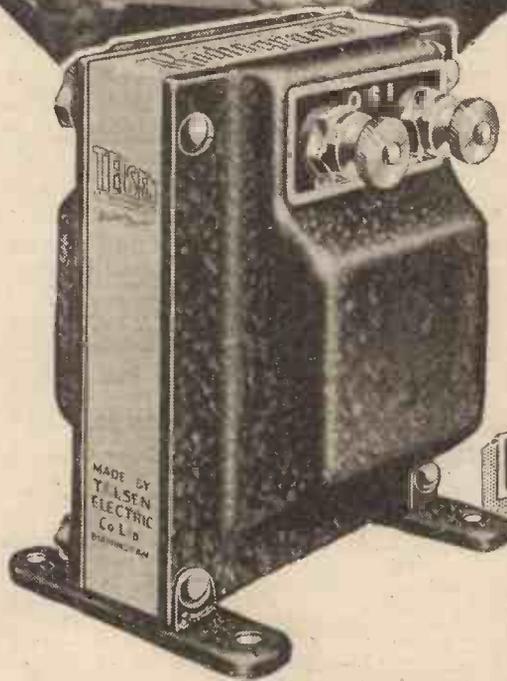
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On Your Wireless!

Quality

CAN detect no difference in the quality of the transmissions from Brookmans Park compared with those from Oxford Street. I should have been surprised if there had been any difference in quality. The B.B.C. development department did a lot of experimental work on the Oxford Street transmitter which put it ahead of any other broadcasting plant in the world. By the careful arrangement of circuits and impedances the extensive use of neutro-lyning for balancing out unwanted capacities, and the use of amplifying valves with a large factor of safety against "blasting," the frequency characteristic curve had been brought up to the ideal—a straight line. Brookmans Park transmitter was designed with Oxford Street transmitter "practice" and with the two big Daventry transmitters as a guide for layout. The frequency characteristic of the Brookmans Park transmitter is also a straight line, the chief differences in the transmission being brought about by the fact that the line carrying the sounds from Savoy Hill is somewhat longer. This slight distortion, however, is compensated for by special line correction circuits.

Opinions

Many listeners have complained that the new station "distorts." Well, whatever difference there may be in the quality of the received signal must be a function of the improved or weakened strength. It is probable that in many cases the signal is so strong that the detector valve is being overloaded; if this is so, it is quite possible that the L.F. valves are also being overloaded. The extra strong signal may also mean that quite a large amount of high-frequency current gets past the detector valve and works havoc in the L.F. circuits. The remedy for all this trouble, if the receiver is not very selective, is to detune slightly when receiving Brookmans Park. The aerial may also be shortened, and if of the multi-wire type should be altered to single wire. If the signal has weakened, possibly reaction is being used strongly, thus affecting quality.

Anglo-American Methods

I was privileged the other day to see and hear in advance a sound film which is to commemorate the Armistice at the cinemas. It has been made in London by a British company using American recording apparatus, and the arrangement of the spectacle called for massed bands, choirs, buglers, and the speaking of impressive lines by one of our greatest actors. The recording was carried out entirely by ex-B.B.C. engineers, who had modified the

apparatus somewhat in order to make it conform to B.B.C. practice. The resultant recording was as near perfect as any talking picture I have yet heard, and this in spite of the fact that choir boys' voices were prominent in the musical arrangement. The soprano-like tones of the boys are always difficult to record without "blasting." As this film is being shown at four hundred cinemas during Armistice week, you should hear it for yourself. And if it doesn't sound good your local cinema's talking-picture machine must be out of gear.

Talkies That Vary

Most of the technical troubles of the talkies are at the theatre end. Even when worked by highly skilled operators many outfits behave in a most erratic manner, refusing to "stay put" for two days' running. The reproduction of talkies from discs still gives the greatest satisfaction, though the quality is not so good as with the best sound-on-film talkies. Sound-on-film necessitates the use of photo-electric cells and three more stages of amplification than are used with discs; consequently there is far more that may "go wrong" when sound-on-film is used.

Laughter Timing

One of the problems that has yet to be solved is the tricky one of "timing the laughs." A comedian broadcasting from an empty studio has rather a tough job in putting over humour. It is rendered even more difficult by the fact that he cannot allow any spaces of time between his jokes for listeners to expend in laughter. When the comedian has a studio audience the conditions are a little better; but in this case the small audience obediently laughs at everything in a most dignified manner, as though conscious of the nearness of the all-absorbing microphone. Jokes which don't deserve a laugh get the same "length" of laugh as really good "gags," and the whole thing, applause and all, is apt to become mechanical. The music-hall broadcast is the most satisfactory of the lot, and the broadcast of Will Hay was a particularly good example. I wonder if the same happy atmosphere will prevail when comedians broadcast from the stage of the large studio at Broadcasting House, which will be quite a large theatre itself. I doubt it. The dignity of the B.B.C. is infectious; studio audiences will never laugh unrestrainedly.

Valves and "Toobs"

There is almost as much difference between a valve and a "toob" as there is between a wireless set and a "radio." The average loud-speaker set in this country

contains three valves, though the average "radio" in America has six "toobs." We go in for a small number of efficient circuits, whilst they prefer a bigger number of only moderate efficiency. Whether the wireless set is superior to the "radio" is a matter of opinion, but there can be no manner of doubt that our valves are infinitely superior to the American "toobs."—and here I can speak as one having tried both. First of all, the British valve of the medium-impedance class, such as we use for H.F. and detector, can be made to give first-rate working with a filament current of only .1 ampere at 2 volts. With a similar voltage a power valve may require .2 ampere and a super-power valve 3. In the 4-volt class all but the super-power valve draw but .1 ampere, and when we get up to 6 volts we find that .1 is sufficient for all types. In other words, we find that .6 watt is sufficient for a really generous emission sufficient to work a man-size loud-speaker.

Now, the "toob" is generally a 6-volt affair and, no matter what its type, it eats a quarter of an ampere. That is, its filament wants 1½ watts. But there is much more in it than this. Even with double the filament wattage its emission is not to be compared with the valve. An American "toob" when new may have a very respectable emission, but my own experience is that they do not last. Take the curve of a British valve when you buy it and again two or three months later. If you have used it properly you will find in nearly every case that there is practically no difference between the two curves. Do the same with an American "toob" and the probabilities are that the shape of the second will be entirely different from that of the first. It seems to me that there is some life in the old country yet—what?

The H.T.B. Question

The letter from a Birkdale correspondent in a recent issue of AMATEUR WIRELESS interested me very much. I gather that the set in question is a five-valver, for he mentions three HL210's, one DEH210, and a DEP215. This suggests two high-frequency stages followed by a detector transformer coupled to a high-impedance valve with resistance coupling between this and the output valve. He does not state the voltages used for the various stages, but, assuming 75 volts apiece for the H.F. valves and the detector and 108 apiece for the two L.F. valves, it is rather interesting to work out the total current consumption. The three HL210's will account for about 5½ milliamperes between them and the DEH about ½ milliampere. Properly biased, the DEP will probably draw, say,

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On Your Wavelength! (continued)

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6 milliamperes. I have not the curves by me at the moment, but these figures are not far out. We have thus a total for the set of 12 milliamperes.

A Matter of Size

Now, it is obvious from this correspondent's mention of 15s. 6d. as the price of a 108-volt battery that he is using a battery of standard capacity; made up, that is to say, of cells of the same size as those used in flashlamp refills. For cells of this size the maximum economical load is 5 milliamperes, when they should stand up to about eight months' working at the rate mentioned by this correspondent. Double the load, making it 10 milliamperes, and you reduce the working life of the battery to about two months. Make the load two and a half times what it ought to be, as you do when you draw 12 milliamperes from it, and you will be lucky to get more than about three weeks' service. The correspondent complains that he has had to provide six new batteries in twenty weeks. Myself, I am rather surprised that he did not need seven or eight. The way out of his trouble is a very simple one; instead of spending 15s. 6d. on a standard-capacity 108-volt battery, he should invest rather more in one of the same voltage, but of treble capacity.

Faulty Components

Another correspondent complains that he has not found my remarks about makers being willing to replace or rectify faulty components borne out in practice. I notice, though, that in his letter he does not say that any of the components that did not work properly were of first-rate make. If he failed to get satisfaction after buying cheap-jack components, then his experience exactly proves my point, which was that the extra price that you pay for a good component is an insurance against disappointment. Actually, I have never known a case where a genuine complaint about his products to a maker of repute was not dealt with in the most satisfactory manner. From the symptoms which this correspondent mentions I am rather wondering whether the original trouble was not caused by a faulty valve and whether the other components were really to blame.

Means—Not the End

I noticed that the reports on the television exhibit at the recent U.S.A. Radio Show were rather conflicting. Some handed out palms while others stated that the spectators were treated to a disappointment. This, I suppose, is inevitable with the science in its present stage. Some visitors go with an open mind to a demonstration and are astounded at what is shown to them, while others have drawn up a rather ambitious mental picture, and

in consequence feel that it has fallen short of expectations.

Reverting to the American side, however, unquestionably there must have been an improvement, for the annoying flicker which had previously characterised their pictures had been considerably eliminated, while it had been found possible to increase the size of the picture from 12 in. to 14 in. Of course, in the U.S.A. there are several regular broadcast transmissions of television working to a published schedule, but the only form of synchronising possible over there is by the use of synchronous motors worked off the same power supply used by the transmitter. However, even with this there is undoubtedly a lot of enthusiasm amongst the radio experimenters, and, after all, we must not lose sight of the fact that it is the means rather than the end which must attract attention at first.

Wired Television

Another development I noticed was the activities of those who have been experimenting with "wired wireless." One of the large American power companies which is said to control many wired television

patents is planning the introduction of this system to the public on a commercial basis in the near future. The programmes would be sent into the homes via the normal power lines. This, no doubt, would be a palliative to the synchronising difficulties, but it hardly seems likely that the idea will find much favour. Broadcasting is undoubtedly the best medium.

A Regrettable Affair

The recent announcement made by Radio-Paris that the King had died suddenly must have given a terrible shock to thousands of listeners in all parts of the country, for it occurred, unfortunately, on a Sunday evening at a time when the home stations were not working and when thousands of radio sets were being tuned to foreign transmissions. Since Radio-Paris is one of the most popular of these, this unfortunate message was very widely received and created something like consternation. The whole thing was apparently a hoax perpetrated by one of those foolish creatures who do not seem to care how much distress is caused by their folly. It seems that the announcer at Radio-Paris received a telephone message purporting to come from a news agency of high standing. Since this agency is in the habit of delivering news occasionally by telephone, the announcer accepted the message in all good faith and broadcast it. One would have thought that in the case of news of such tremendous importance he would have gone to the trouble of making quite sure of his ground before he sent his message out far and wide.

Don't Try it in Your Bath

I suppose that thousands of years ago, when our ancestors wore bear skins in the winter time and bare skins in summer, there were misguided people who prodded sabre-toothed tigers to see if they really would bite and became shortly afterwards little heaps of bones. And to-day we have folk who are always doing silly things with electric mains—people who will never be genuinely safe until we succeed in making things not only foolproof, but also dam-foolproof. Recently an inquest was held on a man who was found electrocuted in a bath as a result, apparently, of having meddled with an electric heater. The coroner expressed surprise that 220 volts could prove fatal, not knowing, apparently, how greatly the resistance of the human body can be reduced by immersion in water. The normal D.C. resistance of a person with a dryish skin is in the neighbourhood of 80,000 ohms or more, as you may easily try for yourself with a battery and a milliammeter. But during a hot bath, when the skin is thoroughly soaked, this may fall to but an ohm or two.

THERMION.

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EVERYBODY has a wireless Tit-bit of some kind or other. Everybody knows at least one interesting and possibly humorous incident or experience which would make good reading for his fellow readers. So we are inviting you to write down your wireless Tit-bit and send it to us. Don't make it long, but do your best to make it interesting and readable.

We shall publish as many of these Tit-bits as possible in the Christmas number of **AMATEUR WIRELESS**, and for every Tit-bit published we shall have pleasure in paying half a guinea.

Of course, *your Tit-bit must be original*; it must be *your own* and not copied from any publication.

Please write it on one side of the paper only and see that it reaches us not later than Monday, November 25; you can send it as much earlier as you like.

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Address your envelope to:

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WHY THE BEST SETS HAVE AN H.F. STAGE

The most popular type of set nowadays has at least one H.F. stage; it is evident therefore that this provides some definite advantages. What these are is concisely stated in this article by W. JAMES

THE sets most widely used until a year or two ago had a detector with reaction and one or two stages of low-frequency amplification. They could, as a general rule, be relied upon to deal in a satisfactory manner with the local station both in regard to volume and quality. Further, owing to the almost uncanny powers of reaction, a skilled user could rely upon hearing a number of distant stations. The results to be obtained depended to a by no means small extent upon the ability of the operator in tuning; as a con-

In brief, sets of the detector with reaction and low-frequency type are usually (1) not selective, (2) liable to distort, (3) difficult to tune properly, (4) liable to set up oscillations in the aerial circuit that produce bad interference over a large area, (5) the results obtained depend very much upon the skill of the user. Let us now consider one of these sets with the addition of a tuned high-frequency stage, for this is really all that a modern receiver is. There are two tuned circuits, therefore, the tuning is sharper

low-frequency stages are fitted with a volume control as well as reaction. The volume and selectivity may therefore be adjusted within limits without difficulty and strong signals be reduced to the point where they do not overload. In addition to the better selectivity of the set with a high-frequency stage and the greater volume with which many stations are received, there is the advantage that, as the reaction circuit is associated with the detector, little or no disturbance is produced by allowing the set to oscillate.

sequence, it was not unusual to hear an amateur praising a certain set and a more or less inexperienced user condemning it. The amateur would have logged, say, thirty stations and the ordinary listener perhaps half a dozen. One operator, too, would so use the reaction control that he rarely caused his set to oscillate, whilst another, on the other hand, would produce an amount of interference. The detector and low-frequency set is, therefore, of limited usefulness. Lack of selectivity is a difficulty with this type of set, however. Reaction, no matter how skilfully applied, does not in practice compensate for poor tuned circuits. Too much reaction introduces distortion—generally a reduction in the strength of the higher notes, which is often apparent as a lack of clarity. Speech is not clear; the crispness has gone, and with it the naturalness that everyone tries to obtain. A small amount of reaction may not be harmful. But when the full amount has to be used in order to minimise interference, or to raise the strength of a normally weak signal, distortion is bound to be introduced.

and selectivity is better. The high-frequency stage is magnifying, with the result that the stronger of the distant stations are easily received. Less reaction is needed because the set has more magnification, and as a result the chances of distortion are less. The tuning may at first appear a little more difficult, but this is not really so, as the aerial and intervalve circuits tune practically together. More uniform results are obtained from sets of the same type in the hands of

This is only true, of course, when the high-frequency stage is properly designed. There are two ways of obtaining high-frequency amplification: one with an ordinary valve and the second with a shielded valve. Both methods are satisfactory when suitable circuits are used, considerable magnification being obtained with stability. It is, of course, necessary to shield the circuits or so to arrange them that one circuit does not affect the other, excepting as required for amplification. The coils must be of suitable design, and when an ordinary valve is used, be provided with balancing or neutralising windings. Otherwise the circuit will be unstable. Particular care is needed when dealing with a shielded valve, for, although simplified coils and circuits may be used, there is always the danger of self-oscillation unless they are suitably arranged. The diagrams show the similarity of intervalve and aerial couplings. Thus in Fig. 1A we have a plain aerial circuit having a coil L_1 and tuning condenser C_1 , the ends a b being connected to the aerial and earth. In Fig. 1B this type of tuned circuit is used, forming a tuned-anode coupling.

different users as there is an amount of pure magnification available which is sufficient to bring in the stronger stations without critical tuning. Many sets having a high-frequency stage and the usual detector and one or two

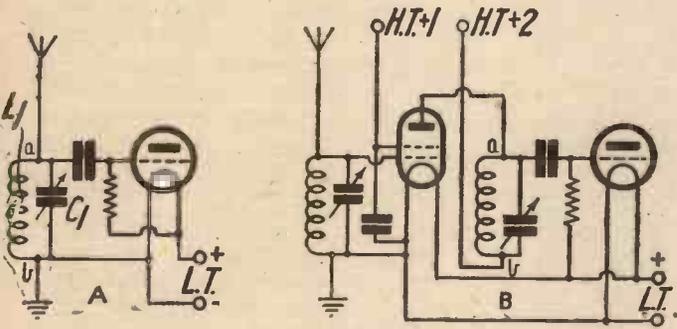


Fig. 1. Diagrams showing similarity of aerial and intervalve couplings

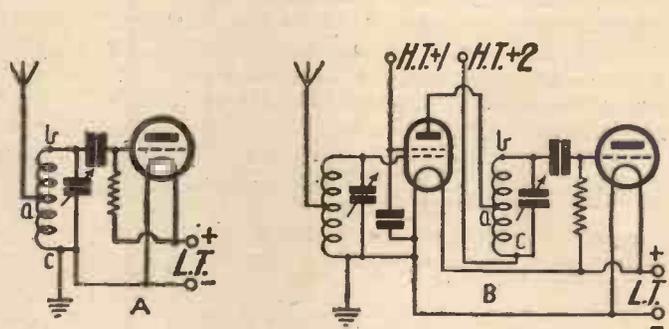


Fig. 2. Another more stable and selective arrangement

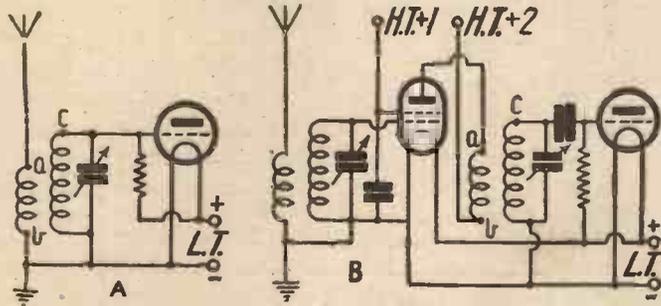


Fig. 3. A detector stage and an added H.F. stage

have a plain aerial circuit having a coil L_1 and tuning condenser C_1 , the ends a b being connected to the aerial and earth. In Fig. 1B this type of tuned circuit is used, forming a tuned-anode coupling. (Continued at foot of next page)

For the Newcomer to Wireless: ELECTRONS

WHAT is an electron?

So far as we know, it is the smallest and lightest thing existing in the universe.

Please tell me something about it?

You probably know that all matter is made up of tiny bodies called atoms.

Yes, I have heard of them. What does the name mean?

"Indivisible." When the existence of the atom was discovered, it was believed that it was the smallest of all things, though we know now that it is not.

Then just what is an atom?

Each atom contains a central nucleus in which nearly the whole of its weight resides. Around this revolve at dizzy speeds a number of electrons. The nature of the atom depends upon the number and arrangement of the electrons.

It reminds me of the solar system.

A very good parallel, for the nucleus is like the sun and the electrons like the planets which revolve round it. Now for the electrical properties of the atom.

Please go on.

The electron is believed to be actually a particle of negative electricity. The nucleus is positively charged, but at present we know much less about it than we do about the electron.

In electricity, doesn't like attract unlike and repel like?

Yes. The atom is bound together by the attraction which the positive nucleus exerts upon the negative electrons. The electrons repel one another violently. So long as the atom is complete, possessing all its electrons, it is perfectly balanced and exerts no electrical influence. But it may lose one of them temporarily.

What happens then?

The atom is now unbalanced, for the positive charge of the nucleus exceeds the negative charge of the remaining electrons. The whole atom is thus slightly positively charged and is known as a positive ion.

And what of the electron?

Having left its atom, it may start out on a journey, for it will be attracted by

any other positive ion that may be in the neighbourhood. Eventually it will join another positive ion and restore the latter's balance.

Then are atoms always becoming unbalanced by losing an electron and then regaining their equilibrium by acquiring another?

That is so, and upon this fact depend all the manifestations of electricity and the uses to which we are able to put it.

What is an electric current then?

A current is a stream of electrons which flows along a conductor just as water flows through a pipe.

How is a current set up?

By creating at one end of a conductor an excess of positive ions and at the other an excess of electrons. The positive ions attract the electrons, which rush through the conductor to neutralise or balance them. It is such a rush of electrons that heats the filaments of our valves, operates loud-speakers, and enables us to drive motors, trams, or trains by electricity.

"WHY THE BEST SETS HAVE AN H.F. STAGE"

(Continued from preceding page)

The resemblance between the aerial and anode circuits is clearly to be seen.

The arrangements of Fig. 2 comprise a tapped coil, the aerial being joined to the tap *a* and the end *b* to the grid circuit. In the anode circuit, shown in Fig. 2B, the anode is taken to the tap *a* and end *b* goes to the grid circuit of the detector. High-tension for the anode circuit passes through the coil from end *c*.

Selectivity

This circuit is more selective and more stable than that of Fig. 1 and, using suitable coils, a larger amplification is to be obtained. Probably the best circuit is that of Fig. 3B. The aerial circuit joined to a detector is shown by Fig. 3A and Fig. 3B shows the addition of a high-frequency stage, using a shielded valve, as in the other examples. There is a primary winding *A B* (Fig. 3A) and a secondary circuit *L1 C1*. This is shown again in Fig. 3B.

These examples of high-frequency interval couplings serve to show their simple nature; they are similar to aerial circuits. The one most widely used at present is that of Fig. 3B, as it has advantages in comparison with the others. Thus the tuning condensers are not joined to the high tension, and the primary circuit of the interval coupling is not connected to the grid circuit.

This circuit is particularly suitable when the high tension is obtained from a

main unit. The amount of the amplification can be adjusted by altering the size

type of high-frequency valve used in order to obtain the best results.

A three-valve set having a stage of high-frequency with a good circuit may be relied upon to be better than a three-valve set without an H.F. stage in regard to selectivity and usually volume. Distant stations will be more readily received and the quality of the reproduction will be better. The amount of the maximum volume is dependent upon the arrangement of the last stage, which sets a limit beyond which distortion is introduced. But when there is a high-frequency stage more stations can be received at the full strength. Better results are possible when two stages are used, but the cost of sets having more than one H.F. stage prevents them from being popular at the moment.

A further station has cropped up in Belgium—that of Radio Conférence, Brussels, on a wavelength of 207 metres. The broadcast can be heard every Sunday morning between 10.30 a.m. and 12.30 p.m.

The B.B.C. is again to co-operate with the Belfast Philharmonic Society in the coming winter. Arrangements have been made for the broadcasting of five of the society's concerts, one of which will be *The Messiah* shortly before Christmas.

A new series of morning talks is being broadcast in Scotland by Miss Margaret Kidd, who is well known as the only woman member of the Faculty of Advocates. She will deal with "Scots Law relating to Women and Children."

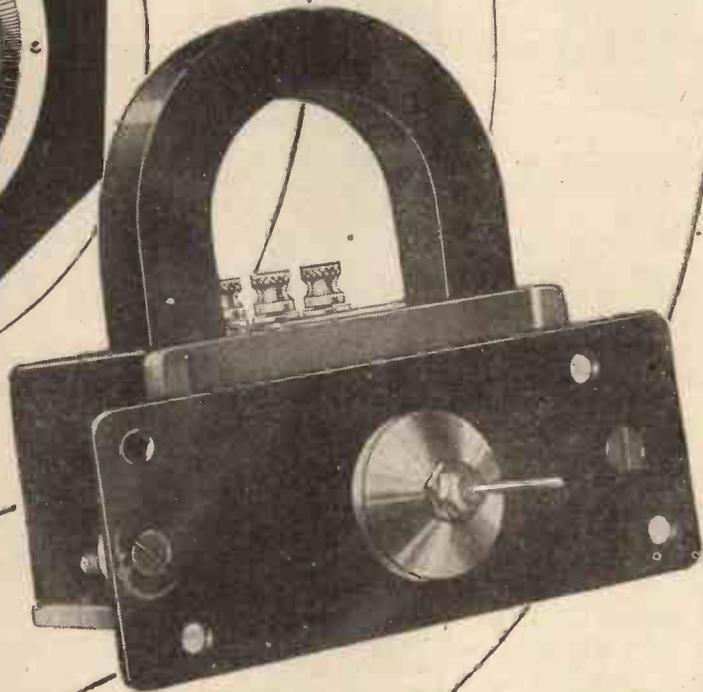
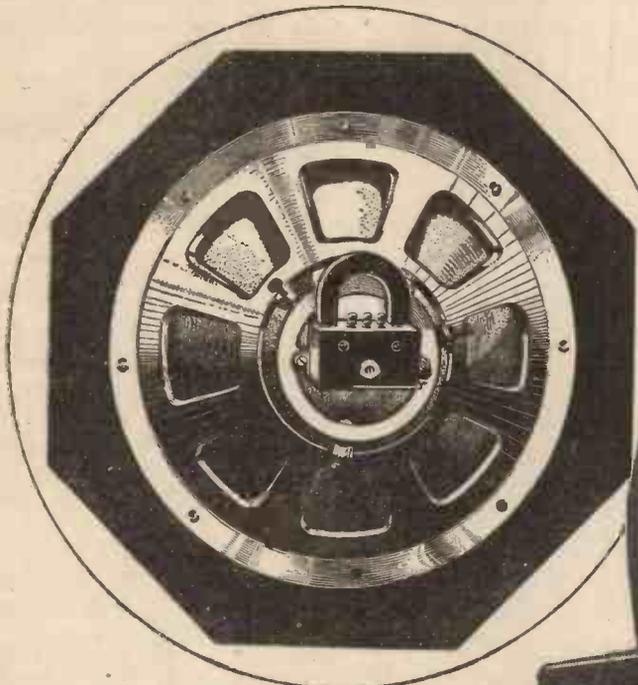


Florrie Forde—an impression

of the primary windings, and so can the selectivity. It is therefore possible to match the transformers to the particular

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EXPERIMENTS With



A PENTODE DETECTOR

By J. H. REYNER, B.Sc., A.M.I.E.E.

IN my article last week I discussed the possibility of using a pentode valve in place of an ordinary valve for the detector. The advantages of this proceeding are that one obtains the benefit of the increased amplification of the pentode so that the sensitivity is distinctly greater than with an ordinary anode-bend detector.

Indeed, practical tests show that the

thus has a much higher effective resistance than it would otherwise have, and consequently the tuning is distinctly flat.

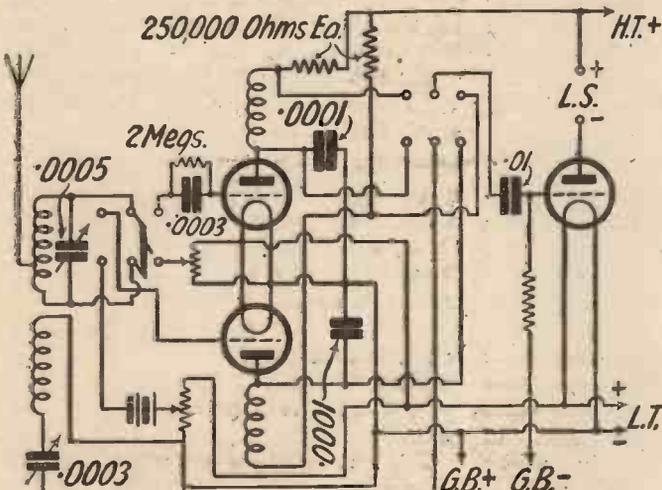
It is for this reason that anode-bend rectification is used in many cases, particularly where low-loss circuits are employed, for the effect of detector damping is relatively the worse as we improve the efficiency of the actual circuit. On the other

will be reduced in price, as, for example, in the case of the new Lissen pentode, which is only 17s. 6d. Many people already have a pentode in their possession, and, with a view to examining the rectification obtainable with this type of valve, a simple test circuit has been rigged up and details are shown by the photographs.

The circuit is shown by the diagram and consists essentially of a tuned circuit having a coupled-aerial arrangement connected to a double-pole switch, by means of which it may be thrown over to either of two separate valve circuits. The first of these is arranged to take a triode operating as a grid detector, while the second is arranged as an anode-bend detector suitable for use either with a triode or a pentode. The anode circuits of the two valves are again switched so that the output may be directed through the L.F. stage, thereby making the matter of comparison a simple one.

A single L.F. stage has been employed, this being a resistance-coupled arrangement which is desirable, if not essential, after the average pentode. One must remember that the use of an anode-bend arrangement necessitates biasing the grid to a relatively large negative potential. This increases the effective resistance of the valve two or three times and, as a general rule, the internal resistance of a

(Continued at foot of next page)



The circuit of the "Pentector" test panel

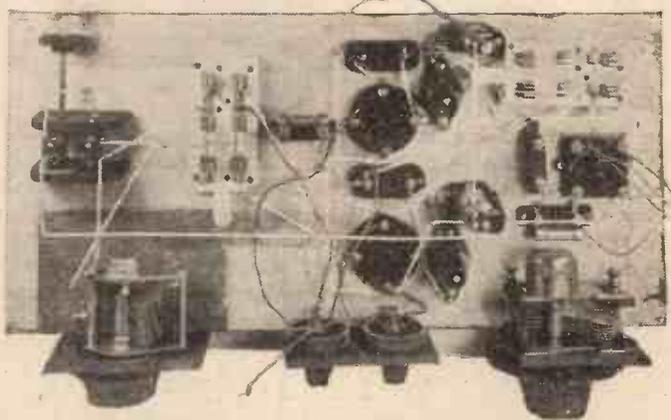
sensitivity is comparable with, or even better than, that obtained from good cumulative-grid arrangements with the ordinary triode, while, as was pointed out last week, the detector damping usually associated with the grid detector is not present to anything like the same extent.

It will be as well to make this point quite clear in order that the advantages of the pentode may be appreciated. With the cumulative-grid detector it is necessary to bias the grid to a small positive potential. This is done by connecting the grid leak either to L.T.+ or to some intermediate point between L.T.+ and L.T.-. It is, however, essential for the correct operation of the circuit that the grid should be slightly positively biased, and the effect of this is that the resistance of the grid-filament path of the valve is relatively low—usually about 100,000 or 200,000 ohms. This is shunted across the circuit immediately preceding the detector valve, which

swing. Its capabilities in this direction are largely controlled by the correct adjustment of the priming grid potential. Normally it will handle two or three volts grid swing without any trouble and under certain conditions it can be made to handle more. Consequently, by relatively small adjustments, we can arrange that the detector not only handles a large grid swing, but is also sensitive to weak signals, and it would therefore constitute a very suitable arrangement.

Its principal disadvantage is the extra cost, but there are indications that pentodes

The pentoderectifier may conceivably prove to be a good solution to this difficulty. It is sufficiently sensitive to work without previous amplification and it will handle a fair grid



This photograph shows a plan view of the tester

"IN REPLY TO YOURS" .. Jottings From My Log

By JAY COOTE

DURING the past three weeks regularly on Wednesdays and Fridays, between 10.15 and 10.30 p.m. G.M.T., I have made a point of switching over to Kattowitz (Poland) for the "Letter Box," a special feature which was inaugurated by that station, and of which, at present, there are no imitators.

Necessity is the mother of invention; the number of letters received from correspondents by the Director of Kattowitz became so numerous, that he found it onerous to reply to them direct, and as he considered that in many instances they were worthy of an answer, it was decided that the answers to correspondents would be given via the microphone.

It is these replies which may be picked up on the two days stated, and which prove good entertainment. Letters are received from all parts of Europe, and as the Station Director is a brilliant linguist, answers are given in the individual languages.

The feature has gradually grown into quite huge proportions, and on the evenings in question it will be found that the station seldom closes before 11.30 p.m. G.M.T. During this period a large number of letters are dealt with, and it is surprising

the amount of interesting information one can cull from the answers given.

A Relic of the Past

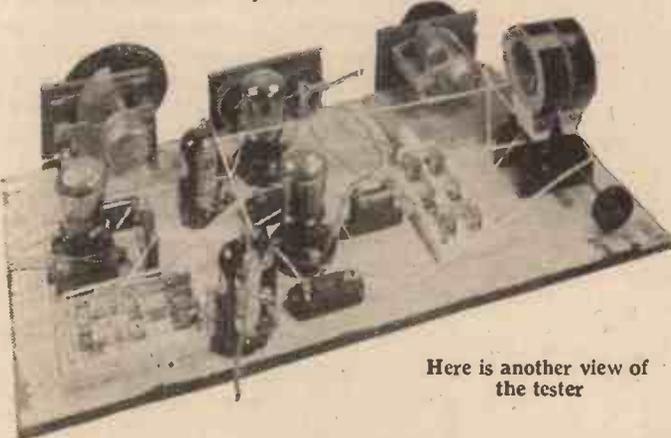
To give an example: There is no doubt that on many nights you may have heard from one or other of the Polish stations the opening trumpet call which is relayed to them from Cracow, which is also peculiar to the Polish transmitters. If you have picked up this signal on more than one occasion, you must have noticed that the melody breaks off suddenly, giving you the impression that the microphone, without warning, has been switched off. Such, however, is not the case. The *fanfare* is broadcast to the four winds from the summit of the tower of the old historical church of St. Mary. Both melody and the custom date back to the Middle Ages, and have become an institution in that city. According to the legend, once upon a time, when the city was attacked by barbarian hordes, the keeper of the tower was struck by an arrow as he was blowing a warning to the defending garrison, and the trumpet call was interrupted. To-day, in commemoration of this incident, the melody is broken off on the same note as it was on that historical occasion.

The Kattowitz "Letter Box" feature has taken on an intimate character which has made a strong appeal to listeners abroad. Even suggestions made by foreign correspondents in respect to the inclusion of certain items in the programme which are of interest to distant listeners, are discussed at length—the Station Director frequently has a friend or two with him standing by the microphone—and any ideas which may prove of value are willingly accepted. Apart from the ordinary birthday greetings to children, which are broadcast from some British and Continental stations, and which do not affect adults, the average listener does not receive any direct and personal communication through the ether, and consequently it is quite a pleasing sensation to hear a voice speaking to you personally from a distance of some eight hundred and fifty miles. If you want the same experience, simply write in English to Radio Pologne, Kattowitz (Poland). You may wish to ask a question or you may care to suggest an idea regarding the composition of a programme. In your letter, it would be wise to state that you would be listening for the reply on some Wednesday or Friday night, of which you would fix the date.

"EXPERIMENTS WITH A PENTODE DETECTOR"

(Continued from preceding page)

valve used as an anode-bend rectifier is about three times its rated value. Now, the average pentode ranges round 50,000 to 80,000 ohms normally, so that its resist-



Here is another view of the tester

ance under rectifying conditions is anything from 150,000 to 250,000 ohms, and none of the transformers on the market to-day are specifically designed to follow valves of such a high resistance as this. It does not follow that they will not work tolerably well; but, nevertheless, they are not designed for this class of work, and it is better to employ resistance coupling for a fair comparison.

For this reason, a resistance-coupled arrangement has been incorporated in this test set. The best value of resistance may

be chosen by trial, but in general a value of 250,000 ohms will be satisfactory for most purposes. The higher the resistance, of course, the greater the tendency to high-note loss. Otherwise, there is no reason why much higher resistances should not be used with every satisfaction. An

external resistance equal to the valve resistance will, of course, only utilise half the full magnification of the valve and a larger value of resistance will give a greater strength up to a point. These, however, are all matters which can be found out by actual experiment, and it was for this reason that the tester was made up in its present

form. If desired, a somewhat lower value of resistance may be used in the anode of the grid detector valve.

To use the tester, place a suitable coil—say, a 60 X-tapped coil—in the grid circuit and a suitable reaction coil, such as a 40- or 50-turn coil, in the reaction holder. Connect up aerial, earth, and batteries, and insert the valve in the detector socket. A suitable H.F. or L.F. valve should be used for the grid-leak detector, while the pentode is inserted in the other detector socket, the priming grid being connected

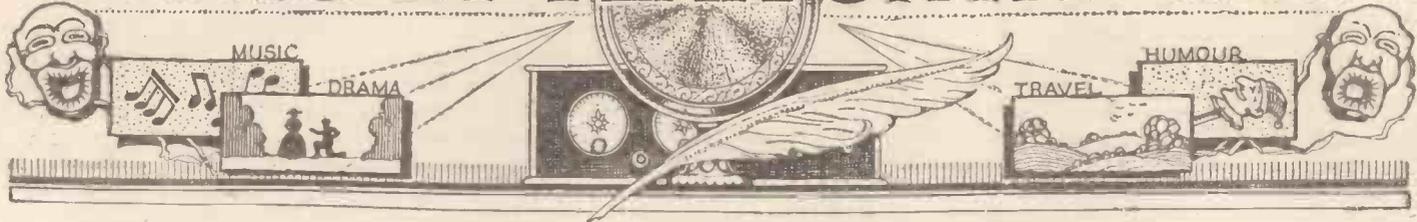
to the special terminal provided thereon. An L.F. or power valve, preferably the latter, should be inserted in the last stage. Battery voltages are as usual, namely, 100 to 120 H.T., grid bias of $4\frac{1}{2}$ to 6 volts on the last valve, according to the valve, while about 3 volts will be required on the pentode. The auxiliary grid should be connected to approximately 20 volts positive.

This is one of the points which is critical in operation, and the best value must be determined by trial. The voltage on the priming grid and the grid bias on the normal grid are to some extent interdependent. With 20 volts on the priming grid, about 3 volts grid bias will be suitable for the ordinary control grid, while with about 10 volts on the priming grid, somewhere about half this value—namely, $1\frac{1}{2}$ volts—will be satisfactory.

With the valves inserted, it is only necessary to tune in a signal in the usual manner. Both the switches should be over in the correct position. With the first switch in the rear position and the second switch in the left-hand position, the circuit receives as a grid rectifier. In the reverse positions the circuit is an anode rectifier. It will be found under normal conditions that the pentode rectifier is more sensitive than the grid rectifier and distinctly more sharply tuned.

Further notes on the operation of this tester and comments on the best circuits in which to employ the pentode as a detector will be given in a later article.

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

TWO items following each other were so absolutely contrasted that I began to wonder whether they came from the same station: Sir Oliver Lodge and—Julian Rose.

"Ah," you may well say, "there's nothing like extremes."

"Pardon me," I may retort, "the listener who likes Lodge will certainly not appreciate Julian Rose."

Sir Oliver Lodge was, as usual, excellent. This series, "Points of View," has been so successful that it is invidious to make comparisons.

But Sir Oliver, in my view, touched the heights. I bet he was beloved best of all the speakers by the average listener. He

cannot say, and even the Gershom Parkington Quintet didn't come up to scratch.

However, in fairness, I am bound to quote the following note, which reaches me in time to go to press:—

"I wonder what the shade of William Shakespeare said when it tuned-in on its 'Spirit Music Maker' and got 'Ikey Gets His'? No, I don't think he was annoyed. For Will had a great sense of humour, and nobody with that great quality could have been offended with this Americanised 'Merchant of Venice.' There is no word to describe this show other than a 'scream.' It was full of genuine fun, and Julian Rose was great."

"T.Y.," of Lambeth, wants to know what I think of glee singers and part songs. He thinks they should be abolished.

Sorry, I can't agree with him. There are, of course, times when they are not too acceptable—particularly when the party includes an effeminate-sounding gentleman with a high voice. I have had something to say about this type of singer before. But to suggest cutting out such songs as those students' choruses which delighted us recently is unthinkable.

Nothing but praise is due to each one who took part in the broadcast of *Aida* from London. The Wireless Chorus in particular deserves high praise indeed.

Aida, however, with its Egyptian settings and costumes, is essentially a spectacular opera, and one needs the colours and scenic effects.

Oh, for television!

Number Two of the "While London Sleeps" series proved highly interesting. The speaker was an L.G.O.C. bus-washer, and he taught us quite a lot.

What I liked particularly was his honest-to-goodness manner of speaking. Those who complain of the overdone Oxford accent must have surely welcomed this refreshing Cockney English.

Thus G.S.: "I have just made the acquaintance—shall I say, the ethereal acquaintance?—of Messrs. Jackson and Blake. Patter and music were their strong points and they proved quite diverting. There was, as we have now grown to

expect, very little sense in what they said and sang; their voices were far from being classic, but they 'got over.'

"They jazzed their way through their act without a moment's stop, back-chatting, playing raucous instruments, and singing a lot of 'do-de-o' stuff; but it was peppy enough to exhilarate the most hardened highbrow."

Had I done the same thing as the rest of the family during Norman Timmis' sketch, *Mrs. Gusset on the Phone*, I should not be in a position to write anything about it, as I intend doing.

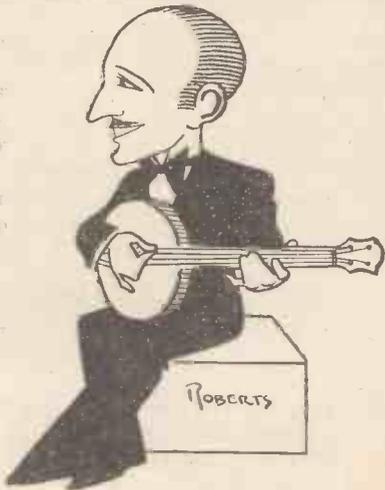
My companion listeners fell asleep after the first few minutes—and no wonder! It was so slow, so dreary. In the desperate expectations of the performance bucking up, I managed to keep awake; but it dragged itself to a dull ending and left me with a profound sense of irritation.

Henry Merton's impressions rank with the best of this kind of entertainment. His imitations of a horse and a lion were as good as any that have been broadcast. But I do wish Mr. Merton wouldn't gabble his patter. Some of it was unintelligible, and, in fact, if it hadn't been for his excellent animal imitations we should have been quite in the dark as to what it was all about.

"Harold" craves space in which to say a few nice things about Patricia Rossborough. He says she is one of the very, very few women blessed with a sense of rhythm.

Furthermore, he thinks her touch is perfect and that in all the high-speed compositions he has heard her play he has never detected the slightest trace of a wrong note.

I listened to her from 5GB the other night and admired her execution; but found myself feeling a little incensed by the rendering of a syncopated version of "The Old Folks at Home." Clever, no doubt, but to my constitutional mind a desecration of a dignified old song.



Our cartoonist's idea of Lou Abelardo

was constructive, helpful, and hopeful. This is the sort of thing the B.B.C. should give us. After all, the biggest people in the country write for the popular press. It should not be difficult to obtain the very best for the biggest platform of all.

As for Julian Rose in "Ikey Gets His"—Heaven and Savoy Hill save us from such appalling crudities! In putting over this alleged parody of *The Merchant of Venice*, Mr. Rose has lost very many marks, and I, for one, don't want to hear him again for a while.

Why that beautiful incidental music to *The Merchant of Venice* was played in connection with this nauseating nonsense I

Let "Amateur Wireless" solve your problems

THE "B.B.C. Brookmans Park Crystal Set" was described recently in AMATEUR WIRELESS No. 386, wherein it was explained that the B.B.C. estimates that crystal reception will be possible in many cases at a distance of 60 miles or more, while excellent crystal reception will certainly be possible at anything up to 50 miles.

The maximum possible range for crystal reception from the old 2LO was about only 20 miles. Thus, over a very wide area, many people who formerly were unable to work a crystal set will now come within crystal range of the new station, particularly in the south-east district.

A Simple and Cheap Set

This, however, is not the whole scope of the new Brookmans Park. The possibility of using a crystal set within the area mentioned is enticing enough, but there will be many thousands of listeners, just on the fringe of this circle, or just outside, who will find that a crystal set does not give quite sufficient strength—owing to local reasons—but they may not wish to go to the expense of making or installing a loud-speaker set.

In addition, even well within the area there may be some local conditions and some places where it is difficult to erect any effective kind of aerial in which a crystal set does not give real satisfaction.

For folk in these areas the next best thing to a crystal set is the simplest and most economical one-valver. Such is the Brookmans Park One-valver here to be described, and made up according to a circuit recommended by the B.B.C. engineers.

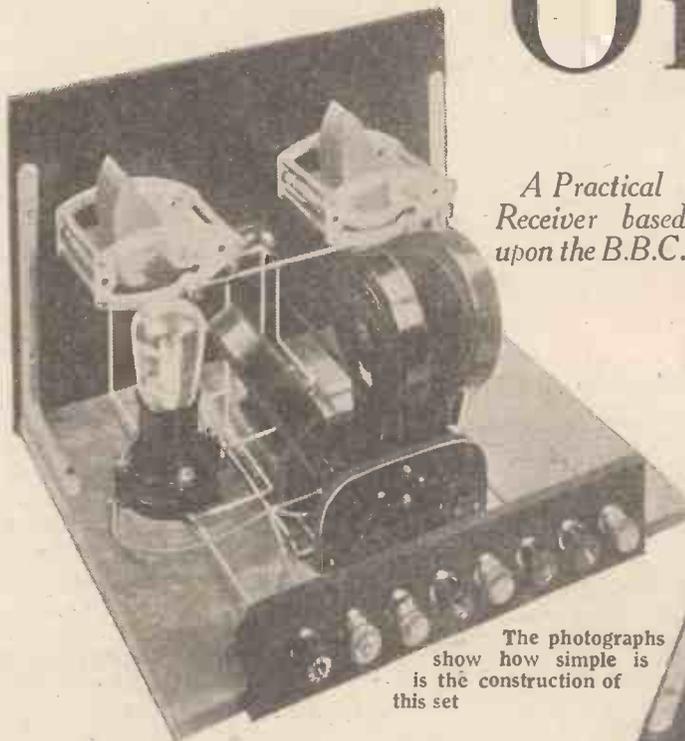
Consequent on the opening of Brookmans Park the B.B.C. issued a booklet, "Crystal Sets and the Brookmans Park Transmitter," relating to problems which listeners might be expected to face under the new conditions and giving some hints on working a crystal set within the specified crystal service area.

After dealing with some of the troubles to be expected, it is explained: "If, having

tried these suggestions, you are still unable to receive signals on your indoor aerial and cannot, for any reason, erect an outside aerial, the only possible course recommended is the purchase of a one-valve set." This is proposed as a remedy for a certain state of affairs, and indicates no particular preference on the B.B.C.'s part for either crystal or valve sets.

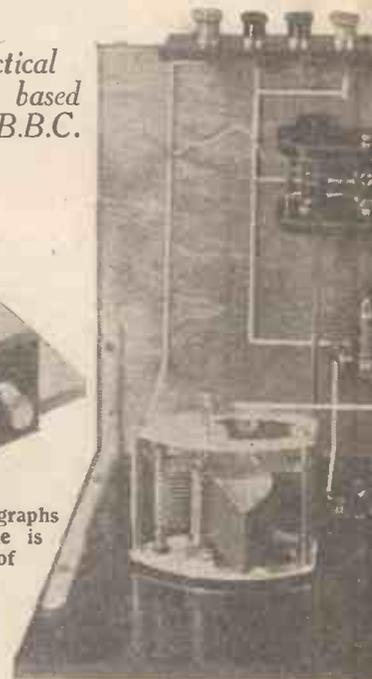
Many Advantages

It would, however, be relevant to say that in these days of low-voltage dull-emitter valves the initial outlay for a one-valve set is but little more than a really



A Practical Receiver based upon the B.B.C.

The photographs show how simple is the construction of this set



good crystal set with an outside aerial, and the maintenance costs are very low.

Further, if the signal from Brookmans Park is insufficient to produce audible results it will not be helped by the addition of a low-frequency amplifier which, broadly speaking, will not amplify that which does not exist. For this reason, the installation of a one-valve set complete with its own tuning unit, etc., is suggested in preference to any form of low-frequency amplifier as an addition to your present crystal set.

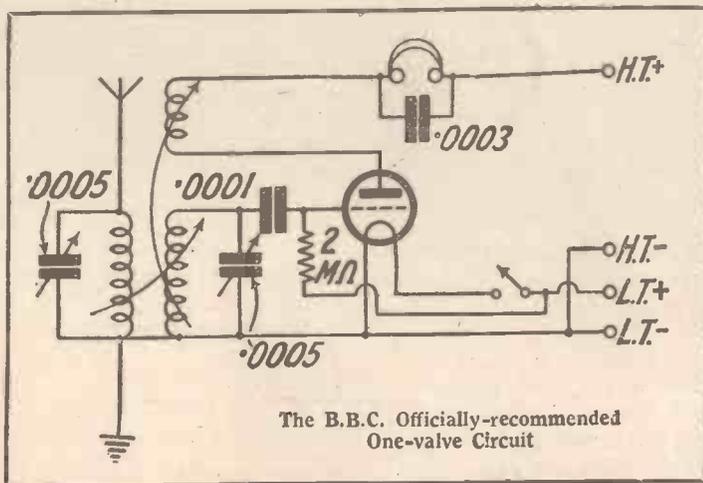
The cost of a one-valve set will be very much the same as that of a low-frequency

amplifier and, moreover, it will be a more selective arrangement than the latter. This will be particularly helpful when the second programme is radiated from Brookmans Park. The use of a valve set does not mean that a loud-speaker is necessary. Indeed, the whole point of this B.B.C. officially-recommended one-valve set is that it is an effective bridge between a crystal set and the more ambitious, but naturally more expensive, loud-speaker set.

The set is made according to the circuit drawn up by the B.B.C. engineers, and it can simply be described as follows.

The Circuit

The tuning arrangements embody a loose-coupled circuit, made up with two plug-in moving coils. The whole arrangement is very similar to one mentioned last week by Mr. W. James in his article on Brookmans Park. There is a third moving



The B.B.C. Officially-recommended One-valve Circuit

IE S.C. CIAL" valver



Officially-
recommended
Circuit



Very few com-
ponents are required
and the cost therefore
is trifling

coil for reaction, which gives a boost up to signal strength, up to the point of oscillation, beyond which one should not go. Each coil is tuned by means of a .0005-microfarad condenser. These two condensers are placed on the panel.

One .0005 condenser is placed directly across one coil, the aerial is connected to one side of the circuit, and the earth to the other. The other coil and condenser circuit comprises the grid tuner.

A .0001-microfarad fixed condenser connects one side of this circuit to the grid and a 2-megohm leak is connected between the grid and L.T. positive to dissipate the unwanted negative grid charge.

A .0003 fixed condenser is connected across the phone terminals. With a valve set this is of even more importance than the same capacity condenser connected in the same position in the officially-recommended crystal set. With the one-valve

set there is the possibility of the H.F. component in the anode circuit having to pass through the phone windings in order to complete its circuit. This may cause hand capacity and similar troublesome effects which will be more noticeable in the case of distant stations, but which in any case are a bugbear.

General Construction

It is conceivable that this receiver will be made up by many listeners who have previously had no acquaintance with the constructional side of radio. For this reason it is not proposed to delve too deeply into

a wordy description of the construction.

The building of the receiver is made most satisfactorily obvious from the blueprint of this set. Blueprints are prepared in connection with every AMATEUR WIRELESS receiver in order to aid the construction. The number of the blueprint relating to this Brookmans Park One-valver is 208, and it may be obtained, price 1s., post free, from the Blueprint Department,

AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. The great advantage of the AMATEUR WIRELESS blueprints is that they are full size and show each component in its correct position. Thus, when you have obtained the ebonite panel, terminal strip, and baseboard, you can drill the necessary holes, using the blueprint as a guide. The components detailed below will be needed:

The constructional stages should be as follows: Drill the terminal strip and panel, and screw both to the baseboard. Mount the baseboard components, using the blueprint as a guide in the way mentioned, and then mount the panel components and the terminals. Wiring can then be tackled, and there is no need to be frightened of this job, difficult as it may seem, for the Brookmans Park One-valver is essentially a simple set.

Simple Wiring

Each wire is shown in the blueprint; although it is not possible to show each in its exact size owing to the "development" of the drawing to show the panel and baseboard in the same plane. It is advised that the wires should be soldered wherever possible to make quite sure of obtaining a good electrical joint. Rigid wire is used for the major part of the circuit, but flex leads connect up the coil holder to its related components.

The work of checking over the wiring when all the leads are soldered takes only a few moments, but is essential in order to prevent burning out the valve or short-circuiting the batteries.

A general-purpose valve, or one of the H.F. type having not too high an impedance, is best used. It is assumed, of course, that the phones employed have an impedance of between 2,000 and 4,000 ohms. If they are of the low-resistance pattern—say, 120 ohms—then a step-down transformer must be employed, just as is done in the case of a crystal set.

The high-tension battery need only be of the small-capacity type, although it is

LIST OF COMPONENTS

Ebonite panel, 12 in. by 8 in., and strip, 9 in. by 2 in. (Becol, Raymond).

Two .0005-microfarad variable condensers (Lissen, Igranic, Polar, Burton, Ormond, Burndept).

Three-way coil holder, with long handles (Lotus, Lissen).

Anti-microphonic valve holder (Igranic, Benjamin, Lotus, W.B.).

.0001-microfarad fixed condenser, with series clips (Dubilier, Lissen, T.C.C., Watmel).

.0003-microfarad fixed condenser (Dubilier, Lissen, T.C.C., Watmel).

3-megohm grid leak (Dubilier, Lissen, Ediswan, Graham-Farish).

Push-pull filament switch (Bulgin, Lissen).

Panel brackets (Bulgin, Raymond).

Eight terminals marked: Aerial, Earth, L.T.+, L.T.-, H.T.+, H.T.-, Phones+, Phones- (Burton, Belling & Lee, Eastick).

Connecting wire (Glazite).

Baseboard, 12 in. by 9 in. (Pickett).

1 yard of thin flex (Lewcoflex).

“THE B.B.C. ‘OFFICIAL’ ONE-VALVER” (Continued)

somewhat an economy to buy a rather larger battery than needed, so far as capacity is concerned. A medium-capacity battery will give a far longer life than one of the single-capacity type. The voltage may be as much as 120, although the set will work reasonably well on only 60 volts H.T. and the H.T. cost will be approximately halved.

Operating Hints

When operating the set during a preliminary test keep the reaction coil well away from the aerial coil, but place the two aerial coils close together. Now tune in Brookmans Park, turning the two condensers approximately simultaneously until the loudest point is obtained. Moving the one tuning coil away from the other will then be found to increase the sharpness of tuning and the two condensers may need slight readjustment.

As one coil is moved farther away from the other, the strength may drop slightly, but this can be counter-balanced by bringing the reaction coil a little closer, although not so close that the reproduction is at all

distorted or that the set whistles when the coils are moved or the condensers rotated.

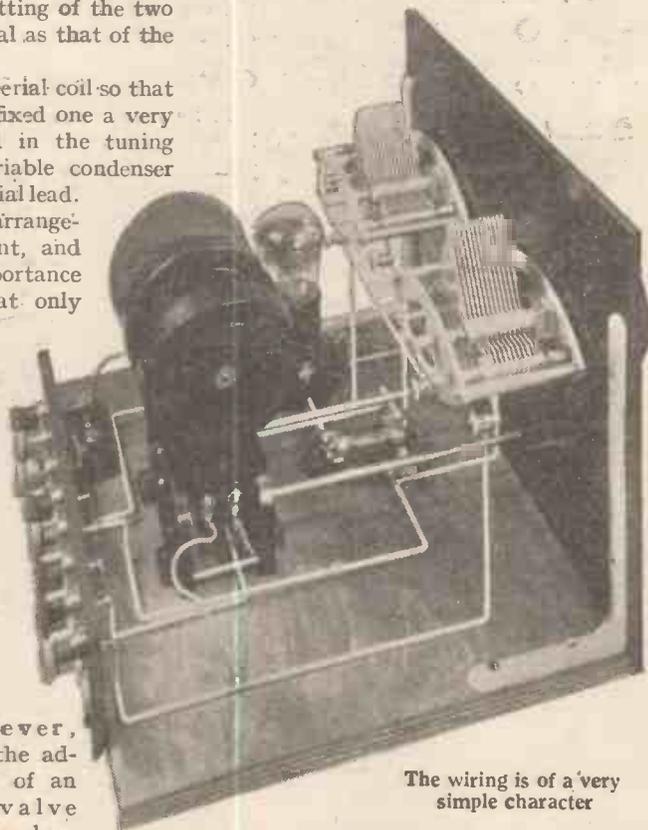
The three-coil holder used in this set has slow-motion control, so that the adjustment of the coil setting is not at all a difficult matter. The setting of the two aerial coils is not so critical as that of the reaction coil.

By setting the moving aerial coil so that it is well away from the fixed one a very similar effect is obtained in the tuning circuit as if a small variable condenser had been placed in the aerial lead. Nevertheless, the present arrangement is far more efficient, and efficiency is of vital importance in view of the fact that only one valve is used.

Incidentally, in next week's issue a few hints will be given on extending the range, power, and utility of the “B.B.C. One-valver” by the addition of a low-frequency amplifier. It must be quite clearly understood,

reference is amplified in the same proportion as the station it is desired to receive, unless the interference is very weak.

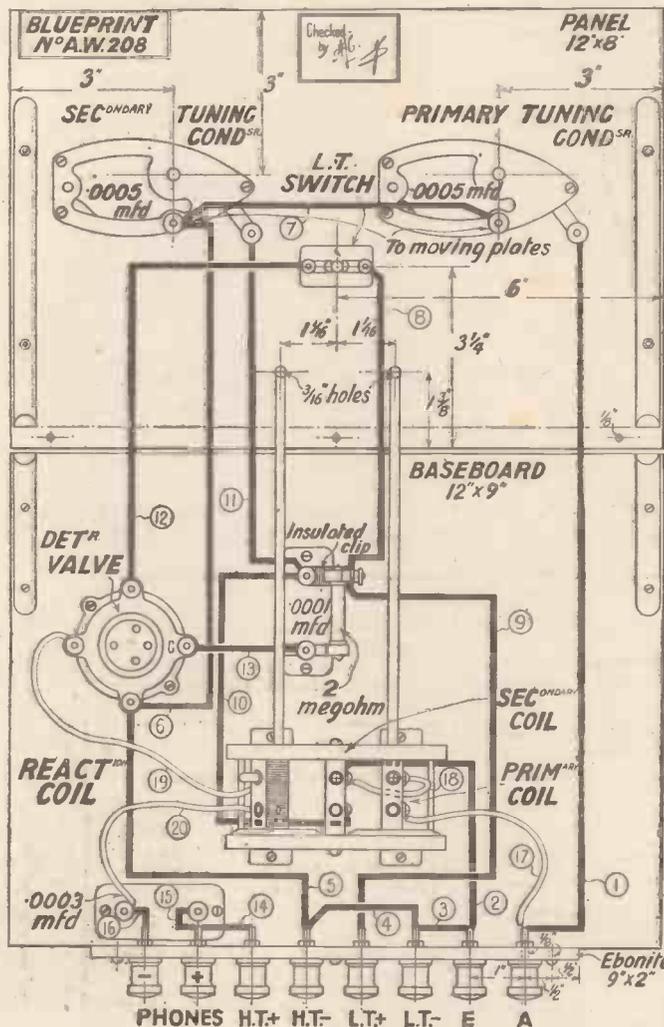
But more will be said of this in next week's issue. In the meantime accustom



The wiring is of a very simple character

however, that the addition of an extra valve on the low-frequency side does not improve selectivity. Rather the reverse, for any slight background of inter-

yourself to the operation of the set just as described here and endeavour, by a suitable choice of a valve and H.T. battery values, to make your multi-valve-set friends sit up and take notice!



The wiring diagram of which a full-size blueprint is available, price 1/-

MYSTERY STATIONS

MYSTERY broadcasting stations have cropped up at intervals during the past and the identity of some of them has never been established. About three years ago, as some readers may remember, listeners in this country were astonished at picking up one Sunday afternoon an exceedingly powerful transmission from a station which was broadcasting in English a programme of the vilest and the most seditious kind. The station was heard all over the country, but no one knows to this day where it was and who was responsible for what was sent out. Not many months ago another mystery station started to broadcast in the lower part of the medium waveband, sending out programmes which were about the last word in vulgarity. Happily, this “service” has now ceased; but very few people know who was responsible.

To-day we have a fresh crop of mystery stations, though, luckily, most of them are neither political nor vulgar. They are, however, great offenders against the peace of the ether, and the wonder is that so many of them can exist. Anyone who cares to glance through the September report of the Brussels Laboratory will be astonished to find how many unidentified stations there are at work in Europe. Many of them are probably ordinary broadcasting stations which fail to give a call-sign, but there is no doubt that there are quite a number of unauthorised stations at work upon unauthorised wavelengths.



LISSEN ELIMINATORS

The current you get from Lissen Batteries is the purest form of current you can get for radio. But if you want to use an eliminator, use a Lissen Eliminator. You'll then get current from your mains smoother, steadier, better than before.

There are four types of Lissen Eliminators; one of them will almost certainly be just right for your set. Tell your dealer what voltage your mains supply is and whether it is A.C. or D.C.; tell him what output you require, or what valves you are using, and he will demonstrate for you the Lissen Eliminator to suit your needs.

TYPES AND PRICES

D.C. Model "A." Employs 3 H.T. + tap- pings; H.T.+1 giving 80 volts for S.G. valves; H.T.+2 giving 60 volts at approx. 2 mA. for detector valves; H.T.+3 giving 120/150 volts at 12 mA.	D.C. Model "B." Employs 3 H.T. + tap- pings H.T.+1 and H.T.+2 are continuously variable (by means of two control knobs) and capable of giving any desired voltage up to 120/150 volts at approx. 2 mA.; H.T.+3 giving 120/150 volts at 12 mA. for power valves.
Price ... 27/6	Price ... 39/6

Models working on 100/110 Mains Voltage give output voltages of approximately 60 per cent. of above values

A.C. Model "A"

Tappings as in D.C. Model A.	
LN 576 for A.C. Mains voltage	200-210
" 577 " " " " "	220-230
" 578 " " " " "	240-250
" 639 " " " " "	100-110
PRICE ...	£3 : 0 : 0

A.C. Model "B"

Tappings as in D.C. Model B.	
LN 579 for A.C. Mains voltage	200-210
" 580 " " " " "	220-230
" 581 " " " " "	240-250
" 640 " " " " "	100-110
PRICE ...	£3 : 15 : 0

LISSEN ELIMINATORS

BUY LISSEN BATTERIES IF YOU WANT BATTERIES.
BUY A LISSEN ELIMINATOR IF YOU WANT ELIMINATOR.

D.C. MODEL "A" 27/6
A.C. MODEL "A" 60/6

Revolutionary New Lissen Pick-up

NEW NEEDLE ARMATURE FULLY FLOATING AND SO LIGHT THAT RESPONSE IS PERFECT AT ALL FREQUENCIES!



HOW THE NEEDLE IS SUSPENDED



Held in position by magnetic attraction without restriction by mechanical contacts.



Three other well known pick-ups were tried against the Lissen. Note the even Lissen curve, meaning that you get true musical values from one end of the scale to the other.

"Better than 'Talking' Picture reproduction"—that is what everybody says who hears a gramophone record played by this new Lissen Pick-up. And actually the reproduction is better than the film experts have achieved—more natural, nearer to reality, because no longer are the high notes thinned out or the lower bass lost.

The Lissen Pick-up is so responsive that even the perfect electrical recordings of to-day can hardly do it justice. It responds to the most minute indentation on the record—the needle-armature is so light that the needle point actually feels its way along the record groove. And you'll find your records almost everlasting when you use this new Lissen Pick-up because the needle-point actually feels and does not plough its way along.

If you want every single record to sound much better than those you hear at demonstrations—if you want radio-gramophone reproduction that comes so near to reality that in a darkened room you would suspect the presence of the artist—get this new Lissen Pick-up and learn what perfection means. Any Lissen radio dealer will demonstrate it for you.

LISSEN

NEEDLE ARMATURE
PICK-UP 30/-



LISSEN 4-POLE BALANCED ARMATURE UNIT (ADJUSTABLE)

The Lissen 4-Pole Balanced Armature Unit brings something approaching loud-speaker perfection within the reach of everybody who owns a radio set. You can build any type of cone loud-speaker with it; you can use it with a big baffle board, or put it in a cabinet. You can build a linen diaphragm loud-speaker with it, or you can buy it completely assembled and ready to connect up to your set. It has a fine adjustment, and you therefore get the utmost volume from it without chatter.

In brown moulded case with attachment for fitting to any type of cone. PRICE **12/6**

Cast aluminium Chassis, specially designed to give the best results from the Unit. PRICE **7/6**

13-in. cone for use with the above **2/6**

COMPLETE ASSEMBLY OF LOUD SPEAKER UNIT, CHASSIS AND CONE. PRICE **22/6**

LISSEN 4 POLE BALANCED ARMATURE UNIT

UNIT ONLY 12/6

COMPLETE ASSEMBLY 22/6

Obtainable from all radio dealers; insist upon hearing Lissen before you buy.

My Wireless Den



Weekly Tips—Constructional and Theoretical—by W. JAMES

Stabilising a S.G. Stage

THE question of stabilising a tuned high-frequency stage using a shielded valve often crops up, particularly when there is a second stage of H.F., as in many self-contained sets.

There is trouble sometimes from self-oscillation or reaction may be difficult. Then again there are cases where a form of low-frequency feed-back is introducing distortion.

A typical, though not widely used, H.F. coupling is illustrated in A, where a tuned-anode circuit having a coil L and a condenser C is indicated. Fixed condenser A is used to stop the H.T. passing to the next valve. This circuit is often best rearranged to give B, which shows a high-frequency choke and a stopping condenser A as well as the tuned circuit.

Sometimes this circuit is known as the tuned grid, but the point to note is that it may be much more stable than the circuit of A.

A variation of the tuned anode circuit is shown in C, where the tuning condenser has its moving plates joined to the L.T. instead of to the H.T. Condenser A is for protection in the event of the variable condenser short-circuiting.

The minimum of trouble is experienced when a transformer is used, as in D, for the reason that there is no direct connection between the anode and grid circuits. Low-frequency feed-back cannot occur with a circuit of this type.

The switching is, of course, more difficult, as the primary and grid windings have usually to be changed when going from the medium to the long wavelengths.

The circuit is a particularly stable one, however, and is becoming very popular.

This Anode-bend Business

I wonder how many amateurs try an anode-bend detector and then, being disappointed with the results, return to the leaky-grid type. The truth is that every valve is not suitable for anode-bend detection. Some, in fact, are quite unsuitable.

A good valve for this purpose has a fairly short curved part in its anode-current grid-voltage curve. Those valves having a long curved foot are often quite unsuitable.

The bend must be sharp, and I have found that different valves of the same series vary a good deal in this respect. It is necessary to adjust either the negative grid bias or the high-tension, not very accurately, it is true, but still the best working conditions are to be found only by trial.

In Search of Smooth Reaction

The majority of sets have reaction from the detector to either the aerial circuit or an anode circuit, and for the best results the control must be smooth and certain. Much depends upon the detector valve, but to an extent the low-frequency coupling affects matters.

I have in mind the case of a resistance coupling. The resistance connected to the anode of the detector reduces the voltage of the anode, and therefore tends to increase its impedance. As a consequence, the circuit does not oscillate so readily as when a transformer or choke is used unless, of course, the value of the H.T. is increased.

Thus a circuit may be satisfactory as described in AMATEUR WIRELESS, but not quite so good if the reader replaces a transformer by a resistance coupling. The point to note is that the circuit values as a whole are chosen to produce certain results and that by changing one part the whole set may be spoilt. One cannot be too careful in using exactly the parts recommended.

The Effect of Good Coils

The results to be obtained from a set depend very largely upon the tuning coils or high-frequency transformers used. In fact, it is true to state that one set would be very like another were all coils of the same pattern.

Some coils are much more efficient than others, however, with the result that selectivity and volume are better. It therefore pays to employ good coils.

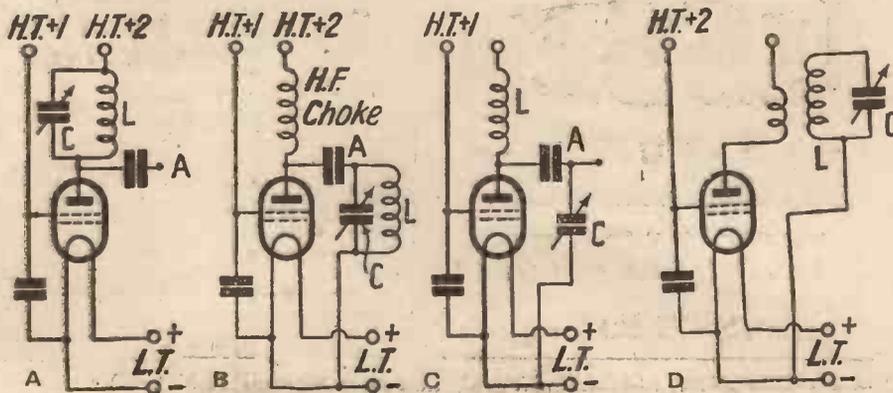
As the result of many tests, I have found a particularly good combination for both medium and long waves, and next week I shall describe a three-valve set using these coils. This set will, I believe, set a new standard, both for selectivity and the number of stations it will receive. I claim that twenty stations can be received by even an inexperienced person in a normal district, and I therefore feel that the set will be very welcome.

Use a Filter

A filter-feed output circuit is not very often included in a three-valve set of the type having a high-frequency stage; at least, not in sets of my design, for the reason that such sets are usually battery operated.

I would include a filter circuit if I used a voltage of, say, 180 on the last valve, but not when the voltage is only 120 and the valve itself is an ordinary power one passing a current of about 8 milliamperes. A filter-feed circuit is of great value in a four-valve set having two low-frequency stages, and may be necessary when there are two high-frequency stages.

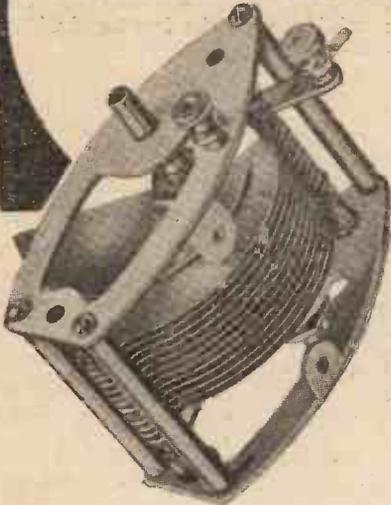
As a general rule, however, the expense of a filter circuit need not be incurred for the ordinary three-valve set battery-operated. Loud-speakers stand 8 milliamperes very well.



Four diagrams explanatory of some stabilising points

"A.W." Solves your Wireless Problems

*Do you
KNOW WHAT
facile turning
REALLY MEANS*



When you put a Lissen Variable condenser into your set, you get a new sense of mastery in the control. Because not only is the variation of capacity even and accurate over its capacity range, but movement is free without being slack. Notice the unshakeable rigidity of the construction of the Lissen condenser—the long bearing and the absence of end pressure or distortion of the vanes.

The Lissen Condenser is a real low-loss condenser; because of this stronger signals are passed to your valves and you get greater volume from your set. It is fitted for one-hole fixing or baseboard mounting; the spindle is extended for ganging; ebonite bushes are available for metal panel mounting—so that you can use it for absolutely any published circuit. If you are experimenting, you can use it for one circuit after another and it is universally adaptable. Remember this when buying a condenser and get a Lissen!

**A
BACKGROUND
of
SILENCE**



**in which a whisper
is amplified to a
great degree of
loudness**

The Lissen 8/6 Transformer gained fame in a single season because it gave to constructors exactly what was required of a transformer—a coupling device of almost universal utility at a moderate price. The extraordinary efficiency of this Lissen Transformer has been proved since then in hundreds of thousands of sets—in published circuits of all descriptions.

You cannot buy a transformer that offers you better value for money. And if you consider it by the results you get when you use it, you will find that there is hardly any circuit in which this transformer cannot be used with the most gratifying results.

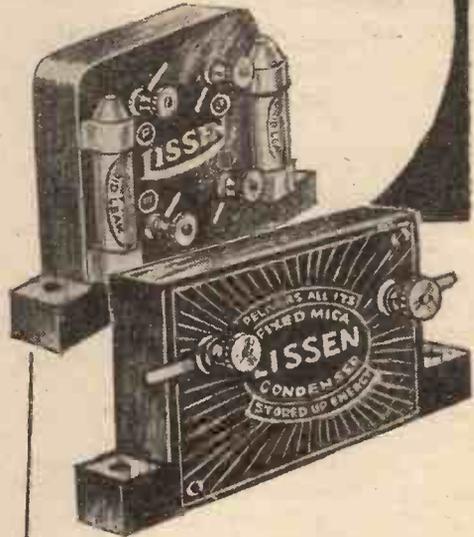
Turns Ratio 3 to 1
Resistance Ratio 4 to 1

PRICE
8/6

If your chosen circuit calls also for a Super Transformer, use a Lissen Super Transformer. You cannot get a better one.

PRICE **19/-**

**DELIVER
all their
STORED-UP
ENERGY**



Upon the condensers you use depends to a great degree the volume you get and the purity you get. Use Lissen Fixed condensers—they deliver all their stored-up energy. Use them wherever fixed condensers are specified—in any circuit and for every purpose. They never leak, they never vary, and deliver all their stored-up energy all the time.

LISSEN R.C.C. UNIT

embodies an accurately rated .01 condenser which delivers all its stored-up energy and resistances that will never vary, no matter what the current load, interchangeability of resistance values.

PRICE **4/-**

LISSEN

**VARIABLE
CONDENSER**

- .0031 mfd. capacity 5/9
- .0002 mfd. capacity 6/-
- .0003 mfd. capacity 6/-
- .00035 mfd. capacity 6/3
- .0005 mfd. capacity 6/6

**LISSEN
VERNIER
DIAL**

A handsome black moulded dial, extremely easy to fit, and giving delicate and definite adjustment.

PRICE **3/6**

LISSEN

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LISSEN LTD., WORPLE ROAD,
ISLEWORTH, MIDDLESEX

Managing Director: T. N. COLE.

LISSEN

**FIXED
CONDENSER**

**LISSEN
FIXED
GRID LEAKS**

These resistances are unvarying in value, and all have been tested. All values **1/-** each.

With terminals **1/3** each.

Holds its charge and delivers it without loss or leak; accurate to within 5% of stated capacities.

- .0001 to .001, price 1/- each.
 - .002 to .006, price 1/6 each.
 - .01 price 2/- each.
- Obtainable of all radio dealers.

"A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

Philips Filament Transformer

WITH the standardisation of a 4-volt filament, the new mains valves are becoming exceptionally popular. These valves can be run off raw A.C. It is required that the correct voltage should be applied, necessitating the use of a suitable step-down transformer.

It is essential that the constants of this transformer should be carefully arranged for its specific purpose. For maximum efficiency, the filaments must not be run below 3.5 volts, whereas it is harmful to exceed 4 volts. In consequence, the regulation of the transformer should be such that any number up to, perhaps, five or six, can be run in parallel without appreciable drop in voltage.

Messrs. Philips Lamps, Ltd., who are well known to readers as pioneers in mains apparatus, have recently introduced a special filament-heating transformer possessing the essential qualities of such an instrument. The ample iron core and windings are shrouded in a metal case on the top of which three terminals are arranged. The middle terminal is connected to the centre point of the winding, and considerable care has been taken in obtaining the exact position in order to ensure freedom from hum.

During our tests, we measured the voltage across the terminals when taking currents varying from 1 to 5 amps. The difference was only .35 of a volt, ensuring



Philips filament transformer for A.C. valves that under all practical conditions the filaments are neither overrun nor under-heated.

It might be helpful to give a word of warning regarding the A.C. valve. The filament current consumption with a set employing A.C. valves is normally about 3 amps, and even a small resistance in the

leads may result in a serious drop in voltage; it is, therefore, essential to keep these leads as short as possible.

The address of the manufacturers of this efficient filament transformer is 145 Charing Cross Road, London, W.

Lewcos L.F. Transformer

THE London Electric Wire Co. and Smiths, Ltd., are well known to readers as manufacturers of the famous Lewcos components. It is, therefore, interesting to note that this company is now marketing a low-frequency transformer having a number of desirable features.

The instrument is fairly large in size, measuring $2\frac{3}{4}$ in. by $2\frac{5}{8}$ in. by $3\frac{1}{2}$ in. high, the object of the makers being to provide a high-inductance winding, a high step-up ratio, and a substantial iron core.

Although we found on test that the primary inductance exceeded 90 henries with a D.C. polarising current of 2 milliamperes through the winding, the step-up ratio is 5 to 1. With 6 milliamperes D.C. polarising current, the inductance is 61 henries, and with 10 milliamperes, D.C. 40 henries. These figures will give readers some idea of the high impedance of this winding, even with large polarising currents.

The secondary is fitted with a centre tap, allowing the transformer to be used for push-pull amplification. This is certainly a commendable feature.

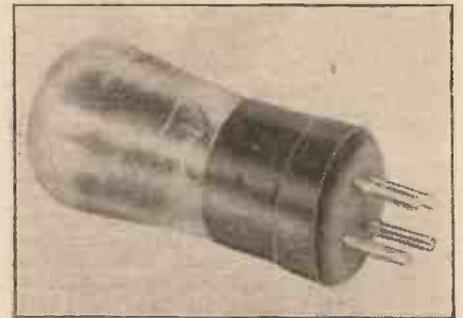
As regards construction, the windings and iron core are housed in a substantial

moulding, with the five terminals, two on one side and three on the other, projecting horizontally. Four holes are drilled in the base for mounting purposes.

It is evident from our tests that the makers have taken considerable pains to develop an electrically efficient instrument. The address of the makers is Church Road, Leyton, E.10.

Fotos Valves

RADIO valves may now be purchased at extraordinarily low prices, although this does not necessarily indicate that they are inferior in characteristics to the normal-



New Fotos Valve

priced article. Amongst the cheaper varieties we have received two samples supplied by the Concerton Radio and Electrical Co., Ltd., who market in this country Fotos valves. These are manufactured in France.

The standard high-frequency, low-frequency, and detector valves are extremely economical, both in filament and anode current consumption, whilst they sell at 5s. 6d. each. In consideration of the filament current consumption, which is only .05 of an amp., the characteristics are quite good. A general-purpose type, BC9, tested in the laboratories, had an impedance of 22,000 ohms and an amplification factor of 11, representing a mutual conductance of .5 milliamp per volt.

A super-power valve, type BD9, is also made and sells at 7s. 6d. The filament-current consumption of the sample tested was actually .3 of an amp., but then the impedance was 3,700, with an amplification factor of 8.2; figures which, for a 2-volt valve, are quite praiseworthy.

In general construction, the valves follow standard practice: the electrodes are mounted horizontally and are solidly held in position by substantial supports.

Radio Toulouse, of which the interval signal was "closed down for repairs," is again broadcasting strokes on a bell between items.

Coming Shortly—

The "1930 ETHER SEARCHER"

A worthy successor to a great success, the new "Ether Searcher" meets the listener's present requirements as fully as the first "Ether Searcher" two years ago. Since it was introduced to readers in November, 1927, over a thousand blueprints of the "Ether Searcher" have been sold, and we are still selling them!

Alan S. Hunter, the designer of the original "Ether Searcher," has for many weeks past worked in close co-operation with Mr. J. Sieger to produce a NEW Ether Searcher.

The "1930 Ether Searcher" is the result of a very determined effort on the part of two members of our staff to produce the best three-valve constructor's set yet designed. They claim to have achieved their object! This preliminary announcement will be followed next week by an important statement, to be made by the designers.

Meanwhile, you will be doing your friends a service by telling them the good news of the "1930 Ether Searcher."

SILENT POWER

FROM BIG CELLS



USE LISSEN VALVES WITH LISSEN BATTERIES

PRICES:

60-volt (reads 66)	7/11
100-volt (reads 108)	12/10
120-volt	15/10
38-volt	4/6
60 (super power)	13/6
100-volt (super power)	22/-
9 volt Grid Bias	1/6
4½ volt Pocket Battery (4/6 a doz.)	each 5d.
Single Cell Torch Battery	4½d.

The power of a Lissen Battery flows steadily, smoothly. The big cells are packed with energy. The secret process keeps it pure and sustained. The quality lasts throughout the longest programme—there is never a sign of ripple in the current, never a trace of hum.

Hear how well your own loud-speaker will reproduce a heavy orchestral item when you have the power of a Lissen Secret Process Battery flowing through your set—test it on opera, vaudeville, speech, song, or sports event. Hear how natural and true everything sounds.

Obtainable at every good radio dealer's—ask for Lissen New Process Battery and be sure to take no other.

LISSEN LIMITED WORPLE ROAD, ISLEWORTH, MIDDLESEX. Factories also at Richmond (Surrey) and Edmonton. (Managing Director: (T & N: COLE.)

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

THE TALKING TAPE

An Account of Recent Developments in a Novel System of Reproduction

IT is just about a year ago since AMATEUR WIRELESS was able to publish the first exclusive details of the talking-wire machine, and it was explained at the time that this ingenious invention had an obviously promising future for radio, talkies, gramophones, and so on.

Since that time the experimenters engaged on the talking-wire apparatus have not been idle; indeed, many improvements have been made, so that when (writes an AMATEUR WIRELESS Special Correspondent) I was down at the Blattner Sound Studios at Elstree recently, and witnessed a demonstration of the new talking-wire machine, I was most agreeably surprised at the improved results.

The talking-wire apparatus is based on an invention of Poulsen, of singing-arc fame, made some thirty years ago. Poulsen's idea was allowed to drop, however, until roughly fifteen years ago a German scientist, Dr. Curt Stille, took up the idea.

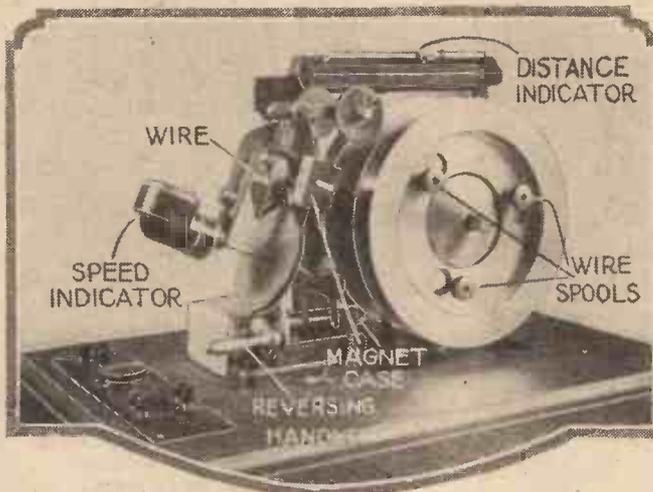
A Novel Principle

The action of the talking-wire machine can be explained as follows. The wire runs at a speed of about 360 ft. a minute from one spool to another, and in doing so passes over two magnet points. On these magnets are placed two bobbins of wire, through which the microphone speech currents are passed. The consequent magnetic variations are impressed on the wire during its travel. Strange as it may seem, the magnetic changes do not spread throughout the wire while it is coiled on the drum, even over a number of years and despite the fact that the wire is not insulated or one turn separated from another in any way.

Therefore, when the wire is rewound and run through the machine again and a pair of phones or an amplifier connected across the magnet bobbins, the speech is reproduced.

Nor is this all. The wire can be used over and over again, and can be "cleaned" simply by running it past a magnet. This almost entirely obliterates the previous speech impressions. For this reason the talking wire is particularly suitable for sound-film work, for alterations and amendments can so easily be made.

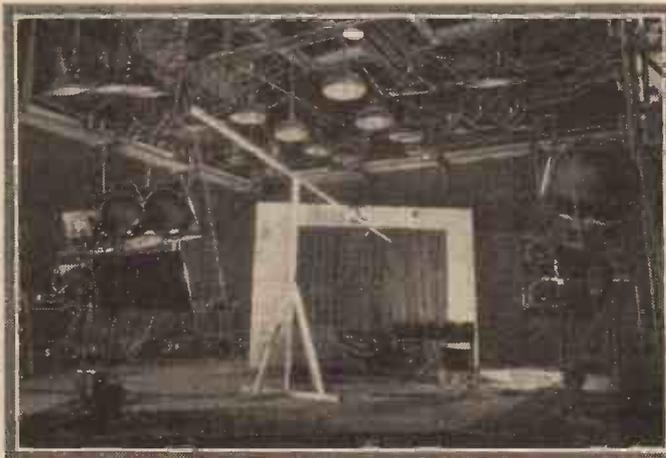
It is interesting here to go a little further into the construction of a typical talking-wire machine, such as is illustrated by one of the accompanying photographs. The two large aluminium drums carry the wire,



The actual wire recording and reproducing machine

which is about No. 28 gauge and which is coated to prevent it rusting. The wire runs over one of the little pulleys, down through the magnet case, round a pulley driving a speed indicator, and then on to the second drum. The "pulling" drum is motor-driven, and the speed indicator gives the operator warning should the speed vary at all. Speed variations have exactly the same effect as they have in a gramophone; that is, they cause a noticeable change in pitch.

The magnet case is an insulated box carrying four little magnets, north poles facing south poles in each case. One "N" and "S" set is used for impressing the speech on to the wire and the other for "play-back." The windings of each set are, of course, connected in series. The magnet case opens in halves, so that the wire may be threaded through.



A peep inside the Blattner studio at Elstree, where the Talking Tape is being developed. A "set" is in position ready for making a talking film. Note the microphone in the foreground

So far, I have spoken only of the talking-wire machine. The talking tape is the latest invention, and in the Elstree laboratories they are rapidly developing the tape for "talkie" purposes. German engineers

are largely responsible for the developments which are taking place, and I understand that in Leipzig alone over 400 tape machines have been introduced to adapt silent films to talkers.

The tape machine very closely resembles the talking-wire machine in general principle, except that the magnet poles are slightly different and the drums are, of course, larger to accommodate the tape, which is ordinary springy steel strip, approximately $\frac{13}{32}$ in. wide and .004 in. thick. It is found that by using the strip, which, of course, presents a larger mass of metal to the pole faces, it is possible to secure a much more stable recording, particu-

larly at the extreme ends of the frequency scale. In comparison with other talkie systems, the tape scores in that it is possible to record an octave higher than many well-known existing systems.

Simple Recording

The engineers at Elstree put on a talkie for me, "shot" in the studio wherein it was being presented; the subject was a violin solo with piano accompaniment, and the higher string tones of the violin came out with amazing clarity. It is interesting to note that this predominance and faithful recording of the higher tones coincides with the opinion I gave in AMATEUR WIRELESS, when the talking-wire machine first came into this country and I examined it at the end of last year. For talkie purposes the tape is run synchronously with the film strip.

After this talkie demonstration a few friends and I were asked to talk for two or three minutes in front of a microphone, blow a whistle, shout and clap, and so on. A record was made of our little "performance," the wire was rewound, and within a few minutes we were listening to our record reproduced through the talkie loud-speakers.

The loud-speakers used were of the ordinary semi-moving coil type; and no doubt others could be produced which would match more faithfully with the talking-wire amplifiers. Nevertheless, what I can only describe as the "silver" clearness of reproduction was most striking.

For recording it is really not necessary to have any amplification whatsoever. A microphone and a dry battery in series with two of the magnet bobbins is

(Continued on page 798)



FOR ELIMINATOR CIRCUITS

You cannot afford to use any but the best Condenser in an eliminator circuit.

HELSEY CONDENSERS

are made and guaranteed by a firm with 30 years' experience in condenser making, from small telephone and radio condensers to Power Condensers weighing upwards of 2 tons.

Guaranteed working voltages :-

Type M	-	-	150 volts D.C.
Type 2A	-	-	350 volts D.C.
Type 3A	-	-	450 volts D.C.
Type 4A	-	-	600 volts D.C.

All Helsby Condensers are vacuum dried and impregnated with a special non-hygroscopic material which renders them moisture proof.

If unobtainable from your dealer write to us giving his name and address.



BRITISH INSULATED CABLES LTD

PRESCOT - LANCs.

Makers of PRESCOT and HELSEY cables

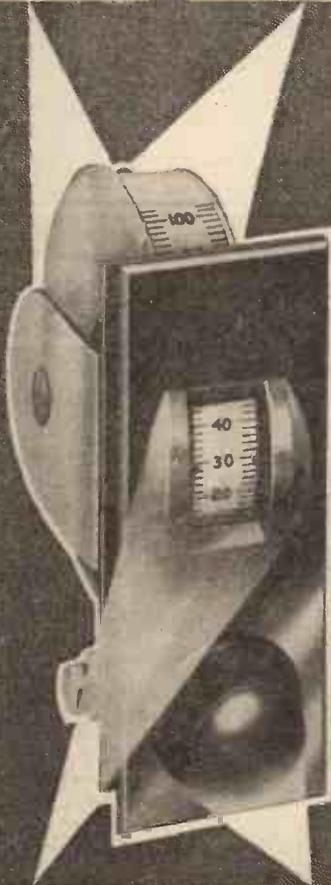
Here's how "J.B." do it

Follow the lights and see for yourself the improvements in the J.B. Drum Dial, one of the most popular models in the J.B. range. It is made in both a Bronze 10/6 and Oxidised Silver finish and costs 10/6



All parts of the Dial are insulated from the Condenser, so that the drum becomes an anti-capacity shield and may be earthed.

The scale is Ivorine, reading 0-100, and is reversible so that reading may be altered to 100-0.



The scale is flush with the panel and may be read with ease. A powerful and positive friction drive is used which prevents backlash and slip.

By an improved method the Control Knob is placed immediately below the scale — the most convenient place for it.

Advertisement of Jackson Brothers, 72 St. Thomas' Street, London, S.E.1
Telephone: Hop. 1837

To Ensure Speedy Delivery, Mention "A.W." to Advertisers



IN a new form of entertainment to be transmitted from 5GB on November 22, under the title of *Intimate Snapshots*, Lance Sieveking, the author, places the action in a tube station and later in a newspaper office.

Further visits by B.B.C. artistes are to be made to the Parlophone studios on November 25 and 27 for the performance of Charpentier's opera *Louise*, to be transmitted through 5GB and 2LO and 5XX.

One of the most humorous sketches broadcast, namely, *The 'Ole in the Road*, from the pen of the late "Seamark," is to be revived on November 28. On this occasion it will be interpreted by George Graves, the well-known comedian, and Miles Clifton, the latter in his original part.

On December 12 speeches made by Lord Derby, Mr. Arthur Henderson, and the French Ambassador, at the dinner of the United Associations of Great Britain and France at the Hyde Park Hotel, will be

relayed to 2LO and 5XX. On this occasion, for the first time, Mr. Rudyard Kipling will also face the "mike."

Arrangements have been made for the simultaneous broadcast by Berlin, Ecole Supérieure, and Radio Paris of performances from the Paris Opera House.

On October 2 last Madrid (EAJ7) relayed a broadcast emanating from the Berlin short-wave station. As these transmissions on 31.38 metres are easy to capture, the Spanish broadcasting authorities have decided to give their subscribers samples of the German entertainments from time to time.

It is reported that the Siamese Posts and Telegraphs have placed an order in Holland for the supply of a high-power wireless-telephony transmitter to work on both long and short waves. The station will be installed at Bangkok.

Owing to interference caused by a

French station, Turin, during the past week, has broadcast on a wavelength of about 293 metres.

Radio Normandie (Fécamp, France) is to be given a new lease of life, for some 80,000 francs were recently locally subscribed to maintain its radio service. Although generally advertised to work on 220 metres, listeners will pick up its broadcasts on about 212 to 214 metres, usually clear of morse interference.

In Mexico City the authorities have declared their intention to broadcast the trial of José Leon Toral, accused of murdering General Obregon.

The Italian Government has decided to grant a subsidy of five million lire towards the construction of the Vatican wireless transmitter.

By the beginning of 1930 the Westinghouse Electric Company of East Pittsburg will be in the possession of a new high-power transmitter, which is being erected in the immediate neighbourhood of Saxonburg (Penn.). The site of this improved "KDKA" station has been carefully chosen, inasmuch as the geological conditions of the surrounding country have been proved to be peculiarly favourable for the transmission of short waves.

Arrangements have been made between the studios of Huizen (Holland) and Louvain (Belgium) for the exchange of their programmes.

FOR LONG LIFE AND POWER DR. NESPER BATTERIES ARE SECOND TO NONE



60 v. Triple Capacity, 14" x 5 1/2" x 3"
100 v. Triple Capacity, 16" x 8 1/2" x 3"

DR. Nesper High Tension Batteries are the result of many years experience in the manufacturing of dry cells. By using a Dr. Nesper Battery you can be sure of obtaining the very best from your set.

The Triple Capacity Battery is specially designed for giving extra power to all makes of power valves. This is the **Super capacity** battery that will give extra power together with long life.

Ask your Dealer.

DR. NESPER LTD., Colindale Avenue,
Hendon, London, N.W.9.

- 60 v. High Tension Battery, oblong or square, each 8/6
- 100 v. High Tension Battery, oblong or square, each 14/6
- 9 v. Grid Bias Battery, each 1/6
- 4 1/2 v. Pocket Lamp Battery, each 5d.
- 60 v. Triple Capacity Battery, each 15/6
- 100 v. Triple Capacity Battery, each 24/6





ROTARY BATTERY SWITCH

An attractive alternative to the usual Push and Pull type of Switch. All insulated, with indicating "On" and "Off" dial, pointer knob, double contact and suitable for use with panels up to 3" thickness. Each **1/9**



PENTODE

The famous Benjamin Clearer-Tone Valveholder, Flexible connection for attaching to the terminal on the cap of the pentode valve. Price each **2/3**

Pentode attachment only for use with existing Clearer-Tone Valveholders or Vibrolders, 3s. each.



5-PIN VALVEHOLDER

Designed for use with the new 5-pin A.O. valve with centre leg. The well-known Benjamin anti-microphonic feature is incorporated, and also patented contact, which ensures perfect contact when using either solid pin or split pin valves. Price, each **1/9**

MORE NEW BENJAMIN PRODUCTS

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The original CLEARER-TONE VALVEHOLDER in face of considerable low price competition has more than held its own and will be continued at price of **2/-**

The BENJAMIN VIBROLDER was last season's most successful accessory, the self-aligning feature ensuring positive contact with all types of English 4-pin valves. Price each **1/6**

The popular Push and Pull double-contact Battery Switch. It's "off" when it's "in." Price with terminals, each **1/3**

Without terminals each **1/-**

THE BENJAMIN ELECTRIC LTD.
BRANTWOOD WORKS, LONDON N.17.

THE FAMOUS BULLPHONE



DE LUXE

LOUD-SPEAKER

Reduced from 55/-

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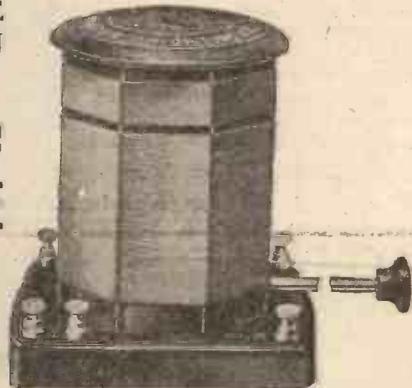
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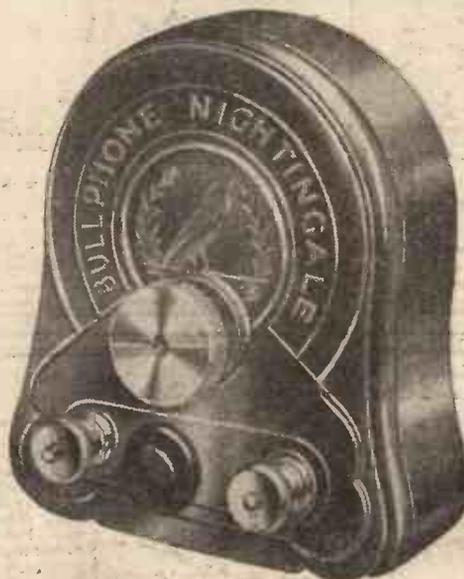
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Ganged Tuning.

Q.—Why is it that to "gang," say, an aerial tuning condenser and an H.F. tuning condenser the coils must be specially matched and the two tuners specially designed? I should have thought that, provided the aerial coil and the anode or H.F. coil were identical and the two tuning condensers of the same capacity, the ganging of tuning would be a simple matter.—L. B. (Birmingham).

A.—You have overlooked some very important points connected with the tuning of a receiver, and which bear on your question: (1) The natural capacity of the aerial; (2) the inter-electrode capacity of the valves; (3) the coils, unless specially matched, will not be identical; and (4) the natural inductance of the aerial system adds a certain amount of inductance to that of the aerial tuning coil. The use of aperiodic or semi-aperiodic aerial tuning facilitates the ganging of aerial and H.F. tuning circuits, but, even so, accurate tuning of two such circuits when directly ganged is well-nigh impossible.—A. L.

Amateur Call-signs.

Q.—Do you publish a complete list of amateur

call-signs, or can you tell me of any publication dealing with amateur transmitting stations?—M. B. (London, E.11).

When Asking Technical Queries

PLEASE write briefly and to the point

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

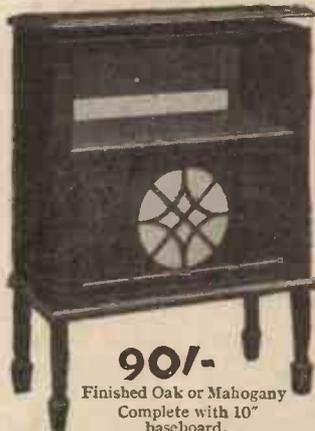
A.—We have not, at the moment, a complete list of amateur call-signs, but the Annual

and Log Book, published by The Radio Society of Great Britain contains a list such as you require.—C. L.

Valves and Transformers

Q.—I have recently been conducting tests with the new L.F. transformers now on the market. These include the Mullard, Igranite, Philips, and Marconiphone. I notice that whereas with the older types of transformer everything appears to be quite satisfactory, with many, if not all, of the new transformers a high-pitched whistle or other form of oscillation makes itself apparent.—H. H. (London, W.1).

A.—We have experienced this trouble and by carefully choosing valves with impedances to match the impedance of the transformers we have effectively cured the tendency to howl. A temporary remedy is to use a somewhat lower H.T. voltage on the detector valve than would normally be used, but the remedy is to use a valve that matches the transformer as far as its impedance is concerned. This requirement is not new, but with the latest instruments the efficiency and sensitivity is so marked, that unless the amplifier is matched trouble will result.—A. C.



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	PR10	3.5-4	.063	15,000	8.7	I.F.
	PR11	3.5-4	.063	65,000	40	R.C.
	PR17	5-6	.1	24,000	17	H.F. Det.
	PR18	5-6	.1	15,000	9	I.F.
	PR19	5-6	.1	80,000	40	R.C.
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PR40		4	.15	8,000	6	"
PR60		6	.1	8,000	6	"
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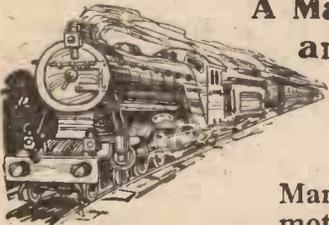
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"Amateur Wireless," 16 11/29.

LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

Radio Catalana

SIR,—Whilst reading "Jottings from my Log" recently I came across a paragraph stating that Radio Catalana had apparently changed his wavelength. Whilst playing with the dial and tuning low down on the scale R.C. came in at terrific strength immediately below Kaiserlautern. Verified by hearing the station call "Radio Catalana." This was obtained on October 30, time about 10.30 p.m. This may be of some use to your numerous readers. I suggest the station Jay Coote heard was Zurich.

Secondly, can anyone identify a transmission which lies between Brno and Barcelona (GAJ)? Tremendous strength, late on in the evening.

Thirdly, London. This station is magnificent, but he can be tuned out in favour of either Graz or Stuttgart.

M. D. A. K. (Sheffield).

Are We Progressing?

SIR,—Since I started the controversy on the above subject I feel it my duty to defend myself against the "onslaught" of J.L., who tries to find inaccuracies in my line of reasoning.

He goes to some length to explain how and why L.F. amplification and actual reproduction have improved. That is surely what I pointed out, and I said it was time our tuning arrangements were brought up to the standard set by the remainder of our receivers.

Another statement of J.L. is to the effect that a few years ago a station was claimed as being received if a few words were faintly audible in the phones. On this I do not agree; those who did make claims of this kind were the kind of people who to-day boast loud-speaker strength when signals can just be heard by holding the ear to the speaker.

Your contributor continues by pointing out that the more receivers there are tuned to a particular frequency, the weaker the impulses receivable on that frequency. I am not going to dispute that fact, although I will say that in practice this effect is not nearly so pronounced as one might believe by the study of theory alone. Even if this is the case, my original question as to whether or not our reception is better remains unaffected. That is merely another side of the question.

And now we come to coil design. J.L. agrees that our wire is on the thin side, but says there are no "dead ends" in our

coils. But he must know that a very great number of commercial dual-wave coils operate on S.W. by merely shorting the long-wave section. Thus the "dead end." The "Q" coil is undoubtedly better, but, even so, the idea of putting two coils of even slightly different characteristics in parallel does not appeal to me, either in theory or from experience. My experience shows that for best results a toroidal coil (seldom heard of now) or the binocular (same principle, of course) wound with reasonably stout wire is superior to all other forms. Mention is made by J.L. of centre-tapping; of course, that is sound, but that was originated several years ago for use with our two-pin plug-in coils, and so does not come under our discussion at the moment.

Since writing my previous letter I have reconstructed one of my old receivers (single valve) and compared it with several more recent ones. Without going into details, I might say it was of the Reinartz style with plug-in coils and home-made H.F. choke. Using an old DER valve, the results were better than on many similar receivers using commercial dual-wave coils, and on substituting a new valve (Cossor R.C.) at least two dozen stations were received sufficiently well to be comfortably heard on a cone speaker used with an efficient two-stage amplifier. As to the amplifier, this consisted of one R.C. stage and one good transformer stage.

Changing to good home-made binocular coils brought in a few more stations and improved all those previously received. This last arrangement compared more than favourably with well-known screen-grid three-valvers in so far as it enabled as many stations to be received at greater volume.

I think many people would be agreeably surprised if they were to substitute an R.C. valve for detector and follow this by a good R.C.C. unit. Better reaction control is the chief feature and, combined with the higher amplification factor of the valve, better reception results.

I still wonder "Are we progressing?"
F. P. (Liverpool).

Television Matters

SIR,—Your correspondent F.A.I. (London, W.C.) has the idea that television will need a much wider frequency band than broadcasting. The "dot" theory of television that attempts to prove that television is impossible has been shown to be

wrong, because we do not wish to transmit a large number of dots, but a picture with masses of black, white, and the intermediate tones. Further, the 30-hole disc has, I believe, been adopted in Europe because it gives the maximum detail that can be accommodated in the allotted band.

I would further mention that television in England, anyway, is no longer an "expensive experiment," as your correspondent will agree if he has seen the latest Baird demonstrations.

G. H. L. T. (London, E.).

South-coast Interference

SIR,—Accepting Thermion's invitation, I am sorry to say that my recent experiences of long-distance reception fully confirm those of his unfortunate friend who (like myself and a few million others) live on the south-coast.

Conditions are, indeed, terrible. When to heterodynes you add night fading, transmitter deviation, morse interference, sometimes atmospheric, occasional oscillation, and the inevitable "mush-to-signal" ratio, middle-wave band reception here becomes scientific inquisition inseparable from audible torture.

To turn, therefore, to 5XX is like suddenly going from a simultaneous contest of Hyde Park orators surrounded by a fair and a circus to a sound-proof concert hall—and where the only "fly in the ointment" is a slight detriment in quality due, I imagine, to the unavoidable land-line system.

Certainly, real music lovers (uninterested in the technical side of wireless) could not tolerate anything else but 5XX for more than five continuous minutes down here.

When I recollect that not so long ago it was seriously suggested that our long-wave station should be abolished, it makes me go hot all over! W. N. C. (Hove).

SIR,—I would like to back up Thermion's south-coast friend who said that reception in this part of the country is very bad. This evening I have only found one station worth listening to on the lower wavelength, this being, I think, Nurnberg; the next best is also a German station, and then comes Milan. To me the English stations are a wash-out, only 5XX being any good, and that is messed up by Zeesen and Eiffel Tower stations. When the news came through from London this evening it sounded more like a banana-eating contest than a news item, and 5GB is worse, being swamped very often by Langenberg; in fact, the German station wipes out all the English ones here, and all the evening the ships in the Channel are having firework displays — anyhow that is what it sounds like. I wish you would point out to your readers and Mr. R. W. Hallows that those who grumble most about the regional scheme are those who live close to an English station, and no doubt in the last few years have listened to programmes in their native tongue; will

they please let some of us, whose nearest station is fifty miles or more away, have a look in? I have been driven to listening to the stations of the Fatherland so much that my head is going quite square at the back. I might say that my set is a four-valve (H.F., D., two trans.), I am sure if the P.M.G. were to hear it, he would hasten to give me back 9s. 9d. out of my last licence fee. L. B. (Hailsham, Sussex).

Sixty Stations on the Loud-speaker

SIR,—In March last I made up the "Clarion 3" set, and think it only fair that you should know what splendid results I have obtained. For selectivity and purity I have not found an equal, though my wireless experience dates back many years. The stations tuned in at full speaker strength number over sixty.

The Prague Plan has not interfered with me, except that I cannot get Berlin very well now. The new station, Brookmans Park, has not interfered with my selectivity at all. B. (Brighton).

Another Grouse

SIR,—I agree with "W.D." (Rochdale) that the B.B.C. are sending out a lot of music that is very harsh in character and totally unsuited to any type of loud-speaker, cone or otherwise.

Another real evil is that the B.B.C. programmes are distinctly monotonous. We have bands, orchestras, pianos, and sopranos *ad nauseum*. We would welcome more examples of good solo music. Why should the week's music be practically a mere repetition of the one before in character?

In the old days the B.B.C. did give us a great deal more of the unexpected, but now, week in and week out, there is no originality. W. J. F. (Redruth).

Next Week:
"EVERYBODY'S THREE"
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A special League of Mercy programme is being arranged by Lady Tree and others for broadcast from 2LO and 5XX on November 26.

Blueprint Wanted.—Has any reader a blueprint of the Mullard Nelson P.M. de Luxe set and the booklet published at the same time describing the set? Also has anyone the issue of "Radio for the Million" which contains a description of this circuit incorporating a screened-grid valve? The request is made by Mr. L. H. Messent, 116 Burbage Road, Herne Hill, S.E.24; who will be glad to purchase them.



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 - Celestion C.12, in Oak. Cash £5 12s. 6d., or send only 10/4; balance in 11 monthly instalments of 10/4. In Mahogany, £5 17s. 6d., or 12 monthly instalments of 10/9.
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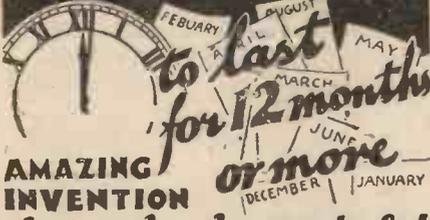
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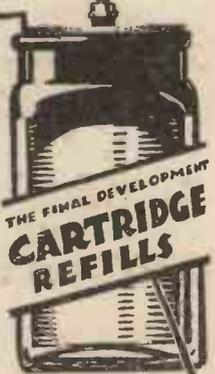
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*200	1,500	Leeds (2LS)	0.13	*288.5	1,040	Mont de Marsan (PTT)	0.2	*441	680	Rome (Roma)	3.0
*242	1,238	Belfast (2BE)	1.0	*291	1,127	Limoges (PTT)	0.5	458	662	Bolzano (IBZ)	0.3
*188.5	1,040	Newcastle (5NO)	1.0	304	916	Bordeaux (PTT)	1.0	*501	599	Milan (Milano)	7.0
288.5	1,040	Swansea (5SX)	0.13	305.6	981.7	Agen	0.25	308	973	Zagreb (Agram)	0.7
288.5	1,040	Stoke-on-Trent (6ST)	0.13	309	970	Radio Vitus	1.0	429	008	Belgrade	2.5
288.5	1,040	Sheffield (6LF)	0.13	*316	950	Marseilles (PTT)	0.5	560	533	Ljubljana	2.5
288.5	1,040	Plymouth (5PY)	0.13	329	974	Grenoble (PTT)	0.5	*525	572	Riga	8.0
288.5	1,040	Liverpool (6LV)	0.13	331.4	905	Petit Parisien	0.5	LITHUANIA			
288.5	1,040	Hull (6KH)	0.13	364	824	Algiers	12.0	*1,035	155	Kovno	7.0
288.5	1,040	Edinburgh (2EH)	0.35	368	815	Radio LL (Paris)	0.5	NORWAY			
288.5	1,040	Dundee (2DE)	0.13	*381	988	Radio Toulouse	8.0	240	1,250	Rjukan	0.18
288.5	1,040	Bournemouth (6BM)	1.0	411	729	Radio Maroc (Rabat)	2.0	*283	1,058	Notodden	0.05
288.5	1,040	Bradford (2LS)	0.13	447	671	Paris (Ecole Sup. PTT)	3.0	*365	820	Bergen	1.0
*301	995	Aberdeen (2AD)	1.0	468	640	Lyons (PTT)	5.0	*394	761	Frederiksstad	0.7
*310	968	Cardiff (5WA)	1.0	1,458	205.76	Eiffel Tower	12.0	458	662	Tromsø	0.1
356	842	Brookman's Park 30	1.0	*1,725	174	Radio Paris	12.0	453	662	Aalesund	0.3
*377	797	Manchester (2ZY)	1.0	*218	1,373	Flensburg	0.3	453	662	Porsgrund	0.7
*399	753	Glasgow (5GC)	1.0	*227	1,319	Cologne	4.0	*493	608	Oslo (testing)	7.3
*473	626	Daventry (5GB)	25.0	*234	1,283	Muenster	3.0	POLAND			
*1,554	193	Daventry (5XX)	25.0	*239	1,256	Nurnberg	2.0	*313	959	Cracow	0.5
AUSTRIA											
*246	1,220	Linz	0.5	*246	1,220	Kiel	0.35	*335	895	Posen	1.2
*283	1,058	Innsbruck	0.5	*253	1,134	Cassel	0.25	385	779	Wlito	0.5
*352	851	Graz	7.0	*259	1,157	Gleiwitz	2.0	*403	734	Kattowitz	10.0
*453	666	Klagenfurt	0.5	*270	1,112	Leipzig	1.5	*1,411	212.5	Warsaw	8.0
*517	581	Vienna	15.0	*276	1,085	Kaiserslautern	0.25	ROUMANIA			
CZECHO-SLOVAKIA											
*283	1,139	Morava-Ostrava	10.0	*283	1,058	Koenigsberg	2.5	*394	761	Bucharest	12.0
*279	1,076	Bratislava	12.5	*283	1,058	Berlin (E)	0.5	*825	364	Moscow (PTT)	20.0
*293	1,022	Kosice	2.0	*283	1,058	Berlin (E)	0.5	1,080	283	Tiflis	10.0
*342	878	Brno (Bruno)	2.4	*319	941	Stettin	0.5	1,000	300	Leningrad	20.0
*487	617	Prague (Praba)	5.0	*319	941	Dresden	0.25	1,100	272.7	Moscow Popoff	40.0
BELGIUM											
135.5	1,273.5	Charleroi (LL)	0.25	*319	941	Bremen	0.35	*1,304	230	Kharkov	4.0
246.1	1,218.8	Schaerbeek-Brussels	0.25	*360	833	Breslau	1.5	1,481	202.5	Moscow (Kom)	40.0
250	1,200	Ghent	0.5	*372	806	Stuttgart	1.5	SPAIN			
270	1,112	Radio Binche	0.2	*390	770	Hamburg	1.5	251	1,193	Almeria (EAJ18)	1.0
180	1,171	Liege	0.1	*418	716	Frankfurt	1.5	314	956	Oviedo (EAJ19)	0.5
312	901.4	Arlon	0.25	*453	662	Berlin	1.5	*349	860	Barcelona	8.0
339	887	Louvain	8.0	*458	657	Danzig	0.25	*368	815	Seville (EAJ5)	1.5
*509	590	Brussels	1.0	*473	635	Aachen	0.35	403	743	San Sebastian	0.5
DENMARK											
*281	1,067	Copenhagen (Kjbenhavn)	0.75	*533	593	Langenberg	13.0	428	700.9	Madrid (EAJ7)	2.0
1,153	260	Kalundborg	7.5	*560	596	Munich	1.5	493	662	Salamanca	1.0
ESTHONIA											
*2.5	1,013	Reval (Tallinn)	0.7	*560	596	Augsburg	0.25	*1,348	222.5	Motala	30.0
FINLAND											
*221	1,355	Helsingfors	0.9	*570	527	Hanover	0.35	SWEDEN			
*1,790	167	Lahli	40.0	*1,031	142	Freiburg	0.35	231	1,301	Malmö	0.6
FRANCE											
31.65	9,779	Radio Experimental (Paris)	1.0	223	1,346	Luxembourg	3.0	*257	1,160	Hoerby	10.0
175	1,714	S. Quentin	0.1	HOLLAND			270	1,112	Trollhattan	0.45	
211.3	1,420	Béziers	0.1	31.4	9,554	Eindhoven	25.0	*322	932	Goeteborg	10.0
212.8	1,410	Fecamp (Radio Normandie)	0.5	HUNGARY			322	932	Falun	0.5	
237	1,265	Nice (Juan-les-Pins)	0.5	*298	1,004	Hilversum (until 5.40 p.m. G.M.T.)	0.5	*436	689	Stockholm	1.5
238	1,262	Bordeaux (Radio Sud-Ouest)	1.0	*1,071	280	Hilversum	0.5	*542	554	Sundsvall	0.6
239	1,256	Radio Nimes	0.25	*1,071	280	Scheveningen-Haven	5.0	*770	389	Ostersund	0.6
*255	1,175	Toulouse (PTT)	1.5	(from 10.30 a.m. to 5.40 p.m. B.S.T.)				1,200	250	Boden	0.6
*265	1,130	Lille (PTT)	0.7	*1,375	160	Huizen (after 5.40 p.m. G.M.T.)	0.5	*1,348	222.5	Motala	30.0
268	1,121	Casablanca	0.5	ICELAND			550	545	Budapest	20.0	
268	1,121	Strasbourg	0.3	*1,200	250	Reykjavik	1.0	IRISH FREE STATE			
*212	1,103	Rennes (PTT)	0.5	*225	1,337	Cork (IFS)	1.0	*413	725	Dublin (IRN)	1.0
GERMANY											
ITALY											
*3.2 0.5 Naples (Napoli) 1.5											
*20 1.2 Turin (Torino) 7.0											

All wavelengths marked with an asterisk have been allotted according to the Plan of Prague.

CHIEF EVENTS OF THE WEEK

- LONDON AND DAVENTRY (5XX)**
- Nov. 19 A vaudeville programme.
 - " 20 *Typhoon*, a play by Conrad.
 - " 22 Symphony concert from Queen's Hall.
- DAVENTRY EXPERIMENTAL (5GB)**
- Nov. 18 A programme of selections from the musical comedies.
 - " 20 *Fed Up*, a revue; book and lyrics by Graham Squires; music by Shirley Goodall.
- GLASGOW**
- Nov. 21 Speeches by the Duke of Montrose and H.R.H. the Prince of Wales at meeting of Scottish Branch of Royal National Lifeboat Institution, S.B. from Edinburgh.
 - " 23 Running commentary on Partick Thistle v. Motherwell Association football match.

CARDIFF
Nov. 20 Concert by victors at National Eisteddfod of Wales, Liverpool, 1929.

BELFAST
Nov. 22 *A la Carte*, a radio cabaret, by Edward P. Genn.

The Katholieke Radio Omroep (Huizen) has adopted as an interval signal a series of chimes on four notes (G, D, E, B, D, B) repeated *ad lib*.

After a stay of about a month in the Glasgow area, the Post Office wireless detector van has been successful in discovering and warning about 1,500 wireless "pirates."

WIRELESS IN PARLIAMENT



SIR NICHOLAS GRATTEN-DOYLE asked the Chancellor of the Exchequer whether he could state the cost of maintaining the British official wireless service and whether he had any information as to the use which was made of it.

Mr. Henderson, who replied, said that the total annual cost of this service, including salaries and cost of transmission, amounted to approximately £12,000 per annum. The messages were reproduced daily in the press of numerous foreign countries, the Dominions, India, and the Crown Colonies.

Sir John Power enquired if it was now the policy of the British Broadcasting Corporation to allow unlimited facilities for the members of His Majesty's Government to make broadcast speeches on matters of public interest.

Mr. Lees-Smith replied: "No, sir. The British Broadcasting Corporation were informed in March, 1928, that the prohibition which had previously been imposed on the broadcasting of political and controversial matters was withdrawn; that the responsibility for using this power would devolve solely upon the governors, and that they would be expected to use their discretionary power in the spirit of

the report of Lord Crawford's Committee. This Committee had recommended 'that a moderate amount of controversial matter should be broadcast, provided the material is of high quality and distributed with scrupulous fairness, and that the discretion of the governors in this connection should be upheld.' I understand that the British Broadcasting Corporation have done their best to carry out this policy.

"The Easy Way"—The enterprising firm of Peto-Scott, of 77 City Road, London, E.C.1, are specialising in deferred payments for all classes of radio apparatus. The style of deferred-payment scheme is styled "The Easy Way," and a comprehensive book under this title has just been issued. It contains details of all the leading manufacturers' components and sets, and explains how each can be obtained for a small initial deposit and a certain number of monthly payments, depending on the total value of the goods. The scheme is entirely private, and the convenience with which the deferred-payment arrangement may be applied to any radio apparatus will be of great assistance to many AMATEUR WIRELESS readers. Copies of the catalogue "The Easy Way" may be obtained free direct from Messrs. Peto-Scott upon mention of AMATEUR WIRELESS. A point to note is that any radio manufacturer's products can be supplied through Messrs. Peto-Scott in "The Easy Way."

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3-Valve Set in polished Oak cabinet, guaranteed to give you several stations on Loud-speaker, especially 2 LO and 5 GB, at very exceptional strength and purity. £4 12s. 6d. cash or 12 payments of 9/8 per month. No extras.

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Long Wave Coils, suitable for 1929 Cossor Melody Maker. 7/6 the set (listed at 17/-)
 Plaque Cone Loud-speaker. Splendid tone 9/1 1.
 Variometer with dial 1/6.
 Twin H.F. Ckeke 1600 turns No. 40 s.w.g. silk wire 2/9

MAGNIFICENT 3-VALVE S.G. RECEIVER

Still the finest set on the market. Supplied with Coils, 3 suitable Valves (Mullard P.M.12, Triotron Detector and Power). £5 12s. 6d. cash, carriage and packing free. Or with "N. & K." Cone Loud-speaker, 120 volt Ever Ready H.T. Battery and Oldham I.V.D. Acc. £7 15s. 6d. (Long Range Coils given free with this lot.)

We will supply you with any kit of parts or special accessory on easy payments. We will quote you an exceptionally low figure for any set of parts or accessories. You will be surprised at our quick delivery and service.

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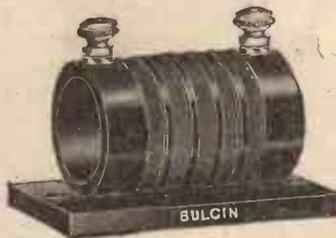
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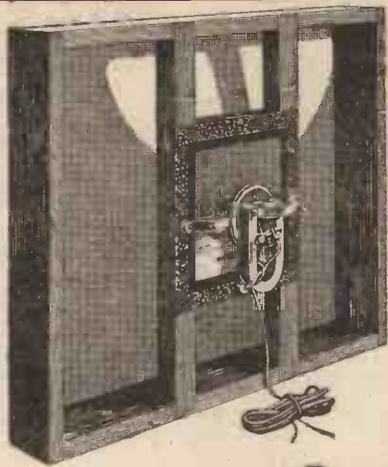


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ULTRA AIR CHROME

British Patent No. 295,623

Ultra Electric Limited, 661-663 Harrow Road, N.W.10

"THE TALKING TAPE"

(Continued from page 788)

sufficient to impress magnetic variations of fair strength on the tape or wire. For talkie purposes, however, a number of microphones are used and are followed by two or sometimes three stages of amplification. When the tape is being used there is practically no limit to the amount of amplification that can be employed; I have seen as many as four low-frequency amplifiers in use. This is not the case with the wire, however, with which, I should think, the limit of amplification would be about three stages without exceeding the reproduction limits.

A Wide Scope

Two final tests made at Elstree interested me. A crystal set followed by two low-frequency stages picked up a broadcast programme and impressed it on to the wire. The wire was rewound, and within a few minutes I had the novelty of hearing the orchestral item repeated! This opens up an obvious channel of possibilities.

Regarding the imperviousness of the wire or tape to any change other than the magnetic one, it is worth noting that rubbing the wire with grease or heating it with the flame of a cigarette lighter, just before it passed under the magnet points, had no effect whatsoever. Neither is any noise made if the drums or even the magnet case are hit while the record is being made. I was assured that one record made eight years ago is still in almost perfect condition, and I tested for myself the fact that knocking and hitting the drums does not destroy the essential residual magnetism.

Adaptability

It is the adaptability of the wire and tape that will, I am confident, assure a rosy future for this system. The recording is entirely electric, an instant play-back is obtainable by simply rewinding the drum to any desired point, there was practically no limit to the amplification, either for recording or reproduction, and the higher tones are particularly well recorded and reproduced. Either the wire or tape can be cut and rejoined by a sweating process in a minute or so.

Above all, there is the important asset of being able to make a rapid connection on the tape or wire simply by running it through the machine again and wiping out the undesired portion.

Simply by reversing the direction of the tape it is possible to hear the record backwards! A Schumann sonata sounded perfectly balanced when played either way, the reason being that the phrasing and arrangement of good music is in equilibrium. The human voice when run backwards sounds like a series of jerks, finishing with a *crescendo*. This, I suppose, is because in English the accent is generally placed on the first syllable. K. U.

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Outfit includes 9 ft. steel tubing sections, heavy galvanized stay wires (cut to size), steel collars, heavy galvanized half-yard pulley, 3 galvanized stay eyes. The whole complete in every detail, ready to erect, with full instructions for erecting. AS USED BY THE MILITARY.

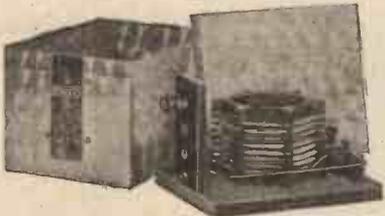
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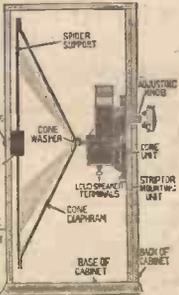
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THE VALVE STILL LEADS THE WAY
 Its Influence at Olympia

By MORTON BARR

MANUFACTURERS have now shown us the kind of set which may reasonably be expected to set the fashion in receiver design for the next twelve months. Perhaps one should say "fashions" since there are so many different kinds and types of sets available that it is difficult to identify any definite standard.

At first sight there seems to be more points of difference than of uniformity. One has a choice between two, three, four, and five valves or more; between portable, transportable, and large cabinet models; and between sets designed to be driven from the mains, or from batteries. Yet, at the same time, it is clear that recent developments in the thermionic valve have left their mark very plainly on the whole of this season's receivers.

H.F. Amplification Comes Back

The new standard of performance of the screen-grid valve may be taken as a case in point. Some years ago the average listener had little or no use for high-frequency amplification. It was admittedly out of court when working at short ranges, and was usually voted more trouble than it was worth even for long-range working.

The discovery of the neutrodyne method of avoiding capacity coupling between plate and grid, and so stabilizing the circuit, brought high-frequency amplification back into favour. It was realized that one or two stages of stabilized H.F. amplification not only opened the door to selective long-distance reception but also made the use of reaction practically unnecessary.

The new screen-grid valve offers a still simpler method of stabilizing the high-frequency side. But that is not its only merit. In addition to shielding the grid from the plate, the screening electrode increases the internal impedance of the valve from say 40,000 ohms to 200,000 ohms or more, and jumps up the magnification factor to a corresponding degree. Instead of a magnification factor of 40 the modern screen-grid valve is rated to have a "mu" factor of 200 and upwards.

This enormous increase in valve magnification is primarily responsible for the success of the small portable-type receiver. Without stabilized H.F. amplification it would be impossible to work a loud-speaker from the relatively minute amount of energy picked up on a small frame aerial.

S.G. Valves and Selectivity

Designers have also been quick to grasp the advantage of utilizing the new high

(Continued on next page)

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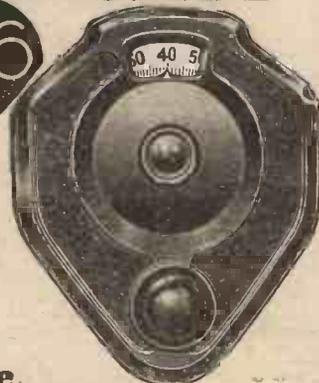
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Brownie

wireless

NELSON ST. WORKS, LONDON, N.W.1

"THE VALVE STILL LEADS THE WAY"

(Continued from page 799)

amplification valves in preparing to meet the demand for higher selectivity which will inevitably follow the introduction of the new Regional Scheme of broadcast transmission.

They have accordingly developed out of the portable, the up-to-date transportable model, where considerations of high-grade quality in reproduction and dependability take precedence over that of mere portability. In most cases these sets are designed to give long-distance reception from a small frame aerial, thus adding the directional properties of the latter to the selective action of the H.F. circuits.

On the L.F. Side

On the low-frequency side, another comparative new-comer to the large family of valves is making its presence felt in no uncertain manner. The pentode, or three-grid L.F. amplifier, is a sort of first cousin to the S.G. valve. By inserting an extra earthed grid, the internal impedance of the valve is reduced from some hundreds of thousands to a few thousand ohms, so as to give an output of sufficient wattage to operate any type of domestic loud-speaker. If extra volume is required, a pair of pentodes arranged in push-pull, will give all the power that is very likely to be called for on the low-frequency side.

In fact, the latest tendency, in circuit design, as seen for instance in the new Marconiphone type 56 receiver, lies in the direction of increasing the number of S.G. high-frequency stages from two to three, and in reducing the low-frequency stages to one.

The All-mains-driven Set

The use of S.G. valves, in turn, compels the designer to draw his operating voltage from the mains. If high- μ valves are to be used to advantage, the plate and screen voltage must be kept steady. In the older type of valve a drop of twenty volts or more in the output of the high-tension battery was not a very serious matter. The set would still continue to give fair reproduction. S.G. valves, on the other hand are not so tolerant of battery variations, and so the designer depends more and more upon the use of the electric mains. This in itself explains the increasing popularity of the mains-driven set, quite apart from the convenience of getting rid of batteries and accumulators.

Finally the all-mains-driven receiver became a much more practicable proposition with the appearance of the indirectly-heated valve, and its near relation the point-8 type driven by raw A.C. current taken directly from the mains.

Thus, from every point of view we are

(Continued on next page)

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World-wide S.W. Three

Contents of the H. & B. Kit:

	£	s.	d.
1 Aluminium cabinet, with baseboard (Parex)	1	1	0
1 Formo condenser, .00015	0	4	6
1 Formo condenser, .00035	0	4	6
1 Igranic 400-ohms potentiometer	0	2	6
1 Bulgin push-pull switch	0	1	6
3 Benjamin valve holders	0	4	6
2 Lissen 1-mfd. fixed condensers	0	5	0
1 Lissen .001 fixed condenser	0	1	0
1 Lissen .0001 fixed condenser	0	1	0
1 Lissen 100,000 fixed resistance	0	1	0
2 Bulgin grid-leak holders	0	1	6
1 Igranic S.W. choke	0	2	0
1 Complete set of S.W. coils (Colvern)	1	15	0
1 Telsen Radio Grand transformer	0	12	6
1 Ebonite strip, 14 in. by 2 in. (Trelleborgs), drilled	0	1	6
1 Clarostat "Standard" resistance	0	8	6
1 Ready Radio 100,000-ohms resistance, wire wound	0	8	6
8 Eastick named terminals	0	3	0
1 Siemens 9-volt grid-bias battery	0	1	6
2 Belling-Lee marked wander plugs	0	0	7
2 Igranic vernier dials	0	12	0
Total	£6	13	1

3 Mullard, Cossor, or Marconi valves, £2.5.0 extra. Every part of this set guaranteed 1N stock.

H. & B. kit of parts to construct the A.B.C.2 ("W.M.," Oct.), complete with Panel drilled, Wire, etc., 50/- Coils included.
2 Mullard Valves, 23/- extra. Cabinet, 8/6 extra. A.B.C.2. Parex Coil, 5/-.

MUSIC LEADER

Kit of specified parts, complete with Panel drilled, Wire, and Screws.

Cash Price, £4.18.6

Ormond Speaker Unit, 12/6 extra.
H. & B. Oak Cabinet, 35/- With frame aerial fittings and Mullard or Cossor Valves, 56/- extra.
All parts in stock. Write for detailed list.
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Formo .0005 Condensers, 4/6
Screening Box, Parex, 5/6

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Buy the H & B Way

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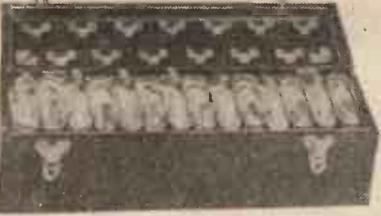
**“THE VALVE STILL LEADS
THE WAY”**

(Continued from page 800)

tending inevitably towards the standardised all-mains set. On the high-frequency side, the screened-grid valve requires a high-voltage at constant pressure. On the low-frequency side the modern power-amplifier demands a plate voltage in the neighbourhood of 200 volts and takes a much larger current than formerly.

Both requirements are outside the scope of H.T. batteries. The function of the indirectly-heated and point-8 type of valve is to make the change-over from batteries to mains both convenient and complete.

Varley Instruction Book—In AMATEUR WIRELESS No. 386 reference was made to a most interesting instruction book issued by Oliver Pell Control (Varley), Ltd., in conjunction with the new section catalogue. It was explained that the price of the instruction book is one shilling, but that a certain number had been set aside for free presentation to AMATEUR WIRELESS readers. Messrs. Varley inform us that the response has been so overwhelming that the demand for free copies has far exceeded the quantity allotted and the normal price of one shilling is now operative. The book is well worth it. The address is Oliver Pell Control (Varley), Ltd., 103 Kingsway, London, W.



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N.C.C. 722



BAGGING THE RUSSIANS

THIS and the next three months should prove the best period of the radio "season" (if there is such a thing!) and on most nights the distant searcher should harvest to his heart's content. The Russian stations—in particular Leningrad and Kharkov—can be relied on most evenings from 6 p.m. G.M.T. to give a strong signal, and as this coincides with 8 p.m. Eastern European Time we pick them up at an opportune moment, namely, their main evening transmission.

Owing to the fog beacons, Leningrad is disappointing at times, but it is seldom that the programme is thus marred for long periods. Most Russian stations possess both male and female announcers; in fact, the Kharkov studio seems to be dominated by the feminine element.

How to Identify Them

A short but systematic search on wavelengths above 800 metres will bring a number of these Russian broadcasts to your ears. Firstly, on 825 metres you will find Moscow Experimental, a studio which devotes itself mainly to talks, but which on some nights will give you the relay of an opera. Immediately above, on 1,000 metres, Leningrad cannot easily be missed. Perhaps now and again you may fancy that you have picked up a Spanish or Italian transmission, the reason being that a number of talks, and even news bulletins and programme items, are given out in Esperanto. Slightly turn your condenser dials, and between Hilversum and Kalundborg you will find Moscow Popoff on 1,100 metres; in fact, I have sometimes found this station interfering with the Dane. Moscow Popoff, it seems to me, does not work at full power every day, but on Sundays at 5.30 p.m. G.M.T. it is worth trying for it, for on those days it takes a relay of a performance from the Moscow State Opera House. Above Kalundborg, but clear of Motala, tune in Kharkov on 1,304 metres; on most evenings at 7 p.m. you may hear a good concert. The feminine call giving the name of the city is particularly clear; and a gong is struck at the end of each item in the programme.

Finally, on some evenings it is possible to disentangle Moscow Komintern from Eiffel Tower. Should this prove troublesome, try for the station when Paris has closed down (at about 9 p.m. G.M.T.). At 9.55 p.m. you will be switched over to the Red Square for the midnight time signal and chimes from the Kremlin Tower. The carillon, although not very musical, can be clearly heard. Then again, if you are truly an enthusiast, you may want to listen to Moscow on 1,481 metres in the very early morn. Daily at 4 a.m. that studio broadcasts physical jerks, followed by music half an hour later. From a radio point of view, the time is eminently favourable, but otherwise— J.G.A.



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By Ernest H. Robinson (5 Y.M.)

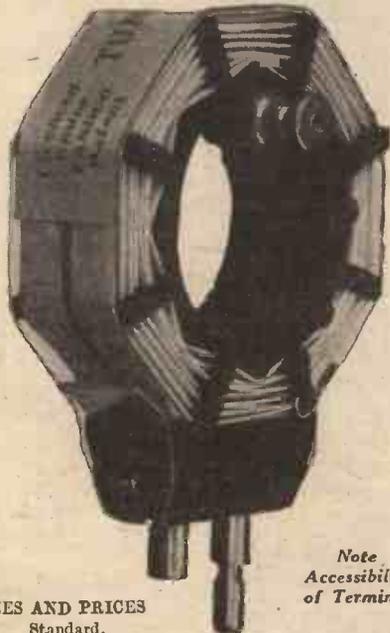
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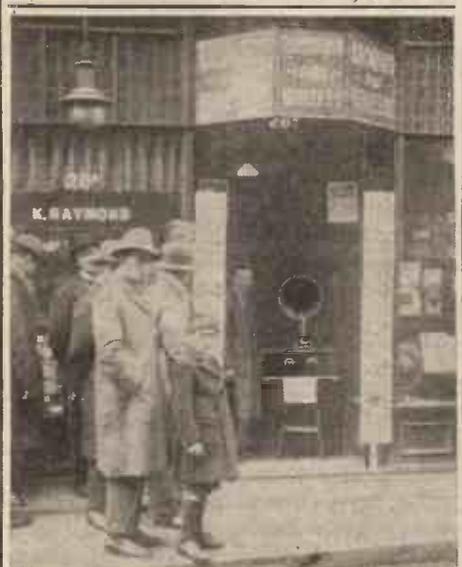
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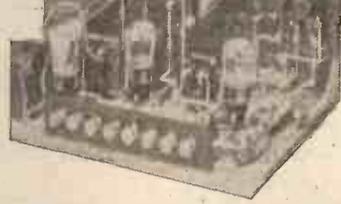
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JUDGING A COIL

THE influence of metal on the performance of a coil can be very little or quite appreciable. It all depends upon the design of the coil. This point is often lost sight of, with the result that quite wrong conclusions are sometimes formed.

Thus, if you have a good coil, one having a low value of high-frequency resistance, the effect of placing it near metal may be serious. Should the coil be of the fine-wire type, however, its losses will probably not be increased by a material amount if it is placed near a shield or other metal part.

Its effective inductance may change, with the result a little more capacity is needed to tune it to a certain wavelength. This is a matter of small importance, however.

Reaction is so widely used and its benefits are so great that one is sometimes apt to forget that reaction does not truly compensate for circuit losses.

Such losses would be those due to resistance in coils and condensers, and also the damping effect of valves. Reaction may be used to improve signal strength and selectivity, but only to a limited extent. If you are at all doubtful on this point, try a circuit having a good coil and then another having a poor one, paying particular attention to the strength of distant stations and also the selectivity. The difference will be found remarkable.

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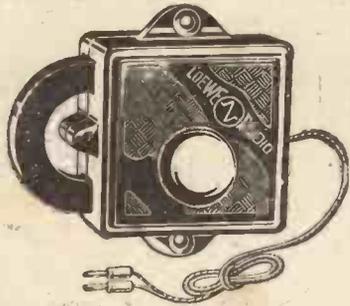
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Amateur Wireless

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THE "EVENING CHRONICLE" EXPERT SAID:—

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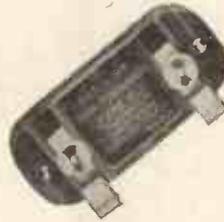
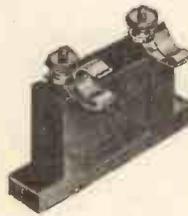
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LC 244/F

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Lewcos Components give Super reception because of the superior materials and workmanship used in their manufacture. The fixed Potentiometer is designed to give smooth reaction control on *all* radio receivers, and the quality of the H.F. Choke makes it supreme.

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"EVERYBODY'S 3"—FOR THE NEW CONDITIONS

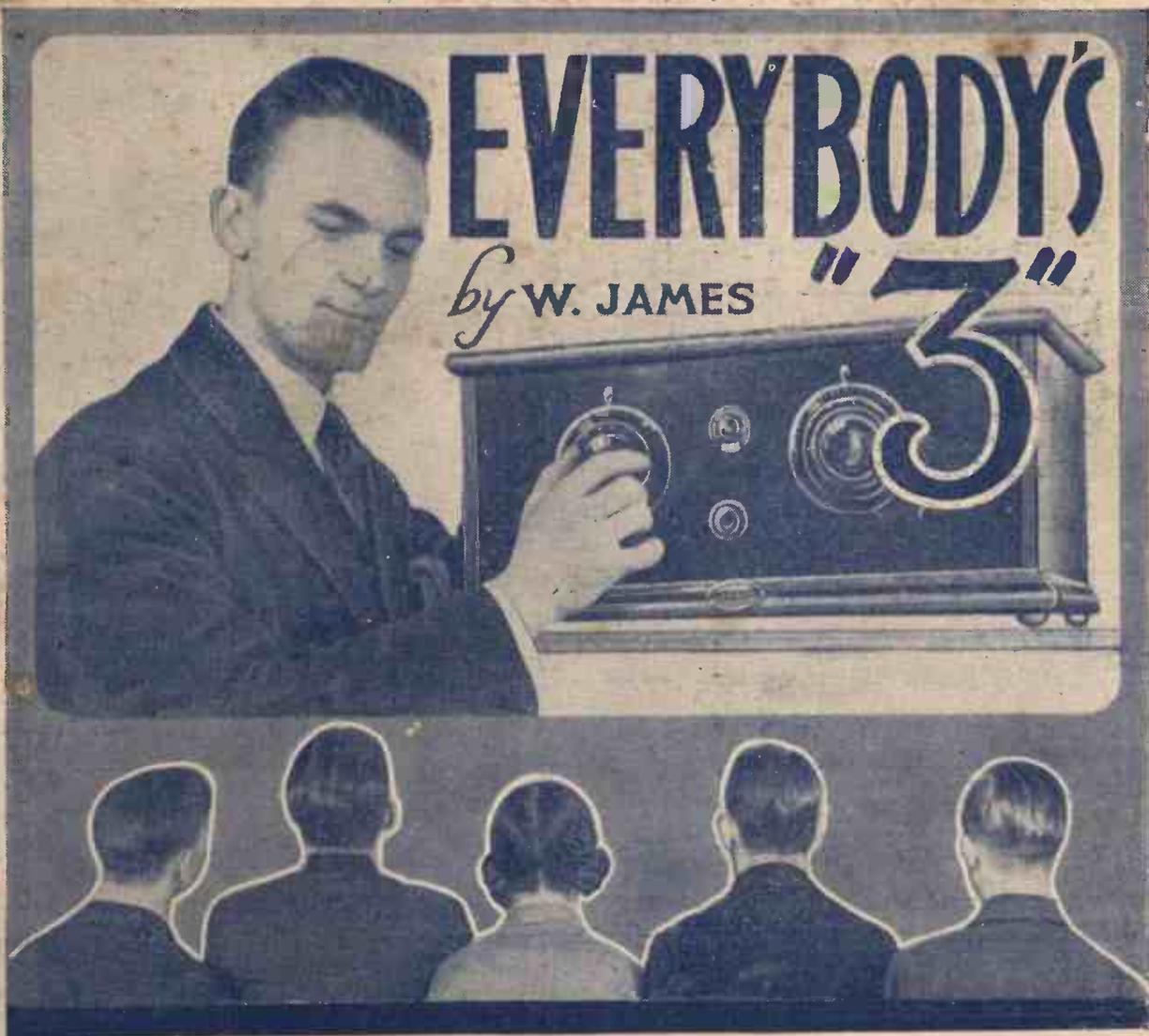
Amateur Wireless

SIXTY **3**^d.
PAGES

and
Radiovision

Vol. XV. No. 389

Saturday, November 23, 1929

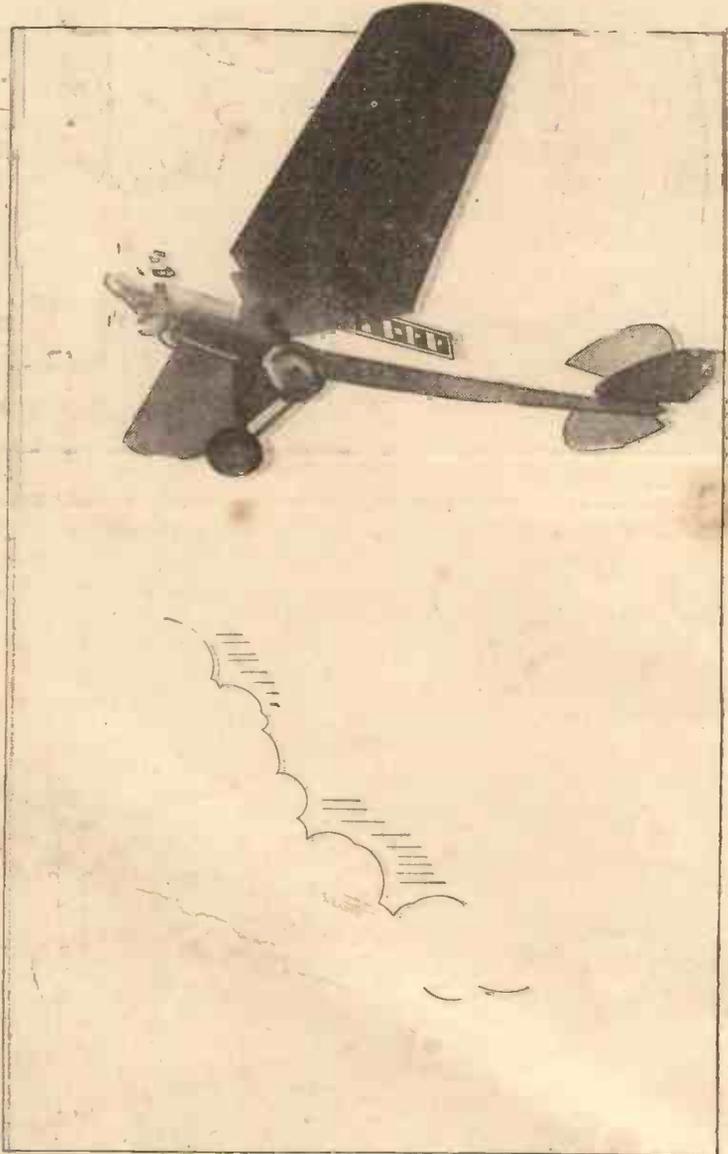


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Great 20-passenger
Air Liners rely on
Marconi Valves for
navigation messages

CROYDON aerodrome— noon.
"All aboard? Cast off!" Giant air-
liner roars upwards. Chessboard
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glittering in sun.— Channel. Pilot
wirelesses to Croydon: "Sea dead-
calm. Flying at 10,000 feet. Slight
breeze." Fifteen minutes later —
poplars of Picardy. Le Bourget.
Punctual to the minute. Three
hours — three hundred miles. And
all the time in touch with aero-
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Imperial Airways' machines use
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Tower uses them. For their reli-
ability. For their long range. *Your
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Give you greater volume, clearer
tone, longer service. Cost not a
penny more. Fit any set.



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Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

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FAULTLESS SERVICE

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TAKING TEN MILLIAMPERES



EVER READY

REGD. TRADE MARK

BRITAIN'S BEST BATTERIES

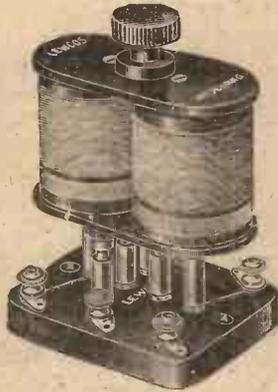
EVER READY
"Popular Power"
(For 10-16 M.A.
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60 VOLTS	...	13/8
64	"	14/6
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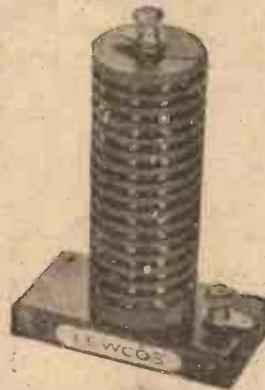
Specially designed with Fieldless and Astatic windings to prevent inter-action.



The Lewcos Dual Unscreened Coil

For Triodes and screened grid valves. Wavelength range: 235-550 and 1,000-2,000 metres.

Radio Products
improve the
Quality of
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The Lewcos H.F. Choke

An extract from an appreciation from Industrial Progress (International) Ltd., reads: "The Lewcos H.F. Choke is, in our opinion, the most efficient Choke we have tested."

GLAZITE
BRITISH MADE REGD.



Coloured Connecting Wire

6d. per 10ft. Coil.

Lewcos engineers are occupied year in and year out on problems connected with improvement of radio reception—inductive coupling, minimum self-capacity and low H.F. resistance—these are the factors demanding continuous experiment and research, the result of which is shown in the remarkable superiority of Lewcos Coils.

Many of the most successful receivers in the past depended in a large measure on the high efficiency of Lewcos Coils. Therefore take the advice of the technical experts and fit Lewcos Coils when building or improving your set.

Fully descriptive leaflets of the Coils illustrated above will be sent on request.



The Lewcos Fixed Potentiometer

Is designed to give smooth reaction control on all Radio Receivers.

THE LONDON ELECTRIC WIRE COMPANY and SMITHS LIMITED

Church Rd., Leyton, London E.10

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easy...

for the amateur
to build his own
**Super
Loudspeaker**

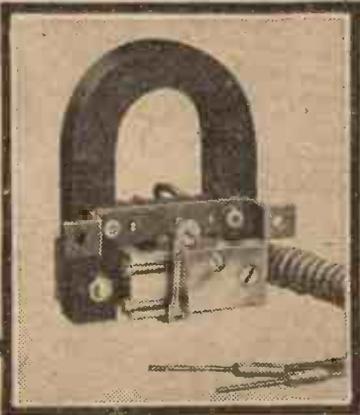
This cone unit and assembly now permits the amateur designer to construct a super-sensitive loudspeaker which is cheaper than a factory built model whilst at the same time allowing him to use his own ideas as to the type of cabinet or baffle to be used.

For the small sum of 15/- for the cone unit and 12/6 for the assembly he can build a loudspeaker unequalled in its class for volume, tone and sensitivity.

Like all Ediswan products this unit and assembly combine typically British quality with life-long dependability.



Assembly—Price 12/6



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W.35a

If a record's worth playing it's worth playing well!

**Use the
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LESS-WEAR
PICK-UP**



Pick-up with adaptor for use with standard Gramophone tone arms—Price 27/6 complete.

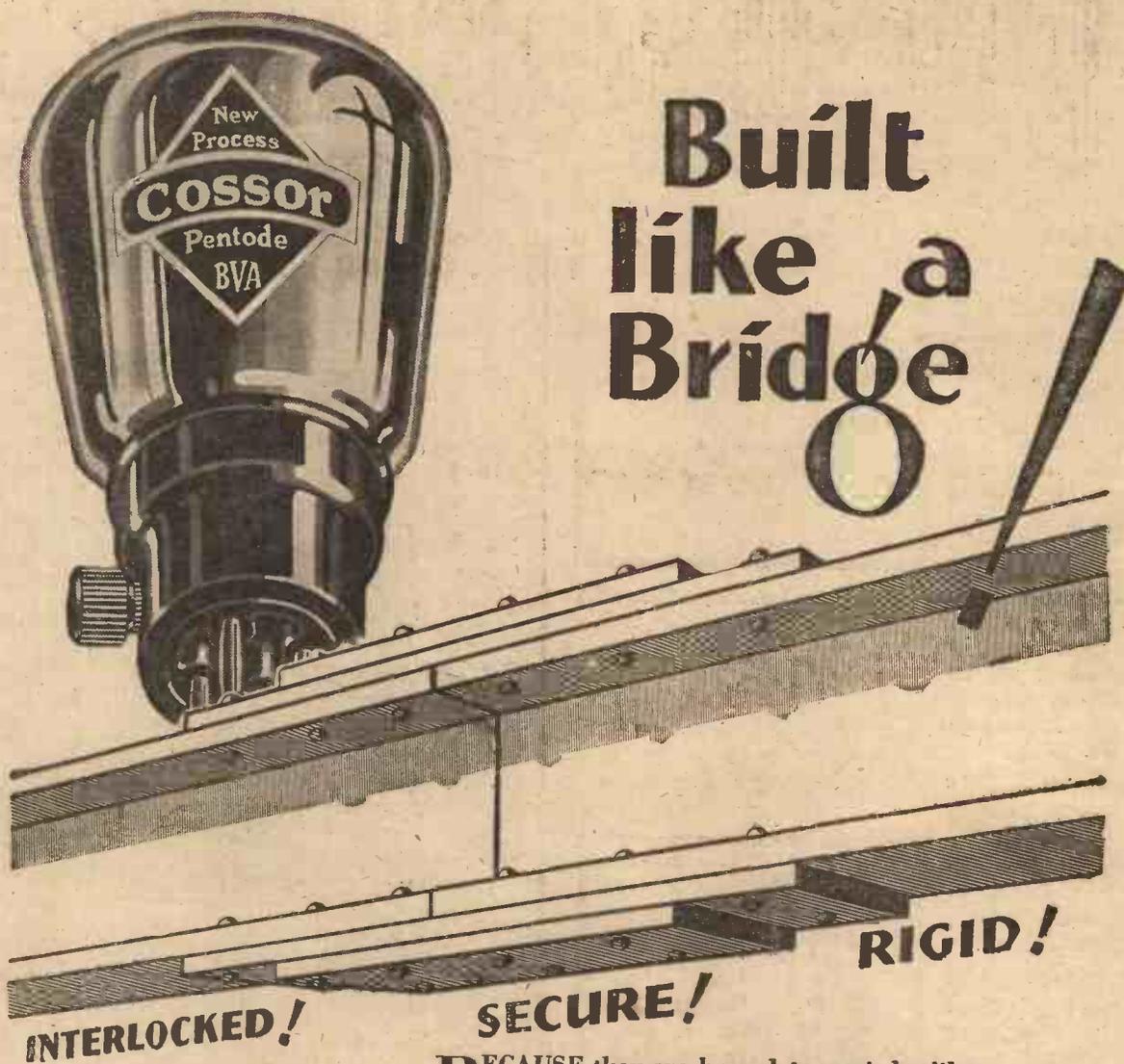
A record is made electrically—unless it is reproduced electrically a great deal of its beauty may be lost. Use a B.T.H. pick-up with your radio set and hear record music as you've never heard it before.

Pick-up and Tone Arm—
Price 45/- complete.



PICK-UP and TONE ARM

You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers



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Bridge

INTERLOCKED!

SECURE!

RIGID!

In two types:

Cossor 230 P.T. (2 volts, .3 amp.) and 415 P.T. (4 volts, .15 amp.) Amplification Factor 40. Impedance 20,000 Anode Volts 100-180.

Price . . . **25/-**
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BECAUSE they are braced to a girder-like rigidity the elements of the *NEW* Cossor Pentode have exceptional strength. Locked top and bottom they are secure against individual movement. This unique Cossor system of Interlocked Construction definitely eliminates all possibility of damage due to shock. Only complete destruction can impair the superb tone—the enormous volume of this remarkable valve. Use the *NEW* Cossor Pentode in your Receiver—no other make has Interlocked Construction.

The **NEW**
COSSOR
PENTODE

The only Pentode Valve with Interlocked Construction

A. C. Cossor Ltd., Highbury Grove, London, N.5

2283 

Don't Forget to Say That You Saw it in "A.W."

Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Editor: BERNARD E. JONES

Technical Editor: J. H. REYNER, B.Sc., A.M.I.E.E.

Research Consultant: W. JAMES

Assistant Editor: H. CORBISHLEY

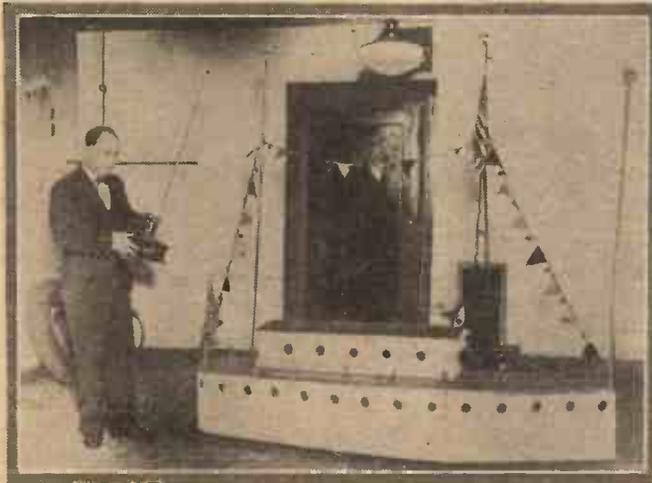
Jhelum, Geelum, or . . . —“Amateur Wireless” at PCJ—Amazing Range— Radio at Sea—The “Atmosphere” of a Tube!—Criticism!

Jhelum, Geelum, or . . . —

Our radio critic, Mr. Sydney Moseley, recently had something to say about pronunciation, as follows: “One point regarding announcing, however. Was it necessary to announce each of the short songs of the short suite entitled, ‘On Jhelum River,’ by Woodforde-Finden, which, by the by, the announcer called ‘Geelan.’ I was under the impression that it was ‘Yelum.’ The B.B.C. referred this matter to Mr. Lloyd-James, who is a member of the Advisory Committee on Spoken English, and he says: “‘Jhelum’ is certainly not ‘Yelum.’ It is pronounced by Europeans ‘Geelum,’ with the accent on the first syllable. In its native form it is ‘Jehlam,’ but this is a form that is difficult for Europeans to pronounce. I recommend ‘Geelum.’” So now we know!

“Amateur Wireless” at PCJ—A member of the AMATEUR WIRELESS and Wireless Magazine staff was in Holland last week and took the opportunity to visit the famous short-wave station, PCJ, which can be heard regularly on 31.4 metres. After being taken round the station, he was asked to speak over the microphone to all the British-speaking listeners to PCJ. And so for ten minutes he had the pleasure of addressing short-wave enthusiasts in places so far away as the Dutch East and West Indies. This, it is believed, is the first occasion on which a visitor from the British radio press has had this privilege extended to him, and it is a double honour that the microphone from which the AMATEUR WIRELESS man spoke is that which H.M. the Queen of Holland used in the opening broadcast from this famous Dutch station in 1927.

Amazing Range—PCJ, of course, is the transmitter of the



A radio “battleship” is the invention of an American radio “wizard.” Through a small transmitter he can manoeuvre the ship in any direction.

Philips organisation in Holland, and it is as a result of the work carried out at this station that even larger short-wavers, Huizen, for instance, are possible. It is interesting to note that PCJ has no “stunt” aerial, a single wire hitched at one end to a mast of the Hilversum broadcaster sufficing for the upper capacity.

Radio at Sea—Ordinary radio sets are being used quite a deal at present for the entertainment of travellers on large ocean-going liners. For instance, the M.V. Westralia is fitted with the latest Marconiphone band repeater equipment, operating from a standard receiver and having provision for the use of a gramophone pick-up. A concert from Colombo was recently rebroadcast on the loud-speakers at a distance of 1,260 miles. The best results during one particular trip were obtained with 3LO Melbourne, which came through on the speakers at just under 2,000 miles and was received every night afterwards till arrival. 3UZ Melbourne was rebroadcast

in daylight at about the same distance. The church service from 6WF Perth was put on the L.S. on a recent occasion, and dances have been held to the music both from 6WF and 3LO.

The “Atmosphere” of a Tube!—

The “atmosphere” of a tube station and newspaper office will be reproduced, and sound effects will contribute prominently to the realism in a programme entitled, “Intimate Snapshots,” to be broadcast to-morrow, Friday, November 22, from 5GB. Lance Sieveking, the author, takes as the central idea the theory that for many people life is a series of dull and often meaningless repetitions. His examples prove it, and afterwards show the contrary.

Criticism!—Regarding the broadcast criticism of plays, the following statement by the B.B.C. is of interest: “Representatives of the Society of West End Theatre Managers and the Theatre Managers’ Association have been in touch with the B.B.C. and it was apparent that both points of view were appreciated. Certain published statements are quite erroneous.

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THE "1930 ETHER SEARCHER"

The "Ether Searcher Three," first details of which were published in "A.W." No. 284, has proved to be one of the most popular receivers in this country—

IN its day, the "Ether Searcher" three-valve set was almost a classic; it was certainly one of the finest examples of its type. Thousands of AMATEUR WIRELESS readers built the set and got results that far exceeded their most optimistic expectations. It is probable that a great number of the original "Ether Searcher" sets are still giving excellent service.

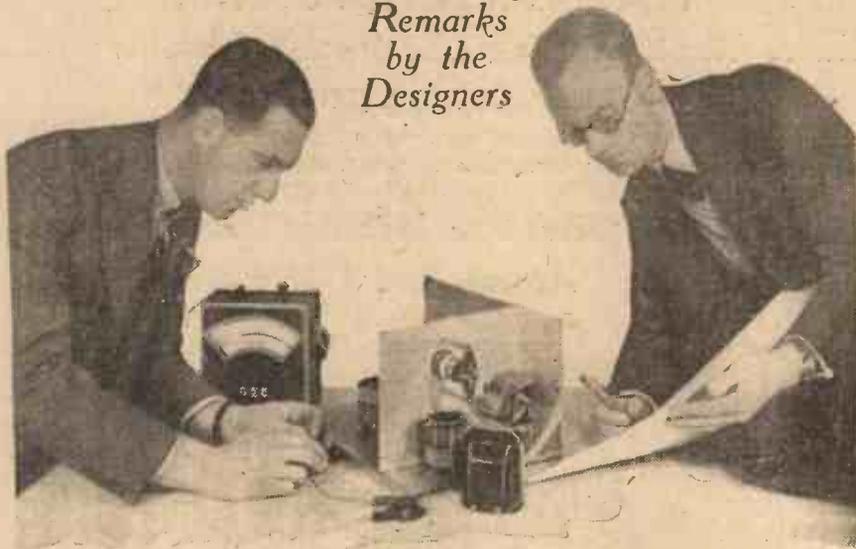
But two years is a long time, in a radio sense, and no one is less aware of the inability of the original set to cope with modern conditions than the present writers. We know that, whereas two years ago when the "Ether Searcher" was first published, it represented the best possible sequence of three valves to meet the greatest needs of the greatest number of listeners; that is not so to-day.

Altered Conditions

What, then, has happened in two years to lessen the utility of a set that received such universal acclamation at its inception? Two developments of great significance to set designers have combined to alter the whole basis of broadcast reception. Under the Prague plan of European wavelength distribution, all transmitting stations are now appreciably closer together than they were two years ago. So close together are the stations, that the most minute movement of the dial will bring in some powerful foreigner. In London, for instance, the reception of 5GB is often characterised by the nearness of Langenberg. Not only are stations closer together, but many of them have greatly increased their power during the last two years.

This general increase in power, combined with the closeness of the transmissions one to another, is rendering sets of the "Ether Searcher" type incapable of giving such satisfaction as was possible two years ago. Difficulty in separating stations is the chief short-coming of this type of set; this difficulty has recently been accentuated by the starting up of the 2LO Regional transmissions on high power. It is not uncommon for us to hear that, at the present time, 2LO is the only station that can be heard, because it comes in over the greater part of the dial.

Some Introductory Remarks by the Designers



—but transmission technique and reception conditions have greatly changed in the past two years. So here is a new "Ether Searcher" to suit modern conditions.

Last week, readers will recall, our technical consultant, W. James, explained why the best sets have a high-frequency stage. He pointed out that sets of the detector with reaction and low-frequency amplifier type are usually not selective, they are liable to set up oscillations in the aerial circuit, so producing bad interference over a large area, and the results obtained depend very much upon the skill of the user.

H.F. A Necessity

Whilst we would not go so far as to say that the sequence of a reacting detector valve followed by one or two low-frequency amplifiers is now obsolete, we do think that it is not of such general utility as it was two years ago. For with this sequence, it cannot now be said that the greatest needs of the greatest number of listeners are satisfied. We believe that the present-day needs of the average listener are much better met by a sequence of valves comprising one high-frequency amplifier, a detector and one low-frequency amplifier.

Present-day Needs

Personally, we lay most emphasis on the lack of selectivity and the liability to set up interference. The crying need for more selective tuning is being met in various ways by different designers. Some, we think, are under-estimating the seriousness of the trouble and are making rather half-hearted attempts to impart a high degree of selectivity by using one tuned circuit, very carefully "doctored." We think a far more direct way of achieving the much desired selectivity is so to increase the high-frequency power of the set that two separate tuned circuits can be used without loss of signal strength. If we except all "stunt" efforts, there is only one way to achieve the desired end, and that is by the use of a definite stage of high-frequency amplification.

As the joint designers of the "1930 Ether Searcher," we believe that we have fulfilled the requirements of the present-day listener in the same completely satisfactory way that one of us was able to do two years ago with the original "Ether Searcher." Next week we are going to justify our design, and to show how all the difficulties of construction and operation of this advanced set have been carefully smoothed away. Last, but not least, we ought to mention that the cost of building the set has been ever before us; one of the big features of the "1930 Ether Searcher" is its amazingly low cost.

Picture transmissions are being carried out nightly between Moscow and Leningrad. They are to be heard just under the latter's wavelength.

WHAT READERS SAID ABOUT THE "ETHER SEARCHER THREE"

(Described by ALAN S. HUNTER in AMATEUR WIRELESS, No. 284.)

"I have made up a number of sets, but, with the exception of a seven-valve super-het, I can quite honestly say nothing has equalled the 'Ether Searcher.'"—W.E.M. (London).

"Purity of reception is most marked, and there is no lack of volume in the 'Ether Searcher,' even when compared with a set containing two really good transformers. I congratulate you on understating, rather than exaggerating, the getting qualities of the set."—W. R. (Harrogate).

"The designer's claims for its capabilities are fully justified. It is an excellent circuit."—C. L. (Bradford).

"I built the set immediately it was published, and have, so far, received over 30 stations. Your claims are more than justified."—W. P. (Lanes.)

"For the last fortnight I have been receiving WGY, WBZ, and KDKA medium-wave American stations at excellent strength on the 'Ether Searcher.' Congratulations for a good set."—L. (Pleestwood).

GOOD AS THE ORIGINAL "ETHER SEARCHER". UNDOUBTEDLY WAS, AS PROVED BY THE ABOVE EXTRACTS, THE "1930 ETHER SEARCHER" IS EVEN BETTER. THE NEW SET IS THE COMBINED EFFORT OF J. SIEGER AND ALAN S. HUNTER, WHO CLAIM TO HAVE PRODUCED "THE SET OF THE YEAR." TELL YOUR FRIENDS TO LOOK OUT FOR NEXT WEEK'S PRELIMINARY DETAILS. REMEMBER THE NAME—

•THE 1930 ETHER SEARCHER•

Does B.P.



Overload Your Detector?

Many complaints of distortion when receiving Brookmans Park are entirely due to overloading of the detector valve. This article by J. H. REYNER, tells you how best to deal with the trouble.

THE evils associated with the Brookmans Park transmissions are not confined to the difficulty in obtaining satisfactory selectivity. There are still a large number of people who are not interested in obtaining foreign programmes and whose pleasure, or the reverse, lies in listening to the local station. True, they are desirous of obtaining 5GB free from interference, but, except for those who live very close to Brookmans Park, this is not too difficult.

Let us assume, therefore, that we are interested simply in the reception of Brookmans Park. This appears, on the face of it, to be an easy matter, yet I expect many people noticed that in the change-over period when Brookmans Park took over at about 10.30 p.m. the quality became execrable immediately the change was made, although beforehand the reception was perfectly satisfactory. Very often the quality became so bad that no amount of readjustment or fiddling with the circuit appeared to make any difference, and one had the impression that the new station was giving a very poor service.

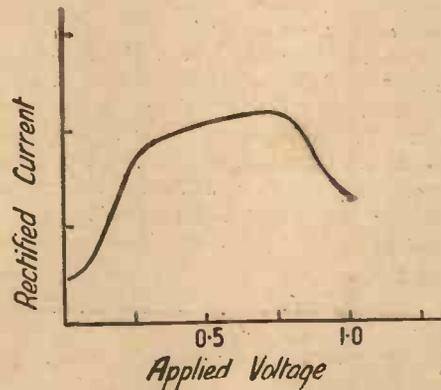
Excessive Signal Strength

This is particularly the case with people who were utilising receivers having H.F. stages preceding the detector. At the time of the change-over I myself was employing a powerful A.C. set having a stage of screen-grid amplification operating on a frame aerial. When the change-over began I could not get satisfactory quality even with the frame in its minimum position and with the volume control fully in. There must be many readers who have experienced the same trouble.

What is the reason for this? Is there something funny in the set or does the new station require a special method of tuning, or what? The answer is simply that the detector valve is quite incapable of handling the volume. We pay particular attention to the question of overloading in low-frequency and power valves. The more experimentally-minded will work out their grid swings and will ensure that these are

always less than the value of grid bias applied to the valves, so that there is no danger of overloading under average conditions. Yet the detector does not come in for its full share of consideration, although it is just as vulnerable a part of one's receiver as the low-frequency stages in this matter of overloading.

The majority of people utilise grid rectification, for it is now largely recognised that anode-bend rectification requires



Curve of rectified current in terms of actual voltage applied to grid circuit.

to be utilised in an expert manner in order to give as good quality as grid rectification, provided suitable precautions are taken. This, however, is outside the scope of the present article, wherein I propose merely to consider the flexibility of the standard grid detector to overloading.

If modulated high-frequency voltages are applied to the grid of a cumulative detector (the customary arrangement with a blocking condenser in the grid lead and a leak either across the condenser or to L.T.), then it is possible to plot the rectified current in terms of the actual voltage applied to the grid circuit. A curve of the nature shown in the figure is obtained. It will be seen that the efficiency of the rectifier is high to start off with and that for small voltages the rectified current is fairly proportional to the input. Quite early, however, at about one-quarter of a

volt the curve undergoes a sharp bend and further increases in the applied voltage cause only relatively small increases in the rectified current. In other words, we have completely lost the proportionality and distortion will occur.

If we continue to apply increasing voltages we reach the second bend on the curve where the rectified current actually decreases instead of increasing. This is because the valve is beginning to act as an anode-bend rectifier and the two effects are upsetting one another.

The curve, therefore, shows that it is very easy indeed to overload the detector and that the voltage must not exceed that corresponding to the first bend (A in the figure) if satisfactory quality is to be obtained. This will be seen to occur round about a quarter of a volt, and a little calculation shows that this value can quite easily be exceeded.

Remedies for Broadcasting

The signal strength from 2LO at a distance of ten miles is of the order of 30 millivolts per metre. (This is an arbitrary figure based on the published data, and is not the result of direct measurement.) The average aerial is something between 3 and 4 metres in effective height, so that we have something like .1 of a volt induced in the aerial. This, however, is not the voltage applied to the grid and filament, for we have on top of this the magnification of the circuit. Assuming we are using poor coils, this magnification factor can easily reach a figure of 50, which means that we have about 5 volts applied across the grid and filament. Is it any wonder that the unfortunate detector overloads under such conditions?

What are our remedies for such a state of affairs? The first remedy is to increase the capacity of the detector, which is done by increasing the voltage applied to the anode, reducing the value of the grid leak and using a valve having a much lower A.C. resistance. In fact, an L.F. or power

(Continued on next page)

For the Newcomer to Wireless PENTODE ECONOMY

I HAVE recently fitted a pentode note-magnifying valve and, though I like it very much, I am uneasy about the amount of H.T. current that it needs.

Why uneasy?

Well, because not having electric light in the house, I have to work from dry batteries and, as you know, it isn't exactly economical to put even the largest of these under a very heavy load.

What is the total H.T. current of your pentode?

For priming grid and plate together it is 18 milliamperes.

And the H.T. voltage?

One hundred and fifty for both.

Let's have a look at my set. As you see, there is a pentode in the last holder and here's a milliammeter in the common H.T. negative lead. Switch on, but remove the H.F. and rectifying valves from the holders. What's the H.T. current now?

The milliammeter shows only 10 milliamperes.

That's what the valve usually takes.—

But it's of the same pattern as mine and you have got 150 volts H.T.

Yes, but I don't apply it to both plate and priming grid. You will find, if you look, that there is a separate tapping for priming grid at a much lower voltage. If you experiment with yours you will find that you can save an enormous amount of H.T. in this way.

I see, too, that you are using much more grid bias than I am.

That also is the result of experiment. You will find that if you tune in the local station to the volume that you require for an ordinary room you can considerably increase the recommended 9 volts grid bias without introducing any kind of overloading or distortion.

I will try both tips.

Unless you want enormous volume

from the pentode you can use quite a big grid bias. Has it ever struck you that instead of being an extravagant valve, the pentode is economical in H.T.?

How do you mean?

To obtain the same volume with equal purity from triodes, we should have to use two note-magnifying stages with a very low-impedance valve in the output holder. These would consume between them, very much more than the 10 milliamperes that now suffice. And there is a small saving of filament current, too, for one pentode takes less than two triodes.

What about the filament voltage?

If you look inside the set, you will see that I use a semi-fixed resistor with the pentode and that there is a certain amount of resistance in circuit. This is a four-volt model, but the filament voltage is actually about 3.8. Use the lowest voltage that will give perfect results.

"DOES B.P. OVERLOAD YOUR DETECTOR?" (Continued from preceding page)

valve should be used as a detector with at least 100 volts H.T., under which condition it is capable of handling a swing of the order of 1 to 2 volts.

The other remedy, which should be applied at the same time, is the reduction of the input. This may be done by means of wavetraps or coupled circuits, or by reducing the efficiency of any H.F. amplifier placed in front of the detector (although this latter is not an easy proposition with

such a large applied voltage) or, fourthly and most simply, by reducing the aerial itself.

It is not generally appreciated how greatly the selectivity of a receiver can be improved by cutting away part of the aerial. A length of 15 ft. of vertical wire is sufficient to receive all that is required with a good modern receiver, and it will be found that Brookmans Park or any other local signal causes much less inter-

ference and much less overloading of the various components in the set if this is done. A 15-ft. length of wire would have an effective height of about 2 metres, which immediately halves the input. If, in addition to this, we have some form of loose coupling or device of this nature, we can easily reduce the strength of the local station to something less than a volt and well within the handling capacity of a suitably augmented detector.

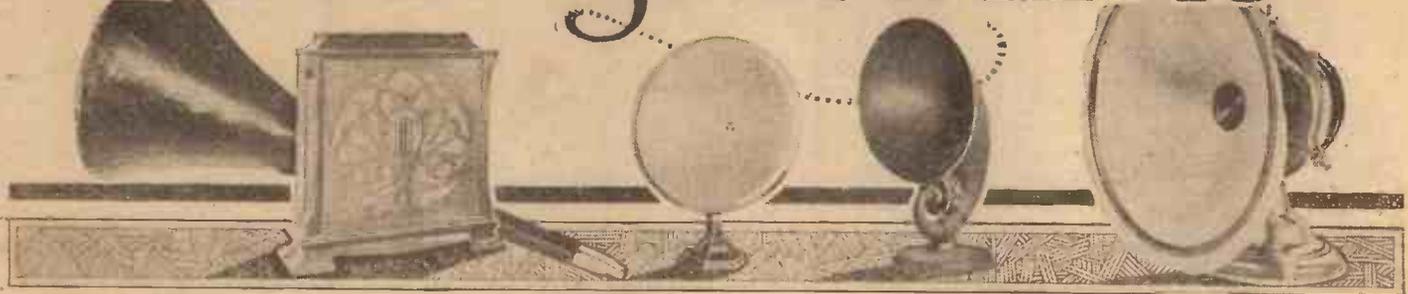
MR. FLEX WILL GET THOSE STATIONS—



—AND MRS. FLEX WILL HAVE HER LITTLE JOKE.



MORE EXPERIMENTS WITH LOUD-SPEAKERS



"Thermion" Talks about Output Arrangements

MOVING-ARMATURE loud-speaker driving units range in price from 12s. 6d. to £1 16s. The constructor who pays only a small price for a unit may feel, so long as it is made by a well-known firm, that he is obtaining extraordinarily good value for his money. Properly used it will enable him to obtain reproduction of wonderfully good quality and to turn out a loud-speaker of which he may feel proud for very little more than a sovereign, including the cost of the unit, the cone chassis and the baffleboard.

By paying somewhat more he can acquire a unit which will handle a rather greater volume of sound without any signs of overloading and which, as is only natural, is likely to show a rather better response curve.

Loud-speaker Characteristics

Now it is, though possibly the reader may not realize it, extraordinarily difficult to tell anyone that a particular loud-speaker will exactly suit his needs. Many people, for example, are strongly attracted by what they term "mellowness of tone" which actually means very often that the upper audio frequencies are suppressed and that rather more is heard of the medium-lower audio frequencies than ought strictly to be the case. Others like a rather high-pitched instrument, since this brings out the full brilliance of the treble and gives speech a crisp and, if I may put it so, a sharp-edged effect.

Others again suffer from a bass complex, caring little about the upper or middle frequencies so long as they can hear "the resin flying off the strings" of the double bass!

With loud-speakers one man's meat is certainly another's poison.

On numerous occasions friends have recommended to me what they considered was the very finest thing in loud-speakers. Before trying them out I have always asked for particulars of the circuit used and have made it up. Very seldom does it happen that I am in complete agreement with their recommendations. Possibly they are all wrong; probably I am. At any rate the

fact remains that just as the B.B.C. cannot please a hundred per cent. of its listeners, so no loud-speaker, however good it may be, can arouse enthusiasm in every one of those who hear it in operation.

Luckily loud-speakers are to a great extent tunable, using the word tunable in a very wide sense—for no one who was not qualifying for a lunatic asylum would endeavour to introduce sharp tuning into his output circuit.

The drawing will serve to show that loud-speakers are to some degree tunable. Notice first of all the coupling circuit between the detector valve and the output valve. It will be seen that it is a combination of resistance capacity and transformer coupling. This particular circuit I have used for nearly two years now on the low-frequency side of my own sets, for it has enormous advantages. It enables the purity of resistance coupling to be combined with the step-up effect of transformer coupling. Since the primary is under no load its inductance keeps up to the maximum figure, enabling if need be a transformer of fairly high step-up ratio to be used. There is no risk of burning out the primary and both primary and secondary are earthed. This circuit actually enables nearly any first-rate transformer to give an almost level response curve at all audio frequencies.

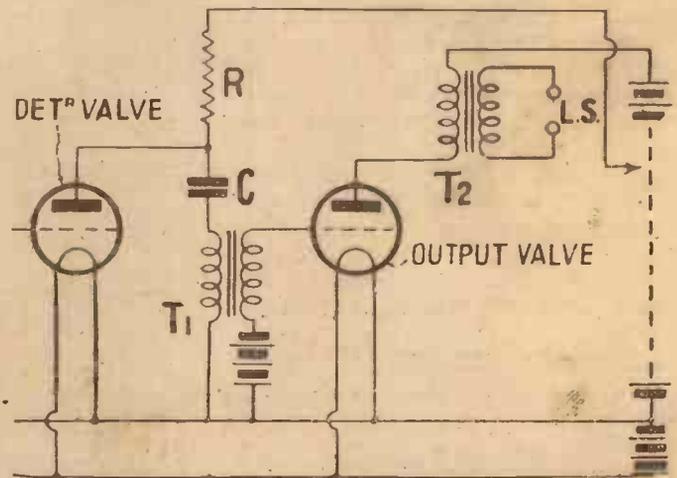
A second transformer, T₂, is used in the output circuit of the last valve; this enables the impedance of the valve to be matched with that of the loud-speaker.

In this particular circuit, assuming that T₂ has a tapped secondary, and that T₁ is "fixed," we can make variations at three different points. We can increase or decrease the resistance of R; we can increase

or decrease the capacity of C and we can increase or decrease the step-down ratio of T₂. Each and every one of these things will have a big effect upon the pitch.

The higher the value of R, the nearer will the magnification from the detector valve approach to the maker's magnification figure; at the same time the worse will be the response to the upper audio frequencies. If we make C a condenser of the order of .5 microfarad T₁'s response to the lower audio-frequencies will be excellent, but if we reduce the capacity to, say, .05-microfarad there will be a distinct cut off of bass notes. Again, by taking in a very small portion of the secondary of T₂ we can emphasise the bass; or we can raise the pitch by using a greater portion or the whole of its turns.

Though T₁ is not tapped, its nature



A circuit recommended by "Thermion"

will have a considerable effect upon reproduction. Some modern low-frequency transformers, for example, show actually a rising characteristic below 100 cycles, which means that they give an increasingly great response to bass notes. It will be seen, then, that we can produce mellowness by increasing the resistance of R and the capacity of C. We can come nearer to fidelity by keeping R reasonably low and

(Continued in third column of next page)

My Wireless Den



Weekly Tips—Constructional and Theoretical—by W. JAMES

A Transformer Point

A MATTER to watch when testing a transformer for supplying the high tension and filament circuits of a set is that the full load is being taken.

It is of no use, for instance, measuring the voltage across the filament winding unless the other windings of the transformer are supplying their full output. There is always a tendency for voltages to fall off as the load increases.

Therefore, although a filament winding may provide its full voltage under load when the other circuits are disconnected, it is possible the voltage will fall by a serious amount when all circuits are working.

Detuning and Quality

Does detuning to reduce the volume introduce distortion? is a question often asked.

Many of us do detune a little when using a set without a volume control, and a little distortion is introduced by so doing. This is only true, though, when the tuning is broad. If the tuning is at all sharp, then detuning will usually distort.

Strange as it may seem, detuning will sometimes improve the tone. An example is a set that has a high-frequency stage which tunes very sharply.

When both tuning condensers are in tune the quality is not too good, because the higher notes are missing. This can be corrected by detuning on both dials; one should be moved up a little and the other down. The quality will then be better.

Get Your Grid Bias Right

Are you using a small 2-volt power valve? If so, are you certain its grid bias is correct?

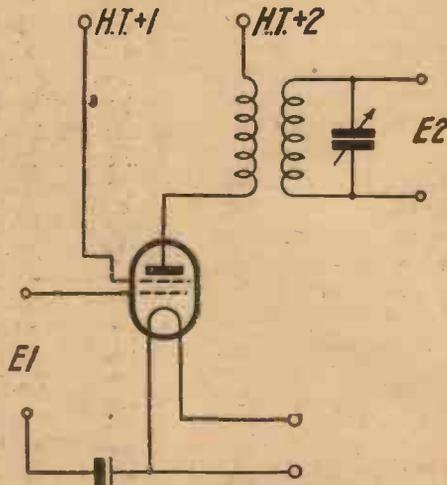
Many amateurs use a high tension of 120 and a grid bias of negative 9. This value of grid bias may be excessive. For one thing, the actual voltage of the anode is not 120. It is probably about 110, because of the loss in the loud-speaker. Then again, the small power valves of to-day have sometimes a greater magnification factor than last season's. As a consequence, the valve will not stand so large a grid bias.

Too much grid bias cuts down the anode current and therefore introduces distortion. Many a set would be improved by attention to this point.

H.F. Magnification

It used, at one time, to be considered rather difficult to estimate with any degree of accuracy the amount of the high-frequency magnification provided by a tuned stage as shown below.

The magnification is, of course, the ratio of the output voltage E_2 to the input E_1 , and it depends upon a number of factors. The chief are the electrical values of the valve and the resistance, capacity, and inductance of the high-frequency coupling. Let us assume for the present purpose that the valve has an impedance of 200,000 ohms and a magnification factor of 200. Also that the coil is of 200 microhenries, has a resistance of 5 ohms, and the tuning condenser a capacity of .00025 microfarad.



A simple tuned H.F. stage

Then the working resistance of the tuned circuit is 160,000 ohms. This value is arrived at by dividing the inductive value by the capacity and the resistance. Now the effective resistance in the primary circuit is less than this amount. Actually it approximates to one-quarter of the amount when the ratio is 1 to 2, to one-ninth when the ratio is 1 to 3, and so on. Let us assume the ratio to be 1 to 2. Then the effective resistance is 40,000 ohms.

It is now easy to find the voltage magnification of the valve and this primary circuit, as it obviously depends upon the ratio of this working resistance to the impedance of the valve. In this instance

the ratio is $\frac{40,000}{240,000}$ or one-sixth.

But the magnification factor of the valve is 200; therefore the actual magnification obtained is $\frac{200}{6}$, or 33, owing to the transformer effect. This quantity, however, must be multiplied by the ratio—in this case 2.

Thus the total magnification is 66, or the voltage set up at E_2 is 66 times that at E_1 . This is a usual value with a good transformer.

MORE EXPERIMENTS WITH LOUD-SPEAKERS

(Continued from page 813)

by using a first-rate transformer for Tr. We can alter the pitch of the loud-speaker according to the impedance of the secondary of T2.

Actually there are other variables in the circuit; we may, for example, use a low, medium, or high-impedance valve for detector and if we have a pentode in the output we can do all sorts of curious things by varying the grid bias. Raising the grid bias puts up the impedance of the valve and reduces its response to low-frequencies. Conversely, reducing the grid bias lowers the impedance and improves the response to low frequencies. When making alterations in the grid bias you must of course always be careful to see that the output valve is not overloaded. With a triode we can make changes in the loud-speaker tone by using output valves of different impedance. The reader, therefore, can to no small extent tune his loud-speaker to suit the requirements of his own ear. He should not condemn a driving unit until he has satisfied himself that his receiving set has given it every chance of pleasing him.

One of the greatest advantages of the moving-armature drive is that the volume of sound can be reduced without ruining quality. Used with a light cone and baffle-board it can give reproduction whose quality is hard to distinguish from that of the moving-coil speaker and to my mind it fills exactly the requirements of the average man whose rooms are not large enough to allow the moving-coil speaker to do itself justice.

THE VARLEY ANTI - MOBO

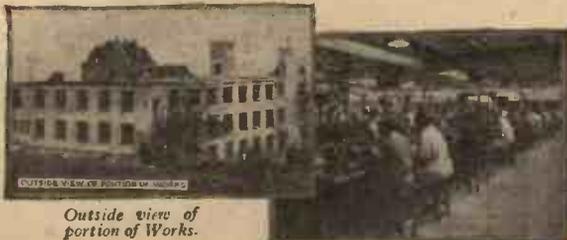


PRICE
9/6

PRICE
9/6

The Varley Anti-Mobo is one of the components specified in the Mullard "Orgola" Senior Receiver. This alone affords convincing proof of its quality, for only proved products are used in this efficient receiver. It has been selected for its effectiveness in eliminating "motor-boating." For this reason, too, it is indispensable in any set which tends towards this form of oscillation. Like all Varley products, its manufacture is the result of careful design and painstaking workmanship. It is finished in bakelite moulding, with terminals and soldering tags ready for connection.

Write for Sections B and C of the Varley Catalogue.



Outside view of portion of Works.

A corner of the Coil-Winding Shop, where over 300 girls are employed.

For
RADIO
MANUFACTURE
Varley

A BATTERY DRIVEN POWER PENTODE

for

ANY SET WITH ONE STAGE OF L.F.

Now that Lissen have produced this new battery-driven Power Pentode Valve, you can get fine loud-speaker volume from any set with one stage of L.F. amplification. In any 2-valve set this new Power Pentode gives double volume; in a 3-valve set—H.F. Detector and L.F.—it gives abundant power on distant stations that before were but a whisper.

The Lissen Power Pentode consumes only 7 milliamps of H.T. current. You can therefore run it economically off ordinary H.T. batteries—the only power pentode valve with anything like such a low consumption.

There is no rewiring of your set—just a piece of flex and a wander plug from the pentode terminal of the valve to the highest H.T. tapping on your set (or +100 volts, whichever is lower)—no alterations necessary at all, and no extra batteries.

LISSEN 2 VOLT POWER PENTODE 17/6

LISSEN

NEW PROCESS

VALVES

AND A LIVELY DETECTOR VALVE

The Lissen Detector Valve is lively because of the Extended Grid, which controls every electron emitted from the filament. Every fraction of energy is utilised, every impulse definitely passed on. And the liveliness LASTS because the emissive surface of the filament is actually amalgamated to it and therefore does not disintegrate.

H.L.210. Price 10/6

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX (Managing Director : T. N. COLE)

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

On Your Wavelength!

Radio Plays

I DON'T think there is any item of the broadcasting programmes over which opinion is more sharply divided than the radio play. My own "responsiveness" to the radio play seems to vary with the seasons. Just now, I seem to have the patience to concentrate on the B.B.C.'s dramatic offerings, and have been rewarded by the splendid performances of *Carnival* and *Journey's End*. The latter, now considered to be the classic play of the war, was first brought to the public attention by frequent recommendation of the B.B.C.'s Dramatic Critic. He advised listeners to see the play, in spite of its lack of the usual "box office" angles, and hoped that the courage of the producers in putting on such a play would be rewarded by at least a few weeks' successful run. Shortly afterwards the play was produced, and was hailed as a masterpiece by press and public, and has been running ever since.

"Journey's End"

I think it was on the night of the production of the play in London that a short excerpt was broadcast from the London station, this performance actually taking place in the studio. That excerpt was most impressive and dramatically effective over radio; rather more effective, I think, than the full play, which was broadcast on Armistice Day. In spite of minor alarms and excursions, the full script was broadcast, including several words which are usually not permitted by the B.B.C. censorship.

"Carnival"

Compton Mackenzie's *Carnival* is a very long radio play, occupying nearly two hours of transmission time. I enjoyed it immensely, though I was conscious of a certain amount of "dragging" in the middle. I wonder how many people were able or inclined to sit and concentrate on such a long play. It is, of course, impossible to listen to a radio play for long on a bad receiver or loud-speaker; the continuous listening to talk reproduced with distortion and resonances induces a peculiar kind of mental lassitude. Given a good receiver, I should say that the length of a radio play should not exceed one hour's transmission time. If the play is good, this leaves the listener "wanting more," a psychological state of affairs generally contrived by the best music-hall artistes. On a bad receiver twenty minutes is about the limit. But, unfortunately, twenty minutes does not give the playwright much time in which to develop his theme.

Voltage Without Volts!

I had rather a curious experience the other day with the grid battery which biases the output valve of my quality receiving set. As it had been installed for some time, I was giving it its periodical test with the voltmeter. The instrument first used was a meter of moderate resistance. When applied between the zero and $2\frac{1}{2}$ -volt negative sockets it showed a total apparent voltage of about $2\frac{1}{2}$. This was obviously wrong, since the battery was biasing the grid properly, as was shown by the milliammeter reading of the plate current passed. Further, any alteration in the socket in which the negative wander plug was inserted produced a corresponding change in the plate current. Yet the voltmeter was quite definite that the volts weren't there. Actually, of course, they were; but what had happened was that with increasing age the battery had developed such a resistance that it could not supply the 10 milliamperes necessary for a full-scale deflection of the instrument. When I tested out with a high-resistance meter a reasonable reading was obtained.

Still, the medium-resistance instrument really did me a very good turn, for it showed that the grid battery was on its last legs. One cell might easily have gone dead at any time, in which case the grid bias would have dropped very greatly and the high-tension battery would have had a nasty jolt. The past summer has been very hard upon grid and other dry batteries, and I strongly advise readers who have had theirs in use for more than four or five months to test them out and see in what sort of condition they are. A dead grid battery may mean a badly damaged high-tension battery.

Astatic Coils

A good deal of the swamping by high-powered stations at short range that occurs is certainly due to the evil effects of direct pick-up. It is very easy to see whether one's own set is guilty of this. Simply remove aerial and earth, and see whether you cannot bring in the transmission without them. Slight re-tuning will probably be required. In many cases where direct pick-up is much in evidence, a powerful station is received almost as well without aerial and earth as with them. Every coil that is not astatically wound acts as a small frame aerial, and there is also pick-up by battery and loud-speaker leads. Usually a big improvement can be made by fitting astatic coils, which are absurdly easy to construct. All that you need for the job is a chunk of ebonite or paxolin coil former and a supply of suitable wire. Wind on half

your turns clockwise and the other half anti-clockwise. The total number of turns on an astatic coil will generally have to be about 40 per cent. greater than on a plain. Thus, to replace an ordinary No. 60 coil, one needs 60 plus 24, equals 84 or 42 turns in each half.

Screening Simplified

For complete stability with modern high-efficiency circuits, and for the best possible selectivity, the receiving set should certainly be completely screened. Many people are deterred from building such apparatus owing to the rather high cost of copper or aluminium screening boxes. One friend of mine has got over the difficulty very neatly, and in a way which cuts the expense down to something very small. He simply built boxes for his set with plywood and then covered them with copper foil. The foil is tacked to the box, the edges and corners being soldered where necessary. Owing to its thinness, copper foil is quite easy to solder. It is obtainable from most big wireless shops or from metal merchants at about sixpence a square foot.

Hearing Your Own Voice

Until recently, comparatively few people had ever made a gramophone record because, unless you were a Melba or a Harry Lauder or somebody like that, they didn't exactly press you to rush down to the works and see what you could do. But now you can put a coin in a slot, enter a little cabinet, and make a record of your very own that runs for about one and a half minutes. It is most interesting to hear one's own voice when the record is played over, and I expect that to most of us it comes as rather a shock to hear how we really do sound when we are talking. I am hoping in the near future to entice several friends whom I do not love very dearly to make records. I shall collect these and ask them all round one evening, when I will play over the records on my radio gramophone. And if that fellow Poshkins, who borrowed one of my best transformers and returned it with a burnt-out primary, is amongst them I will give him the shock of his young life by eliminating all the low pitches when I play his record over.

An Interesting Hastings Ceremony

If only it could have been arranged, nothing would have been more fitting than to have televised the principal participants in a most interesting ceremony which took place on Thursday, November 7, at Hastings. On that day a tablet was unveiled in the Queen's Arcade, where Mr. Baird commenced his television experiments in a small laboratory. The apparatus

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On Your Wavelength! (continued)

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with which he started, was of the very crudest form and incorporated in its construction were such things as biscuit tins, soap boxes, sealing-wax and string, and the weird instrument finally evolved can now be seen in the Science Museum at South Kensington. True, it only projected vague shadows in those trying early days, but it established the principle of television and showed Baird clearly—what, indeed, he knew already—that he was working on the right lines.

Early Trials

One of the greatest difficulties with the television invention was to convince the public that there was really something in it. He is fond of telling the story of a visit he once paid to a large newspaper office in an endeavour to get them to take an interest in the work. He asked to see the editor, and after a while a gentleman came down looking extremely nervous and watching Baird closely. It transpires that the editor had received a message that there was a lunatic waiting to see him and was warned to look out and see if the person had any razors or other dangerous weapons about him!

However, it would appear that Mr. Baird has won the first round of his fight to prove his claims. In a charming speech at the ceremony, Mr. Baird expressed his thanks, and, in conclusion, after referring to the fact that television first came into being at Hastings, stated that it was here he received a gift of incalculable worth—the restoration of health and strength. The plaque bears the following inscription: "Television. First demonstrated by Mr. J. L. Baird from experiments started here in 1924."

An Aerial Eye

Perhaps readers will recall that some time ago I mentioned in these columns that C. F. Jenkins, of America, was engaged in the perfection of an "aerial eye." The eye, of course, is a television transmitter, and it appears that the aeroplane, complete with the apparatus, has now been finished and experiments will start as soon as the radio station, five miles north of Washington, is ready. This is a 5-kilowatt television station with two 128-ft. towers. The actual transmitter is housed in the fuselage with an opening cut in the floor to serve as a scanning aperture. The lens of the projector is directed downward through this hole, and with the aid of a 48-hole scanning disc it is hoped to focus the scene viewed from the aeroplane upon the disc and explore the resultant image in much the same manner as for daylight or flood-lighting television. The practical difficulties to be overcome must be enormous, but Jenkins is to be admired for his efforts in this direction, as, apart

from use in war, the applications of the scheme, should it ever be perfected, would be almost unlimited.

Armistice Day

Countless thousands who would like to be present at the Cenotaph on Armistice Day, but are prevented from doing so, must be profoundly grateful for the wonderful relays that we have of the annual ceremony there. This year's was, I thought, if possible, more impressive than those that we have previously had. Though there was some background noise, the wonderful music of the massed Guards' bands from 10.30 a.m. onwards came through to perfection. Then, as eleven o'clock approached, came the ringing orders, and no ex-service man could help being thrilled by the single sharp sound which occurred as each large body of troops carried them out. Big Ben begins to chime the fourth quarter, then the first boom stroke of the hour is heard. We can almost feel the Great Silence. We can take our part in it. The silver notes of the trumpets end it as they play that most haunting of Army calls, "The Last Post."

Then comes a great rolling volume of sound as the throng sings "God Our Help in Ages Past." And then the brief service, every word of which is utterly appropriate to the occasion.

Through the Empire

Britain's tribute to the Honoured Dead was heard and shared by Canada, for arrangements were made to transmit the relay over the land-line to the big transatlantic beam station and thence by wireless to the Dominion. I do not know whether 5SW was also in operation, but I hope so, for his voice will have brought a wonderful message to countless thousands in outlying parts of our Empire. It is good news that the B.B.C. will shortly have its own high-power short-wave station, with which it will be able to give the Empire a far better service than is possible from 5SW, which the Corporation merely hires. Occasions such as the ceremony of the Cenotaph and many others that occur in the course of a year demand Imperial relays, and it is only to be hoped that these will become the rule in future.

The News Problem

One of the complaints of those of our countrymen who live in far away corners of the earth is that they have no news service from 5SW. It is actually a definite rule that no transmission of the kind shall be made from the short-wave station which the B.B.C. is using at present, though an exception was made during the King's illness when the bulletins were broadcast. The reason appears to be that the news agencies in this country are opposed to any world-wide transmission of news. It seems to be rather a curious standpoint, and it certainly does not obtain in other countries. On any night, for example, one may receive the bulletins from Schenectady or other American short-wave stations. Since he cannot receive his news from the Home Country, the man who lives in the wilds must necessarily rely mainly upon American or Dutch stations for it. He does not get home news, and such world news as he receives must always be coloured by the national spirit of the country from which it comes. An Imperial news service from this country is an urgent necessity. The difficulties cannot be insuperable, or they would not have been overcome in other countries.

The Experts

Scene: Willesden Police Court.

Dramatis Personæ: The Beak, etc., etc., and a woman applicant.

Woman: "My neighbour complains about my aerial. She says that it is the wrong wavelength and upsets her washing, making it as black as soot. The wavelength seems all right for her bad language."

THERMION.

WIRELESS TIT-BITS**Earn Your Half-guinea!**

EVERYBODY has a wireless Tit-bit of some kind or other. Everybody knows at least one interesting and possibly humorous incident or experience which would make good reading for his fellow readers. So we are inviting you to write down your wireless Tit-bit and send it to us. Don't make it long, but do your best to make it interesting and readable.

We shall publish as many of these Tit-bits as possible in the Christmas number of **AMATEUR WIRELESS**, and for every Tit-bit published we shall have pleasure in paying half a guinea.

Of course, your Tit-bit must be original; it must be your own and not copied from any publication.

Please write it on one side of the paper only and see that it reaches us not later than Monday, November 25; you can send it as much earlier as you like.

Now, please set to work. Remember that your Tit-bit, if published in our pages, will afford pleasure to your fellow readers of **AMATEUR WIRELESS**, and that, quite apart from the half a guinea, is worth achieving.

Address your envelope to:

"WIRELESS TIT-BIT,"

"Amateur Wireless,"

58-61 Fetter Lane,

London, E.C.4.

MORE ABOUT the B.B.C. 'OFFICIAL' ONE-VALVER

The Practical Receiver based upon the B.B.C. Officially-recommended Circuit



signal will be amplified to a less degree than the main signal, and the result of the L.F. addition may, therefore, be the total elimination of interference, so far as loud-speaker working is concerned.

The addition of the low-frequency valve is not difficult. Most people will prefer to make up the L.F. stage as a separate unit—or else the dimensions of the panel and baseboard of the existing set may be increased.

On no account attempt to squeeze the additional components on to the baseboard which is specified in the AMATEUR WIRELESS design of the "B.B.C. One-valver."

The accompanying circuit diagram shows

a suitable circuit for a low-frequency stage of amplification to add to the detector. In most cases a medium step-up transformer is to be advised, although one of the newer high-ratio transformers, such as the Ferranti, which has a step-up of 7 to 1, can be used with success.

Suitable Valves

The valve employed in the low-frequency stage is recommended to be of the small power type, having an impedance of 5,000 to 9,000 ohms. When the "B.B.C. One-valver" is being operated quite close to the Brookmans Park transmitter, however, and it is wished to get the greatest output from the receiver, a power valve capable of dealing with a larger grid swing can safely be used. A valve of this class generally has an impedance of 2,000 to 5,000 ohms, and should certainly not be supplied with less than 120 volts H.T.—preferably much more. The grid-bias value depends on the valve and the anode voltage. It may be only 1½ to 3 volts for an anode voltage of 80 to 100, or it may be 9 to 14½ volts with an "XP" type of power valve.

A point to note is that the filament terminals of the low-frequency valve holder should be connected to the L.T. terminals of the detector valve socket. In this way the one L.T. switch in the "B.B.C. One-valver" can control both valves.

It was explained last week that in the officially-recommended B.B.C. circuit for a one-valve set for Brookmans Park we have an arrangement which is most satisfactory for getting the best from a single detector valve, both in reproduction and in selectivity.

Both factors are equally important, for good reproduction alone is of no great use if the overall selectivity of the set is so poor that jamming is constantly experienced. Conversely, sharpness of tuning by itself is no useful property unless the range or output volume of the circuit demands selective tuning.

A point upon which many listeners, and particularly many crystal-set users, seem to have incorrect notions and opinions is the exact effect exercised on range and selectivity by the addition of an L.F. valve. The results are different for valve and crystal, and here we are concerned with the "B.B.C. One-valver."

Adding an L.F. Stage

The addition of one low-frequency stage to this one-valver will, naturally, enable it to operate a loud-speaker within quite a large service area of Brookmans Park. But the real question is: Will adding a valve impair or improve the existing degree of selectivity? The answer must depend on the conditions. In cases where interference is very bad, the addition of an L.F. valve will not improve matters; indeed, it may make the jamming more noticeable, for the interfering station will be amplified in the same proportion as the station it is desired to receive.

Just the reverse is the case when the interference is slight. The much weaker

COMPONENTS for the B.B.C. ONE-VALVER

Ebonite panel, 12 in. by 8 in., and strip, 9 in. by 2 in. (Becol, Raymond).

Two .0005-microfarad variable condensers (Lissen, Igranic, Polar, Burton, Ormond, Burndept).

Three-way coil holder, with long handles (Lotus, Lissen).

Plug-in coils for medium and long waves (Tunewell).

Anti-microphonic valve holder (Igranic, Benjamin, Lotus, W.B.).

.0001-microfarad fixed condenser, with series clips (Dubilier, Lissen, T.C.C., Watmel).

.0003-microfarad fixed condenser

(Dubilier, Lissen, T.C.C., Watmel).

3-megohm grid leak (Dubilier, Lissen, Ediswan, Graham-Farish).

Push-pull filament switch (Bulgin, Lissen).

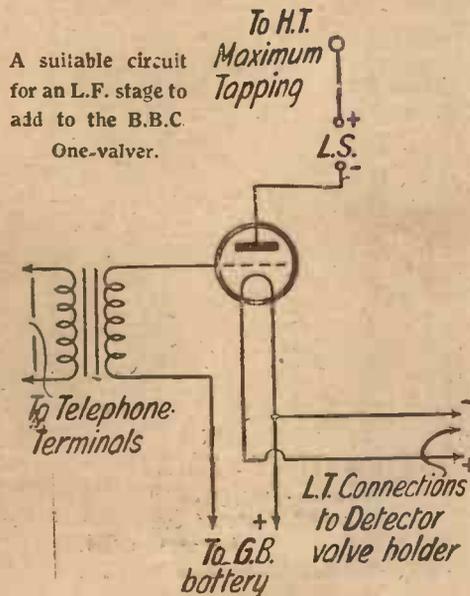
Panel brackets (Bulgin, Raymond).

Eight terminals marked: Aerial, Earth, L.T.+, L.T.-, H.T.+, H.T.-, Phones+, Phones- (Burton, Belling & Lee, Eastick).

Connecting wire (Glazite).

Baseboard, 12 in. by 9 in. (Pickett).

1 yard of thin flex (Lewcoflex).



A suitable circuit for an L.F. stage to add to the B.B.C. One-valver.

HOME-MADE "INTERFERENCE"

THE increasing use of vacuum cleaners, "home sunlight" or ultra-violet ray installations, electric refrigerators, and similar devices operated from the electric mains raises the question as to whether the manufacturers of these articles could not do something definite to minimise the worries of the poor broadcast listener.

Such appliances are certainly responsible for quite a large proportion of so-called "man-made" interference. Some of the more enterprising makers might try the effect of the slogan "Guaranteed not to interfere with broadcast reception." This should certainly increase sales, and would cost no more than the price of a simple filter circuit inserted between the offending apparatus and the supply mains.

M. A. L.

HOMODYNE RECEPTION

IT is some time since any change was made in the general character of the circuits employed for everyday reception. We either use a straightforward detector followed by suitable low-frequency stages, usually two in number, or we may utilise a high-frequency stage which is nowadays nearly always of the screen-grid variety, in which case only one L.F. stage is usual. Our developments seem to be in the gradual improvement of circuits which otherwise remain of a conventional character.

Brookmans Park has rather tended to upset the placidity of mind of many people. Despite the fact that any form of unusual circuit is unpopular, it nevertheless is becoming evident that anyone within 15 miles of a regional transmitter must of necessity use special precautions in order to obtain anything like satisfactory selectivity. Consequently, many readers will be ready to try new and comparatively simple methods, particularly if they can be adapted fairly easily to existing sets.

How the Method was Devised

The method described herewith was devised as a result of some observations made during certain laboratory tests. One of the methods used in the laboratories to determine the identity of a station is to measure its wavelength accurately. Coupled with the nationality of the station this gives a fairly good clue to his identity. The method employed for measuring the wavelength is to use a calibrated wavemeter which is situated some distance away from the set in the first instance and is allowed to heterodyne the particular station. It produces in the receiver exactly the same noise as would be produced by a neighbour oscillating.

Actually, the frequency of the standard wavemeter is adjusted until it coincides exactly with that of the distant station of which the wavelength is being measured. This is detected by the fact that the beat note is reduced to zero. As the frequency is varied the heterodyne note gradually falls in pitch, passes through zero and then begins to rise again on the other side. The absolute zero point is determined as carefully as possible and at this point the frequency of the wavemeter coincides exactly with the frequency of the distant station. This is therefore a measure of the frequency or wavelength of the station we require. All this is by the way and simply to indicate how the particular methods about to be described grew up.

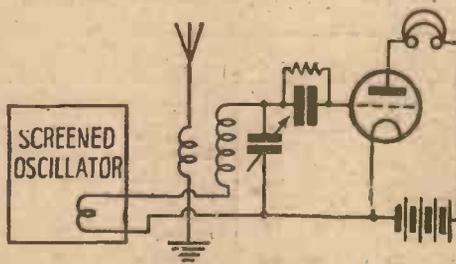
It was noted that any given distant

A Suggested New Method of Obtaining Selectivity

Here is an idea which may assist seekers after selectivity. You have probably noticed how much easier distant stations are received if the set is allowed to oscillate; this, however is usually not allowable because of the interference caused to one's neighbours. Mr. Reyner suggests a possible solution to the difficulty in the accompanying article.

station, even if it were close to a powerful near-by transmitter, could be tuned in with much greater ease when it was heterodyned in this manner. The reason for this is a well-known property of heterodyne detection. Captain Round showed, many years ago that when receiving telephony signals, if the carrier wave of a distant station could be made stronger than that of the local station, then the distant station took control and wiped out the interference from the local station. This statement perhaps requires a little amplifying, for it may not be quite clear how this may be accomplished.

Suppose we tune our receiver away from



Circuit illustrating Homodyne reception

the local station, then although the actual field strength from the local station has not varied, the signal which we receive gradually falls off in strength. At a certain frequency we begin to tune in to a distant station and as we come into tune with this

reduce to the greatest possible extent. How far we are able to do this depends upon the selectivity of the tuning circuit, but if we can make the carrier strength of the distant station greater than the residual strength still received from the local station, then we shall lift the signal clear of the interference and be able to receive it without difficulty.

Heterodynes

It is for this reason that a skilful operator can tune in more stations than a novice, owing to the fact that by careful manipulation he is able to work up the carrier of the distant station, perhaps by the use of reaction, coupled with very fine tuning, until it wipes out the interference in this manner. The use of a heterodyne on the station clearly produces a similar result in a much easier manner for the heterodyning signal mixes with the distant station and lifts it clear of the interference without much difficulty.

Unfortunately, the heterodyne itself introduces further interference, for we cannot sit and listen to a station which has a continual whistle on it. But during some of these tests which were made, it was found that with some stations, if the heterodyning signal was adjusted very carefully to be exactly on the frequency, then the reception immediately ceased to be distorted and could be received quite clearly without any trace of interference. The complete wipe-out of the interfering signal is indeed a most remarkable feature and has to be tried to be believed. It was therefore clear that if some method of this nature could be worked out in a practical form, a useful receiver would result.

The Practical System

Self-heterodyning, i.e. by allowing the receiver to oscillate is, of course, impracticable because it would cause too much interference with the neighbours, and what is more it would not produce the required results, for the strength of the heterodyne is not capable of independent adjustment. Some preliminary tests which have been made indicate that this is most desirable, and the arrangement which seems to have the greatest promise is an entirely separate and completely screened oscillating circuit. Coupled to this should be a small pick-up
(Continued in third column of page 826)

HAVE YOU NOTICED

— the various "tricks of the trade" that are often employed to attract customers? One is to print on the containers of unknown and unnamed radio parts a higher price than either the component's real value or the price at which it will eventually be sold. I recently bought a small .0001 mfd. reaction condenser for 2/6, although the price indicated on the box was 3/6. Whilst the condenser was good value for 2/6, there is no doubt that many were only sold because the buyer imagined he was getting a bargain. Such is the power of suggestion.

The SECRET PROCESS

that puts power into your set!



DIRECT FROM FACTORY TO DEALERS SHOPS
every Lissen Battery is fresh when you get it!

PRICES.

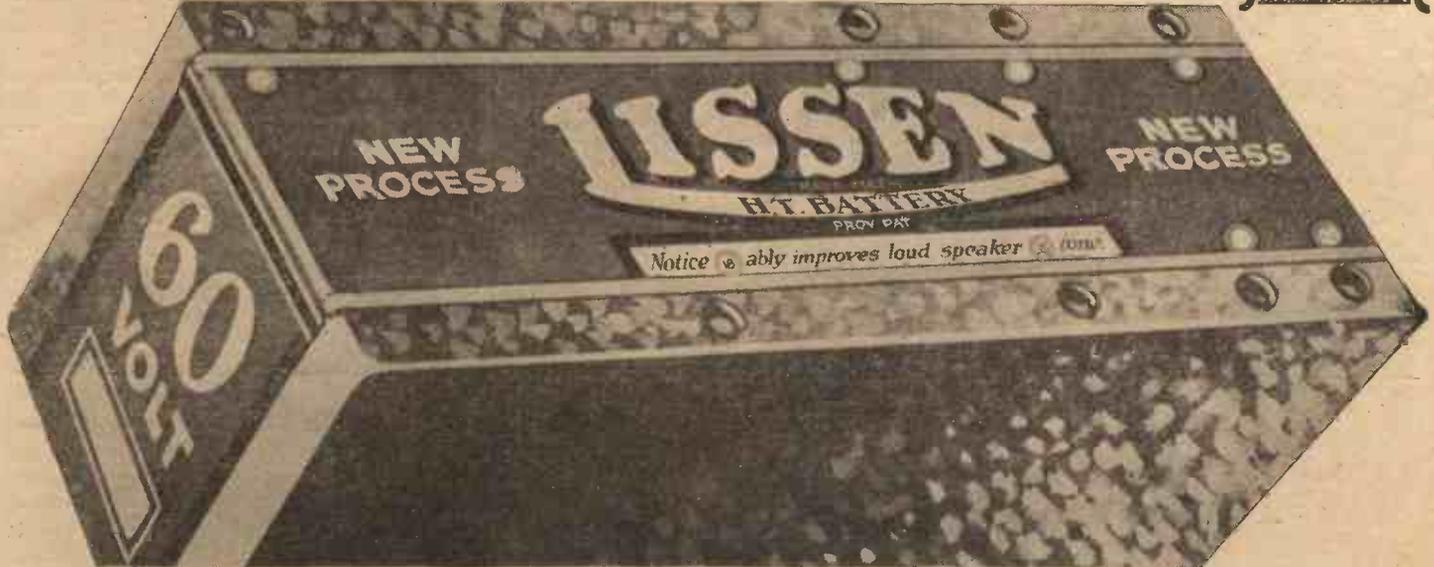
60 volt (reads 65)	7/11
100 volt (reads 105)	12/11
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60 volt (super power)	13/6
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4½ volt Pocket Battery	5d. each ; 4/6 doz.
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There is a secret process and a new chemical combination used only in the Lissen Battery which puts new power into your radio set. It gives to your reproduction of dance music a new liveliness, makes speech distinct, song clear and true.

The current of a Lissen Battery flows smoothly, steadily, sustainedly throughout the longest programme. The large cells have a great oxygen content which gives the battery long life and produces all the time pure power, with never a trace of ripple in it, never a sign of hum.

You want pure power for your radio; any good wireless dealer will supply you with the Lissen Battery that will give it to you.

USE LISSEN VALVES WITH LISSEN BATTERIES



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Each blueprint shows the position of every component and every wire, and makes construction a simple matter. Copies of "Amateur Wireless" and of "Wireless Magazine" containing descriptions of any of these prints can be obtained at 4d. and 1s. 3d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine" sets.

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B.P.C. Brookman's Park Set AW206

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Super Reinartz One AW127
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 Rover 2 (HF, D) AW33
 DX Headphone Two (HF, D) AW134
 Ace of Twos (D, Pentode) AW143
 Home Two (D, Trans) AW146
 Globe DX Two (SG, D) AW157
 East to West Short-wave Two (D, Trans) AW159
 Auto Two (D, Trans) AW174
 All Mains Two (D, Trans) AW180
 Loud-speaker America Two (D, Pentode) AW190
 Talisman Two (D, Trans) AW194
 Hyper-selective Two (D, Pentode) AW198
 Q-coil 2 (D, Trans) WM162
 Crusader (D, Trans) WM169
 Flat-dweller's 2 (HF, D) WM176
 Tetrae Short-wave Two (SG, D) WM180
 Key-to-the-Ether Two (D, Pentode) WM107
 Meteor Two (D, Trans) WM114
 Clipper Two (D, Trans) WM135
 Twinflex (Reflex) WM139
 Continental Two (D, Trans) WM143
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Hartley DX (D, RC, Trans) AW63
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 British Station Three (HF, D, Trans) AW122
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 Talisman Two-three (D, RC, Trans) AW203A
 Wide World Short-wave Three (HF, D, Trans) AW207
 Everybody's Three (SG, Tr. ns) AW209
 Five-guinea 3 (HF, D, Trans) WM29
 Britannia (D, RC, Trans) WM67
 Pole-to-Pole Short-waver (D, RC, Trans) WM89
 Aladdin Three (HF, D, LF) WM95
 All-wave Screened-grid Three (HF, D, Pentode) WM110
 Gramophone Three (D, 2RC) WM115
 Standard Coil Three (HF, D, Trans) WM117
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 Lodestone Three (HF, D, Trans) WM129
 Simple Screen Three (HF, D, Trans) WM131
 Dynamic Three (A.C.—SG, D, Trans) WM136
 At Home Three (D, 2RC) WM141
 Short Wave Link (D, RC, Trans) WM142
 Binowave S.G. Three (SG, D, Trans) WM152
 Fanfare (D, Trans) WM157
 Brookman's Three (SG, D, Trans) WM161
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All these 1s. 6d. each, post free.

Explorer Four (HF, D, RC, Trans) AW120
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 Stability Four (HF, D, RC, Trans) AW182
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 HT) WM80a 1/6
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 "A.W." Gramophone Amplifier (3RC) AW162
 Searcher Unit (HF) AW176
 "A.W." Gramophone Amplifier AW205
 Signal Booster (HF Unit) WM128
 Audural Amplifier WM132
 Concentrator (HF, Unit) WM169

MISCELLANEOUS

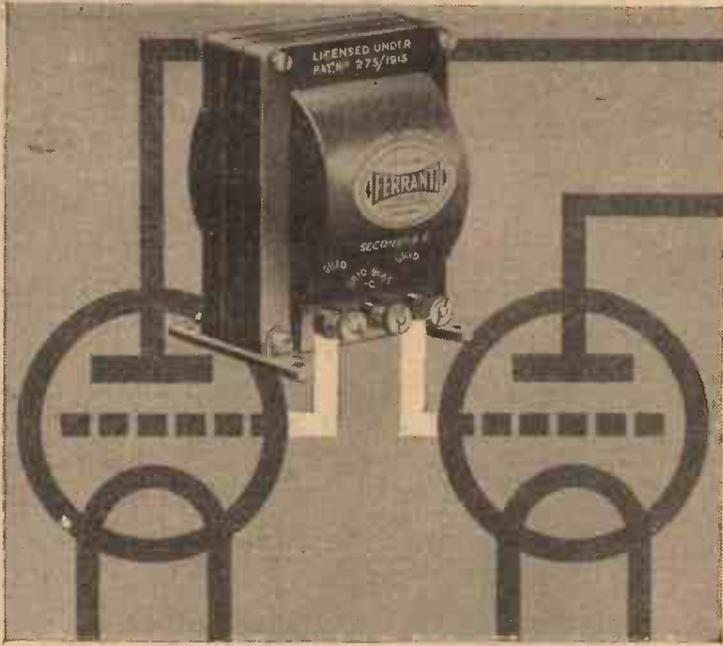
H.T. from A.C. Mains AW73 1/-
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PUSH - PULL AMPLIFICATION

Push-Pull amplification, with moderate H.T. Voltages, enables you to handle considerable volume in the output stage without distortion.

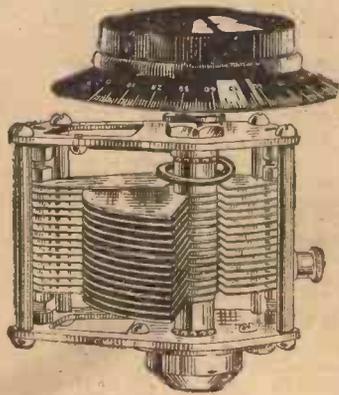
In this system the output of the receiver is divided between two valves, or a multiple of two. The product is combined by means of a Push-Pull output transformer and fed to the speaker. A greatly enhanced grid swing is thus permissible and a correspondingly louder signal can be handled without the harshness or "chatter" due to overloaded valves.

A descriptive leaflet, Wb 412, gives full particulars, Transformer details and circuit. It should be in the hands of everyone interested in the combination of ample volume and quality reproduction. Ask your dealer or write direct.

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FERRANTI LTD. HOLLINWOOD LANCASHIRE

FAST & SLOW MOTION CONTROL for Tuning and Reaction



POLAR "IDEAL"

.0005	.....	12/6
.00035	.....	12/3
.0003	.....	12/-

Supplied fitted with Drum Control. Escutcheon and 2 fixing screws for 2/6 extra.

You will find a wonderful difference in the way you can pull in stations which are separated by only a metre or two, when you employ "Polar" Fast and Slow Motion Condensers.

Polar Condensers make just that difference in selectivity that adds a few more stations to your list of those "worth hearing"; and they also improve the quality of reception by giving you "dead on" tuning.

FOR TUNING

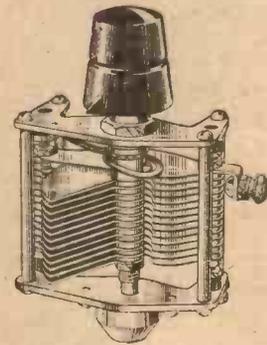
Place the Polar "IDEAL" behind your panel

FOR REACTION

Place the Polar "Q.J." behind your panel

Obtainable from all Dealers.

New Polar Catalogue Free on request.



POLAR "Q.J."

.00025	.....	10/6
.00015	.....	10/3
.0001	.....	10/-

Supplied with Knob and Dial to match the "Ideal," if desired. No extra cost.

WINGROVE & ROGERS LTD.
188-189, STRAND, LONDON, W.C.2

THE NEW BA2-21½

AN
AMPLION
PRODUCT



NEW VOLUME AND CLARITY

The Amplion BA2 Unit has volume-handling capacity coupled with a degree of sensitivity far beyond normal.

With adapter plate to fit different types of chassis and adjustable values of impedance for use with power valve or pentode.

The BA2 means new power and mellow purity of reproduction. Ask your dealer for a demonstration.

THE AMPLION

BA2

BALANCED
ARMATURE
SPEAKER UNIT

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Don't Forget to Say That You Saw it in "A.W."



Building & Testing the Lotus Kit Set

By the "A.W." Set-testing Dept.

FOLLOWING our recent review of that species of set known as a constructor's kit, we are now able to deal with yet another highly efficient set of this type. We refer to the Lotus S.G.P.3 kit set. This has been assembled in our new laboratory and tested, just as any other set is tested, for ease of control, selectivity, sensitivity, and quality of reproduction. Because the set passed through all these tests so satisfactorily, we consider it worth

of the two separate sections of the condenser, resulting in what is, in effect, single-control tuning.

The base section, accommodates the Lotus dual-wave coils, which have a connecting rod between them to link up the wave-changing switches.

Confronted with the instructions, just as the reader would be, we adopted the plan of placing the wires supplied on the printed shapes of these wires, as given by

the instruction sheet. In this way we made sure beforehand that each of the wires supplied corresponded to the specification. The constructional work starts with the wiring of the coil panel, which is not an arduous

Notes we made at the time remind us that wires 8, 10, 12, and 15 are all shown as one of a particular shape on the instruction sheet. It might be thought that one wire joins all these points of contact, but later it becomes evident that this is not so. Actually, four wires are required the same shape as the one pictured. In sheet 2 of the instructions there is a tendency to overlook the fact that both plan and elevation views of the wiring are given. These are vitally necessary, since the wiring is not confined to one plane.

Wiring

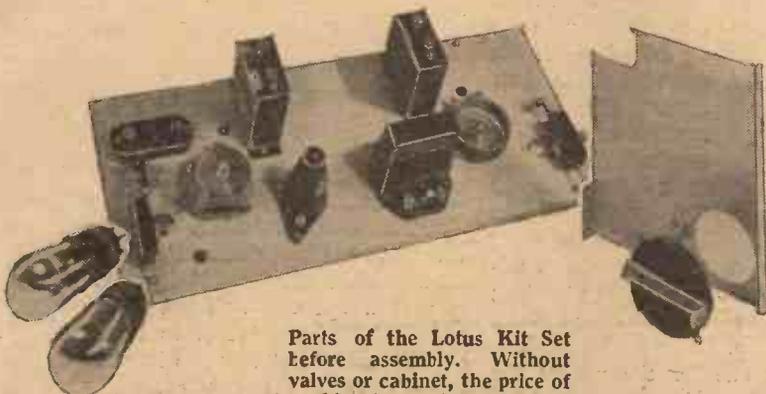
If the instruction sheet is carefully perused, the information relating to wiring is quite adequate. At each stage in the wiring of the components some of the battery cords must also be connected up. There is a possibility that, as this is not emphasised, the constructor may decide to leave the battery-cord wiring till the end; if he does so he will find it very difficult to get at the points of contact, because the fitting together of the sections must be subsequent to the wiring of the parts associated with them.

There is a useful differentiation made between the high-tension and grid-bias wander plugs. They are quite distinct in shape.

Our usual routine tests, as applied to the Lotus kit set in its completed form, included the following measurements: The wavelength range on the medium band was found to be 220 to 540 metres and on the long wavelength band 781 to 1,820 metres. The total filament consumption was found to be .6 amp.

task if the instructions are rigidly followed. As the fourth wire joins the tuning coil with the tuning condenser, it is necessary, when this stage is reached, to fix the panel to the base. To do this, four counter-sunk screws are used so that the pearl veneer is not defaced. Wire seven is reached in no time. The simplicity of the scheme is more evident as the wiring progresses.

We advise constructors, as always, to read right through the instructions before starting—especially the wiring



Parts of the Lotus Kit Set before assembly. Without valves or cabinet, the price of this Kit is only £7/12/6

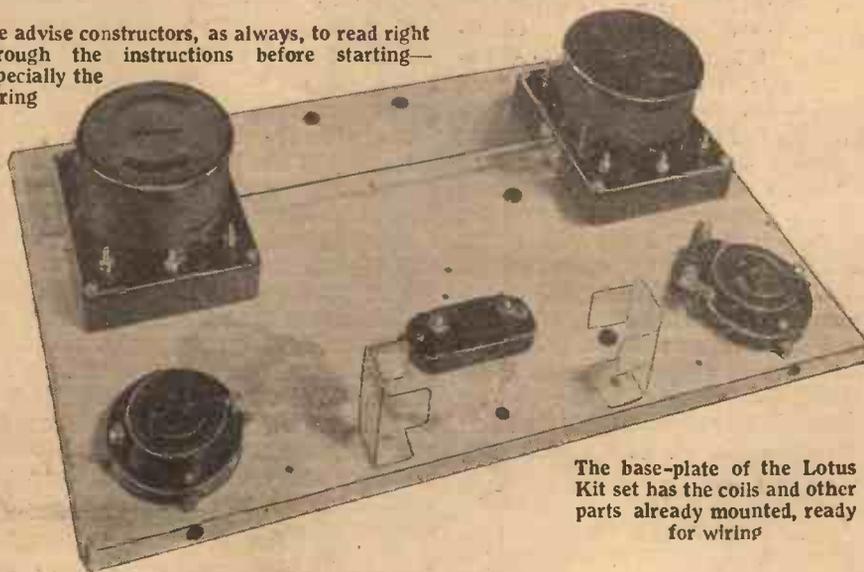
while to give readers a detailed account of our experiences.

As first received, the constituent parts of the Lotus kit set were contained in a well-packed carton; the general neatness of the packing created a good impression at the start. We were attracted by the solidity and the fine finish of the aluminium panels, which the unpacking revealed to us. There are three main sections: (a) the base with coils, (b) the front panel with gang condenser, and (c) the main screen with small components attached. In addition, there is a small centre screen.

Parts Ready Mounted

A unique thing about this kit is that no component parts have to be mounted. All the parts are ready fixed to one or other of the three sections just mentioned. The constructor's task is the connecting together of the parts by means of wires, already supplied cut to shape and looped at each end. Apart from wiring, the constructor's work has been so reduced that very few nuts and bolts are needed to fit the three sections together.

Another outstanding Lotus feature is the panel of pearl finish super-imposed upon the main metal panel. The twin-gang condenser fitted to this panel is a beautiful piece of work. It provides thumb control



The base-plate of the Lotus Kit set has the coils and other parts already mounted, ready for wiring

The total anode-current consumption was 20 milliamperes. The valves used for these last measurements were Marconi S215 screen-grid valve, Marconi HL210 detector valve, and Marconi PT240 pentode output valve. The grid bias for the pentode was 9 volts negative and the maximum

gave its expected high output. It overloaded when the local station was tuned in at maximum volume, but by making use of the volume control, the input to the pentode was reduced to a reasonable amount. The full variation of volume is only effective over the maximum 15 degrees of the total rotation of the volume control. As this control is actually a filament resistance in the screen-grid-valve circuit, the volume can be finely adjusted without distortion.

Good-quality Reproduction

Quality of reproduction is rather a variable factor and depends not only upon the individual's personal taste, but upon the loud-speaker used. No one in the laboratory took exception to the quality of the Lotus set when using

Celestion, Brown, and Blue Spot loud-speakers. The general tone is pleasing; there is plenty of bass and the high notes are pleasantly crisp.

Provision is made for the use of the Lotus set as a gramophone amplifier. For this purpose a separate grid-bias tapping applies negative bias to the detector valve, thereby converting it into the first-low-frequency amplifier for gramophone reproduction. As the volume control in the Lotus set is dissociated from the gramophone amplifier circuit, it is necessary to use an external volume control with the gramophone pick-up.

Good results were obtained using a Blue Spot gramophone pick-up, which also embodies a carrier arm and volume control. Where a good loud-speaker is used, and the battery is of adequate size, the Lotus kit set is well worth while for gramophone reproduction.

It may be of assistance to those who are interested in the Lotus kit set to be told what accessories were involved in the test. Two Columbia super-capacity H.T. batteries giving a total of 135 volts were used for high-tension supply. As an alternative, the Regentone De Luxe D.C. model was used to derive 150 volts high-tension from the 200-volt D.C.-mains supply. An Exide 2-volt accumulator was used to heat the valves. With accessories of such known efficiency as these, the Lotus kit set is an eminently successful proposition which we have every faith in recommending whole-heartedly to those of our readers who are interested in this sphere of radio-set construction.

A RADIO MYSTERY

THE existence of long-delayed "echoes" where the faint reflection of an outgoing short-wave signal comes back to the transmitter, sometimes after an interval of several minutes, still remains one of the mysteries of radio science. The echoes, which were first detected a little more than a year ago, have given rise to various ingenious speculations as to their real cause. Some investigators hold that the outgoing waves are "trapped" by the Heaviside layer, from which they manage to escape after travelling hundreds of times around the earth. Others are of the opinion that the echoes are due to the presence of enormous areas or "banks" of free ions, formed in space, probably by the action of the earth's magnetic field. There are recent records of wireless echoes taking over four minutes to return. This would place the reflecting region at a distance of 25 million miles beyond the earth's surface.

M. A. L.

WIRED-WIRELESS PROGRAMMES

MANY listeners are at present finding trouble in cutting out the new Brookmans Park station. Complaints on this score are likely to be still more widespread by the time the new regional scheme is in full operation. There is, however, always some consolation to be found in possibilities of "wired wireless." In America, where the use of mains-eliminator units is more general than here, the Wired Radio Corporation are already offering to supply an independent service of three separate programmes, all absolutely free from mutual interference or static. Any one of the alternative programmes can be selected at choice simply by fitting a small filter circuit on the mains side of the eliminator unit feeding an existing wireless set.

M. B.

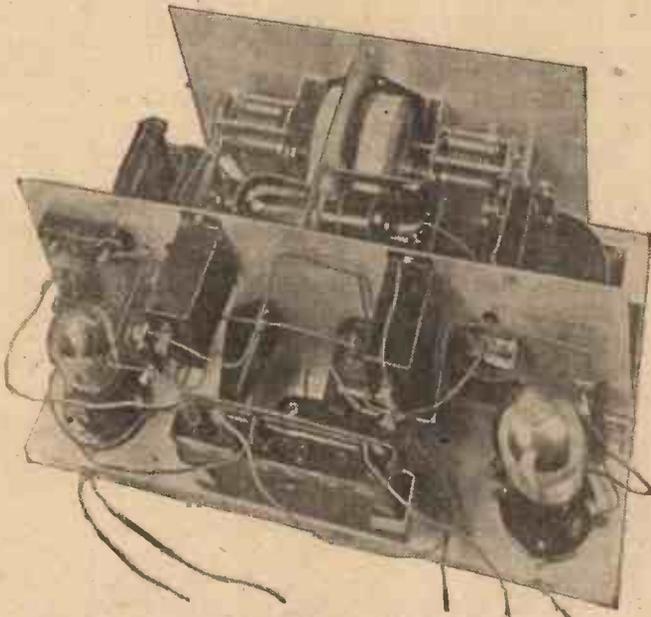
"HOMODYNE RECEPTION"

(Continued from page 820)

coil which can be inserted in series with the main receiving circuit. Then by an adjustment of the separate oscillating circuit to coincide exactly with the distant station and by an adjustment of the strength of the signal by means of the pick-up coil, it is possible to obtain satisfactory reception.

A circuit showing the arrangement is illustrated herewith. There are various possible ways of utilising the system, but for those who are experimentally inclined, the data given will be sufficient. Further information will be provided in future articles as to carrying this scheme into effect.

"A.W." Solves Your Wireless Problems



A photograph of the back of the finished set

high-tension voltage was 150 volts.

From these measurements it will be seen that the wavelength range is conveniently wide and that, through the use of the pentode, at the maximum high-tension voltage advised by the makers, the anode-current consumption necessitates the use of double-capacity or treble-capacity high-tension batteries.

Simple Tuning

In the operation of the Lotus kit set tuning is simple. The two halves of the variable condenser are quite well matched. For example, when tuning in Brookmans Park the left-hand dial was set at 120 degrees and the right-hand dial at 122 degrees. Higher up the scale another test station was tuned in at 144 degrees on the left-hand dial and 146 degrees on the right-hand dial. Only at the lowest part of the scale do the readings of the two thumb-controlled dials materially differ.

As regards sensitivity, the screen-grid valve does its work. Twelve stations were tuned in at good strength on the medium band at 8 p.m. during the evening of the test. All the high-power long-wave stations were available at good strength. Selectivity, so important these days, was found to be quite adequate when using the alternative aerial tapping. The tests for selectivity were done with two aerials; one is a 100-ft. outside aerial and the other a 60-ft. indoor aerial. Not unnaturally, the selectivity was much better when using the indoor aerial. Sensitivity did not greatly suffer when using the indoor aerial.

On the score of volume, the pentode

Electrifying Your Gramophone

Some points about Pick-ups and Pick-up Arms—by KENNETH ULLYETT

JUST recently, in AMATEUR WIRELESS No. 386, a little push-pull amplifier was described which is eminently suitable for incorporation in a gramophone in order to have electrical reproduction instead of mechanical reproduction. The various reasons for favouring the former were given at length, as, for instance, the fact that it is only logical to reproduce electrically when the recording is done electrically, as is the very large majority of modern recordings.

The amplifier is only one side of the question, and equally important is the pick-up itself and the way in which it is connected. Pick-ups do not differ very widely in type, although constructionally there is great latitude and a marked commercial difference. Most pick-ups nowadays are of the magnetic type and the major point of difference is that, at least two use the needle itself as the vibrating armature, supported between two magnet poles. Practically all other makes of pick-up have a damped armature mounting incorporating a needle carrier at one end.

Pick-up Connections

In needle-armature pick-ups, such as the Lissen, the needle slips into an orifice in the pick-up casing without the need for tightening it with a thumb screw. The needle vibrates freely in its mounting and, as is the case with all other pick-ups of the magnetic type, the vibrations produced result in voltage changes which are discernible at the output terminals of the pick-up.

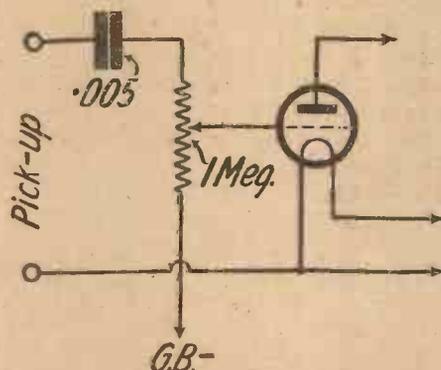
The first question is regarding the correct way of connecting the pick-up. It can, of course, be connected directly into the grid circuit of the first amplifying valve, even if this first valve is normally the detector of the radio set. There is, however, the need for a volume control in practically every gramophone amplifier, and in practice one of the best ways of connecting this is right at the start at the pick-up connection.

An important point to note is that if the pick-up is not connected in the correct manner to the potentiometer forming the volume control, the tone may be changed as the volume is varied. This is a great mistake, and yet one quite frequently evident in old pattern gramo-radio amplifiers. The correct method of connecting the pick-up is as shown in the accompanying sketch.

A factor to which sufficient importance is not always attached is the length of the pick-up lead. Usually the two wires are contained in a thin flexible cable, or twisted flex is used. This is quite satisfactory pro-

vided the length of the lead does not exceed a few feet—say, not more than 4 ft. A considerable length of cable of this kind results in quite a notable capacity between the two wires which run very closely together. This capacity in the pick-up wiring will cause an alteration in the voltage output at varying frequencies and the tone is changed.

Although, as has been explained, pick-ups are similar in principle, the characteristics differ widely. For example, from



A good method of coupling a pick-up to a gramo-radio amplifier

a test made in the AMATEUR WIRELESS laboratory, from four well-known makes of pick-up, one showed a reasonably straight curve between 100 cycles per second and 5,000 c.p.s. Another gave a curve rising slightly from 125 c.p.s. to 400 c.p.s., dropping slightly to 100 c.p.s. and rising again rapidly to a resonance point at approximately 2,500 c.p.s. A third curve showed a most striking resonance point at exactly 2,000 c.p.s., while the fourth, taken from a pick-up which in many ways is considered the best of the batch, gave a practically steadily dropping curve from 120 c.p.s. to nearly 6,000 c.p.s.

As a matter of fact, it is not always a horizontal or even a straight-line curve which is desired. Amplifiers are never perfect, and some manufacturers of high-class electrical gramophones correct some natural frequency peculiarity by using a pick-up having either a resonance or a "dropping" point at about that particular frequency.

Too Much Treble

This is a point which you should remember when using the same amplifier either for radio or for gramophone work. Most sets nowadays employ leaky-grid rectification, and the effect of this is to cause a slight loss of the higher notes, although this loss may not be very noticeable with radio reproduction. If the same amplifier be used with a pick-up and, of course, without the grid condenser and leak, then

this loss of the higher notes will not take place; consequently there will be a little too much treble, and it would be advisable to use a pick-up with a dropping curve.

Mounting the Pick-up

Sufficient attention is not always given to mounting the pick-up correctly. Many makers publish a diagram on the instruction leaflet showing the angle at which the needle carrier should bear with its needle on the record face and this should always be borne in mind. A factor of even greater importance is the position of the pick-up carrier arm.

On the exact centring of the pick-up depends the degree of record wear. One well-known make of pick-up sold complete with its tone arm is guaranteed to give true centring to within 3 per cent. If the makers of your pick-up issue a mounting template then by all means make use of it and do not experiment for yourself. The accuracy with which centring may be obtained on many modern carrier pick-up arms puts a number of ordinary gramophone tone arms in the shade!

Fibre Needles

Obviously, the type of needle used will have a big effect on record wear and on the quality of reproduction. Pick-ups do not need as a rule, such a number of varying types of needle. For instance, it is not usually necessary to change from a loud needle for one record to a soft needle for another. Most pick-ups work best with a loud-tone needle, because a fine point often seems to cut down the brilliancy of reproduction.

Nevertheless, one or two pick-ups on the market seem to take kindly to fibre needles, and the only trouble is that one or two of these have a carrier which does not readily take a standard fibre needle.

A final point worth noticing, in view of the increasing popularity of the electric turntable drive is that some motors, and particularly those fed with A.C., cause a ripple, which makes itself manifest through the pick-up windings. In most cases this can be cured by covering the underside of the turntable board with metal foil and connecting it to earth or to one of the mains terminals.

Short-wave listeners will be interested to learn that the new Zeesen transmitter on 31.38 metres is now working to schedule. Broadcasts are carried out daily from 1 to 1.55, 3.30 to 6.30, 7 to 9, 9.30 to 11.30 p.m., and approximately every third night from 11.30 p.m. to 12.30 a.m.

"A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

Wates Test Meter

TEST meters are useful instruments, not only for the electrical engineer, but for the ordinary amateur who requires to know whether his batteries are in good condition and whether his valves are functioning efficiently.

Generally, there are three tests which the amateur requires to make; one on his L.T. batteries, another on the H.T. battery, and a third on the H.T. consumption, which also affords a check on distortion. A meter combining these functions is certainly useful and it is therefore probable that the new Wates multiple meter, which sells for the modest price of 13s. 9d. should be popular.



Wates Test Panel

This meter is intended for mounting on a panel and is similar in appearance to the other instruments already marketed by the makers. The action has, however, been improved in order to reduce friction. The various ranges are obtained by placing connectors in a number of coloured sockets; these are mounted on a small rectangular panel which can be fixed on the main panel beneath the meter. Full directions for arranging the plugs in the correct positions are printed in black on a white ivory card.

When wired up correctly in accordance with the maker's instructions, the voltage of the L.T. battery can be read up to 6 volts, the high-tension up to 150 volts and the milliamper consumption up to 30 milliamps. We tested these ranges in conjunction with a standard instrument of known accuracy; the results were favourable, and in no case did the error exceed 5 per cent.; it will, therefore, prove satisfactory for tests of potential and anode currents.

The maximum resistance of this meter is

5,000 ohms giving approximately 33 ohms per volt. When used as a milliammeter it might be advisable to connect a by-pass condenser across the terminals.

For general use, we have no hesitation in recommending this instrument to readers. The makers are The Standard Wet Battery Co., 184 Shaftesbury Avenue W.C.2.

Ekco H.T. Unit

THERE is little need to introduce Messrs. E. K. Cole to readers as manufacturers of Ekco mains units, since these have been in use now for many years.

We have recently received for test an Ekco H.T. unit model 1.V.20 for use with A.C. mains. The eliminator is contained in a well-ventilated metal case measuring 7½ in. by 6¼ in. by 4¼ in. high. Underneath the case a number of tapping points are provided for use with A.C. voltages varying from 200 to 250 volts. The metal rectifier is employed in conjunction with suitable smoothing and de-coupling resistances. The output is taken to four terminals, one negative and three positive arranged on the side of the case. The first positive, labelled SG, is taken to a potentiometer connected across the output; whilst the second labelled 0 to 120, is controlled by a compression resistance; and the last, labelled 120 to 150, gives the full output from the metal rectifier. When a resistance is employed to cut down the voltage it is filtered by a condenser in order to prevent back-coupling.

This unit is primarily intended for the standard 3- or 4-valve set. With 5-milliamps flowing, the voltage is 152, whereas with an output of 15 milliamps, which is normal for a 3- or 4-valve set, the voltage is 130. These figures show that the eliminator is a thoroughly serviceable article for normal use and when coupled to a 3-valve set the hum was negligible.

The eliminator can be recommended to readers.

Graham-Amplion Loud-Speaker Unit

THE balanced-armature unit for cone loud-speakers has proved its worth during the last season and is as popular now as it ever was. It is hardly surprising, therefore, that Messrs. Graham Amplion, Ltd., who are well known in the loud-speaker industry, have produced a balanced-armature unit which they are selling as a separate component. As one would expect from a firm of this standing, the design and workmanship of this unit are both exceptionally good. The reed is balanced by two compression springs between the poles of an

electro-magnet and an adjustment is provided for setting the reed at an optimum position. For maximum efficiency the iron circuit is fully laminated and supplemented by a substantial horse-shoe magnet.

A tapping is provided on the windings for the purpose of giving three different impedances, the correct one being chosen to match the amplifier output circuit; this is a commendable feature and one which should assist in obtaining the best results from any amplifier.

In order to produce a fairly even-response characteristic with good bass reproduction, the reed is only slightly damped; this is only possible by providing a reliable adjusting mechanism, enabling the reed to be held midway between the two poles.

As might be expected the reproduction from this unit when employed with a suitable cone and baffle is exceptionally good, the balance of the high and low notes being



Graham-Amplion Loud-speaker Unit

retained without undue resonance. The unit is well finished and totally enclosed in a moulded casing and can be recommended to readers.

A Television Problem

ANY purely automatic system of television reception, i.e., where constant manual adjustment of the receiving apparatus is avoided, must involve the transmission of a synchronising signal simultaneously with the picture signals. This in turn involves an additional modulation frequency, over and above those necessary to transmit the picture. The only practicable way to find ether "room" for the wider band of frequencies, without interfering with the present broadcast service, is to go below the 100-metre wavelength. Unfortunately this introduces other problems, such as fading and attenuation, apart from the difficulty of designing a simple yet reliable short-wave receiver. M. B.

BROADCAST ARTISTES IN PICTURE



GLYN EASTMAN.—One of the best-known baritones, he sings most frequently from Cardiff station and was heard recently at a concert with the National Orchestra of Wales.



OLIVE STURGES.—A singer gifted with a soprano voice of wide range, Miss Sturges is well known to all listeners for the diversity of her songs.



WALTER RANDALL.—A thoroughly capable pianist, frequently heard from 5GB, Mr. Randall joined forces on the 9th inst. with Mr. Harold Mills in a pianoforte and violin recital from that station.



CHRISTINE SILVER.—A famous actress, creator of innumerable roles, Miss Silver has become equally famous over the ether. On a recent occasion she found time to appear in the "children's hour" at 2LO.



ERNEST BELL.—Heard most frequently from the Glasgow station, Mr. Bell is well established in public favour for his many flute solos. He has been heard from several stations.



CONSTANCE HARDCASTLE.—A fine soprano singer, Miss Hardcastle has been frequently heard over the ether. Her songs are always well chosen, and a marked clarity of diction makes her work appreciated.



IVOR WALTERS.—A well-known Welsh tenor, Mr. Walters is most frequently heard from Cardiff. He has a wide repertoire of both classical and folk songs.



DOROTHY FORREST.—One of the earliest of broadcasters, Miss Forrest has been singing recently from the northern stations and notably, on the 20th, from Glasgow. Her repertoire includes folk songs, as well as classical excerpts.



GILBERT MILLS.—This well-known organist broadcasts from the Church of the Messiah, Birmingham. His programme on the 8th included some noteworthy compositions of Wolstenholme and Wesley.

Some Radio Gramophone Notes

Resonance Effects—and Some Good Records

Pick-up Resonance

ALTHOUGH modern pick-ups have improved tremendously in comparison with the earliest models, I think it is correct to say that even now there is no pick-up absolutely free from resonance effects. The presence of a resonance in the pick-up mechanism can always be detected by the increased chatter or "whine" which comes from the pick-up itself while these notes are being played. The chatter comes from the vibrating armature, and the only way in which the effects of this resonance can be got rid of is to arrange the design of the pick-up so that the resonance takes place at a frequency where it doesn't matter. A suitable frequency would be anywhere above 10,000 cycles per second.

It is evident that the latest evolution of the pick-up in which the vibrator is the gramophone needle itself, and which system has possibilities of having a high and, therefore, harmless resonance, is undoubtedly a step in the right direction. The resonance of the ordinary vibrating armature pick-up usually occurs between 2,000 and 3,000 cycles. It can be pushed up higher by artificially restricting the movement of the armature, but such a method is harmful because it results in increased record wear.

Effect of Different Types of Record on Pick-up Resonance

Resonance effects of the type described above are usually thought to be associated with a particular frequency only. It seems, however, that with certain instruments the

effect is much more marked than with others. For instance, using one of the well-known commercial makes of pick-up and playing over Sergei Rachmaninoff's piano record, "Troika en Traineux," Tchaikowsky (H.M.V., DB1279), no trace of resonance could be heard throughout the whole of the record. The notes played cover nearly the complete range of the piano within which the resonant frequency of the pick-up might be expected to lie. On the other hand, if a dance record is played, in which the muted trumpet has a solo run, the effect is noted at once. It would seem, therefore, that, as well as being a frequency effect, the actual wave-form of the sound plays a large part in determining the size of the output at the resonant frequency.

It is realised, no doubt, that two instruments can play the same note, but the tone from them is quite distinct and different because the wave-form of the sound is different, although the actual frequency of the wave is the same in each case.

Recent Records

The piano record given above is distinguished by the skill of the artiste, the gradation in piano tone, and the excellence of the recording, and can be recommended. A further piano record in which the recording seemed to be rather better than normal is "Danse Macabre" (Saint-Saens), played by Karol Szepter and a Grand Symphony Orchestra (Parlo., E10903). In this record the piano tones are well recorded, as well as various instruments in the orchestra, such as the saxophone and, incidentally, a

gong. It is a particularly fine record.

Marek Weber and his Orchestra usually concentrate on light orchestral selections of what may be called "restaurant" music. Their latest—a Paggiacci selection (H.M.V., C1735)—is played as smoothly and as dexterously as ever. The record is notable because the recording gives an intimate impression, as if all the instruments were close to the microphone. Perhaps the best way of describing the effect would be by comparing it with the output from a radio set in which a high resistance in one of the tuning circuits—which always seems to give a distant effect—has been detected and removed. The recording of the harp at the end of the first side is also good. Other outstanding light orchestral records are "In a Chinese Temple Garden," Ketelby (Col., 9858), played by the composer's Concert Orchestra, and a Hungarian "Folk Song Potpourri" (Parlo., R424), played by Barnabas von Geczy and his Orchestra. Both of these are well recorded, the tone of the gong in the Ketelby record being particularly good.

American records of works by large orchestras nearly always seem to catch effectively the reverberation or echo of the sound in the concert hall as well as the first sound. In the record "The Sorcerer's Apprentice" (Dukas), played by the Philharmonic Symphony Orchestra of New York (H.M.V., D1689), the reverberation of the drum is very clear. The concert hall echo in this case is effective and the impression of a large orchestra playing absolutely together is well conveyed. G.McD.

A PLACE IN THE SUN :: Jottings From My Log

By JAY COOTE

WITH the advent of longer evenings and, consequently, more opportunities to twirl the condenser dials, most of us will have realised by now how inelastic is the *Plan de Prague*. With its narrow separations between neighbouring wavelengths, no elbow room is granted to the transmitters and the slightest straying from the straight but narrow path must bring forth contumely upon the heads of the offenders. For this reason it is not surprising that some of the studios, finding themselves jostled out of their allocated seats, should have taken unto themselves rovers' tickets to seek elsewhere a place in the sun.

During the past ten days or so we have had many instances of these sudden disappearances and subsequent reappearances in unexpected positions, and such wanderings, although providing a healthy and interesting sport to the inveterate knob-twiddler, cause considerable trouble to the

other members of an already congested broadcast band. For several days I had chased Turin in and out of his habitual haunts, when on one evening I found this station comfortably anchored on 293 metres, a spot which usually gave me Kosice; it has been there ever since, and daily I can pick up the twittering and trilling of its pet nightingale at exceptional volume. Do I blame Turin? Not I, for previous to this midnight flit it had collided violently with Kaiserslautern, to the disgust of both, not to speak of spasmodic attacks surreptitiously made upon it by Rennes, a French station which appears to walk in its sleep. But where is Kosice? I am still searching for it.

Enhanced Energy

Then again, Radio Catalana (EAJ13), who burst into song with enhanced energy some few months ago on 268 metres, follow-

ing a series of breakdowns, has emitted recently a vigorous yell on 464 metres, with the consequence that a frightened Lyons-la-Doua has slid up to a slightly higher position in the scale. It is this lack of elbow room which spoils matters—that and the dissatisfaction expressed by some studios with the seats allotted to them. In some instances, there is cause to grumble and I anticipate protests from both Hilversum and Kalundborg, for on some evenings you will find these transmitters troubled by Russian stations. In that region you may pick up, if you handle your receiver carefully, Leningrad, Tiflis, and Moscow-Popov, all powerful broadcasters which the Dutchman and the Dane do their best to avoid. Add to these worries the perpetual collisions taking place almost nightly between Eiffel Tower and Moscow Komin-tern, and you will realise how this search for a favourable spot goes on.

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

WHY, oh, why was *Carnival* put on so late? So that good children should be in bed, I suppose.

Said I to myself: "I'll put in an hour of this and go to 'byes' in the usual way." Alas, I lost my beauty sleep, and next morning missed my train! Why, then—oh, why—was *Carnival* put on so late? R.S.V.P.

The production, of course, was first-rate. I say "of course" because this best seller has become a wireless perennial. I paid my tribute to it last year, and no doubt I shall be doing likewise next year. Not only the skill of the author, Compton Mackenzie, but that of his collaborator, Holt Marvel, and the producer, Peter Cresswell, combined to give a picture of wonderful colouring and that atmosphere of pre-war bohemianism which "made" the novel.

Whoever was responsible for the musical background was artfully efficient! Chopin, Schubert, Wagner, Schumann, Delibes, Puccini, Saint Saëns, Liszt, and I believe Strauss. The preference for "Liebes-traume" and "Traumerie"—sob-provoking, soul-searing!—was entirely understandable. "Traviata, the Venusberg music, "Cavalleria," "Le Cygne," and in contrast "Little Dolly Daydreams," "Champagne Charlie," "Linden Lea," and Eugene Stratton's old favourite. . . . Now I wonder if I have left out anything? I tried to catalogue them all. . . . Am I right, sir?

Guy d'Hardelot in my youth represented all that was popular in ballad, but I was surprised to find in the selection of her songs but few remembered to-day. "I Think" and "Because", however, once "swept the boards"!

Haydn Wood, Dorothy Forster, and Hermann Lohr were more prolific. Dorothy Forster's "Love's Garden of Roses" was once highly popular. I think, however, Haydn Wood and Sanderson hold the palm to-day.

Of course, it is rubbish to criticise the freedom of speech by the eminent speakers in the "Points of View" series. That is

what the world has long been thirsting for; and it would have been a better world to-day had some of our courageous public men and women had the medium of wireless in order to reach the masses.

Congratulations for the lively and speedy announcer at the Wembley "dirt-track" meeting! Mr. J. S. Hoskins was the most naïve and natural commentator ever heard. Neatly aided by the second announcer, one had a most thrilling and realistic ear picture. And I liked his "Good night!"

Once more the People's Palace concert season is here, and I advise any listener who wants to see as well as hear a cheap and good evening's entertainment to go to the Mile End Road. The bus passes the door.



An impression of Stainless Stephen

No more popular items can be heard anywhere else. For instance, the outstanding item in the first concert was the evergreen "Tannhauser Overture." And when played by the Wireless Symphony Orchestra even our friends the Germans would like Wagner!

Frank Titterton deserved in full the ovation which was given him for his rendering of "Lend Me Your Aid," although to me it seemed that he was not near enough to the microphone. The orchestra almost drowned him at times

There was some beautiful singing and playing in the Russian Cabaret from the Kasbek Restaurant. The harmony in "Doubinushka" was particularly fine. But although the audience applauded vociferously after each item, they were hardly quiet enough during the orchestral pieces. There was quite a horrible row at times.

"Harold" is justifiably annoyed. Not long ago he complained about the annoying practice of sandwiching variety turns in between late night dance broadcasts. His grouse was Leonard Henry.

Now he is annoyed about the inclusion of the Quatuor Vocal Russe-Moussorgsky in a 10.30 to 12 broadcast by Jack Payne.

"Can't they realise that it is only dance fans who stay up late?" he asks. "It is as bad as including a banjo solo in the 'Second News.' Mind you," he goes on, "I've a bigger grouse than before. For a full half-hour before this broadcast commenced we had been listening to a Russian cabaret. Not only that, but the Quatuor had been featured already in the week's programme. Why this sudden Russian craze on the part of Savoy Hill?"

Clapham and Dwyer still pay too much attention to the studio audience. Time after time one of the pair seems to be doing some special clowning for the benefit of those present—the effect to the listener being a burst of meaningless laughter which drowns the next joke.

Mr. Ramsay MacDonald has improved out of all conscience since he made his first microphone appearance. His speech at the Mansion House came over with exceptional clarity and one could appreciate the Prime Minister's sincerity.

There has been some very fine music from 2LO of late. The Wireless Orchestra certainly play popular music. There was the *Pagliacci* selection (which, by the way, has become a nuisance in the hands of mediocre orchestras), Jarnefelt's "Prelude," and Gounod's "Danse des Bacchantes."

In the same concert was Megan Thomas, who sang delightfully. Especial thanks to her for her charming rendering of Cyril Scott's "Blackbird Song."

EVERYBODY

"3" A 193

GUARANT
RECEIVE A
OF
TWENTY S
AT FULL
SPEAKER S



GOOD three-valve sets having a single high-frequency, detector, and one low-frequency stage are rare, even in these days, when so many models are available. Of course, a number of those in use are old-fashioned, but a few of the recent ones fall short of present-day requirements.

The reason for this is, no doubt, to be found in the fact that they were designed before the London programme was broadcast from the new regional transmitter at Brookmans Park. But some of them have

little defects in their design which result in their being not quite up to the standard of the very latest sets.

Present-day Demands

Most sets have their strong points. Some are super-selective, others provide great volume. But of what real value is super-selectivity if it is present at the expense of magnification? What sense is there in being able to cut out your local station by twisting a knob a few degrees from its tuning point if, round the rest of the dial, the tuning is

critical and the signals weak. It is an easy matter to obtain selectivity by cutting down the strength of the signals, but, clearly, the result is not satisfactory.

Similarly, great volume by itself is of no value. There is no point in building a set that is so powerful that the local station interferes with the others tuned in because the selectivity is not good enough.

The worth of a set is best measured by the number of stations it receives clearly and at comfortable strength. The quality of the reproduction, too, must be acceptable—the tuning easy and the running costs low.



MANY SPECIAL FEATURES

Adaptable to all sizes and types of aerial :: No coil changing :: Cuts out

EVERYBODY'S SET NEED TO MINIMUM STATIONS LOUD- STRENGTH

Now, I have no intention of suggesting that it is possible so to design a set that it is equally ideal in all places where it may be used. However carefully one may fashion the parts and construct a set, there are bound to be those who would prefer, perhaps, a little more volume, even at the expense of selectivity. Listeners in Cornwall, for instance, do not need the same order of selectivity as those in London. The Cornish listeners would prefer the utmost magnification, because in their part of the country the signals are relatively weak. But it is possible

with various aerials and in different places, with the result that I can recommend the set illustrated here to all users.

There is a large class, for instance, who use a fairly small aerial in a town. This class must have a selective set in order to cut out the local station and sufficient magnification to bring in the distant stations. Other amateurs have a large aerial, and also have to use a selective set. Then there are the more fortunate ones who are normally not troubled with interference, and who therefore want a set which magnifies very well and brings in the distant stations.

Finally, we have those amateurs who live in the country; perhaps in a part where signals are normally very weak. Magnification is all that matters here, especially on the long waves, as short-wave signals are apt to fade and be variable.

Good quality is, of course, required in every instance. Tests of the set to be described prove that in those places where reception conditions are normal a minimum of twenty stations can be received at good strength. In some parts there will be no

difficulty in exceeding this minimum number, but in places where, for one reason or another, the reception is normally very poor I cannot guarantee that twenty stations will be received.

There are places where a good three-valve set will bring in Daventry only at good strength, but what I do claim is that this set will put up an unusually good performance.

The Circuit

Owing to the special coils used, the magnification and selectivity are much above normal. They were designed from the point of view of efficiency, and are therefore relatively large and have a good

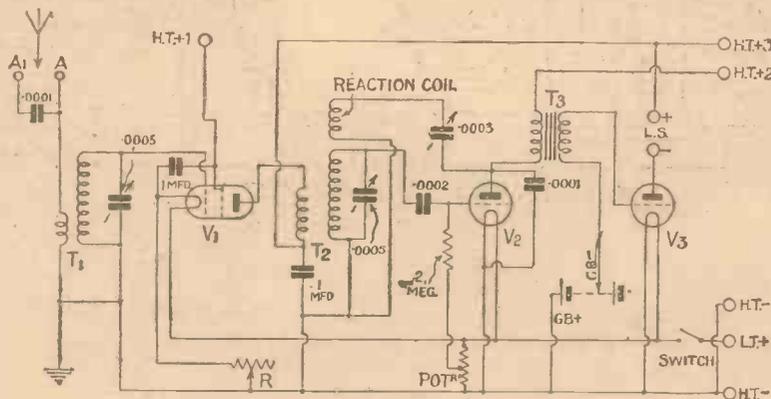


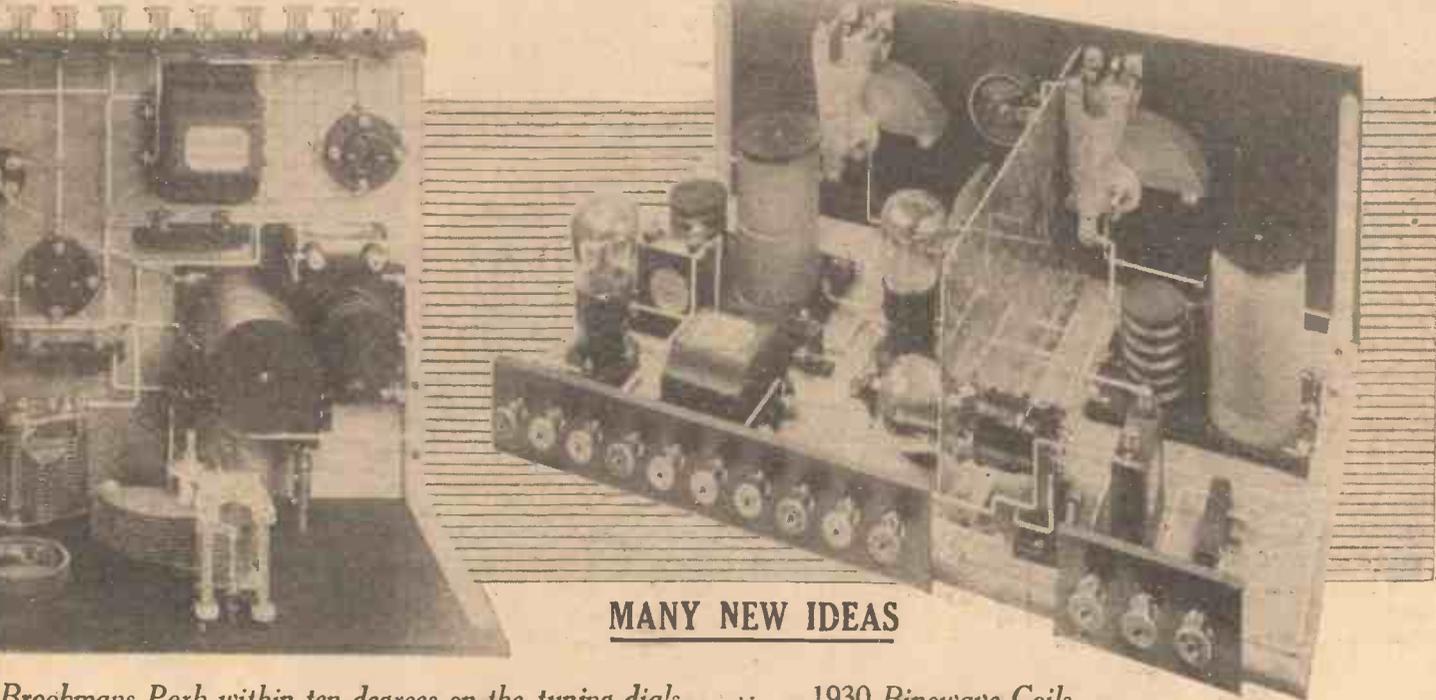
Fig. 1. The explanatory circuit of the "Everybody's 3"

change-over switch.

The general circuit is given by Fig. 1. In the aerial circuit is a high-frequency transformer whose secondary is connected to the grid of the shielded valve. Notice

Twenty Stations at L.S. Strength

I have most carefully considered these various points and have conducted tests



MANY NEW IDEAS

Brookmans Park within ten degrees on the tuning dials :: 1930 Binowave Coils

“EVERYBODY’S 3” (Continued from preceding page)

that a filament resistance R is joined to the filament of this valve and provides a negative bias excepting when it is short-circuited. This resistance is a volume and selectivity control, and will be explained later, as will the various methods of connecting the aerial to the high-frequency transformer to suit individual conditions.

Now, the detector is used to rectify and to provide reaction to the transformer. It is therefore necessary to consider both rectification and reaction when dealing with the arrangement of the detector. Experience indicates that the best results are not always to be obtained by connecting one end of the grid leak to the negative

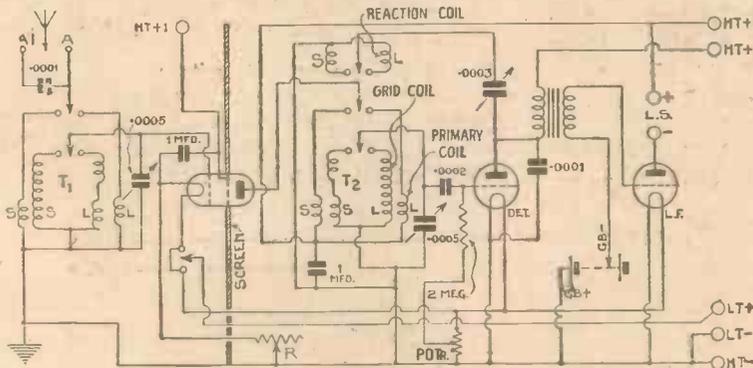
and that the reaction condenser itself is of .0003 microfarad. My tests indicate that for the best results plenty of capacity must be used in the anode circuit of the detector, both signal strength, selectivity, and stability being improved. A point to note is that a high-frequency choking coil is not used. One is not needed, provided the transformer is suitable.

The transformer must not have a condenser built into it; if a type having one is used there will not be sufficient reaction. A choke would have to be used with a transformer having a fixed condenser built into it.

1930 Binowave Coils

The coils used are of the dual-wave type. They are an improved form of Binowave coil and of the same construction as those used in the “Brookman’s Three” and “Two” valve sets described in the *Wireless Magazine*. These new coils are very different from last season’s Binowave coils. They have been completely re-designed to provide the maximum of magnification and selectivity with stability. The aerial transformer has a plain winding of thick wire for the medium range.

(Continued in 3rd column on page 836)



The circuit of the “Everybody’s 3”

A further high-frequency transformer is employed to couple the shielded valve and the detector. Its primary winding is so related to the secondary that it is best suited to valves having an anode impedance of about 200,000 ohms. The impedance value is not at all critical and, further, it is always possible to adjust the impedance value by altering the voltage applied to the shield. I have tried shielded valves of from 100,000 to 300,000 ohms, and the results are satisfactory. It is, of course, possible to detect that the tuning is a little more broad with the low-impedance valve, but when this is not desirable the shield voltage may be lowered a little.

The point to note is that the primary winding is so proportioned that the maximum magnification is obtained from the high-frequency stage, and as the coils are good ones it is considerable. Figures of amplification would be misleading unless the input circuit of the valve was specified, and obviously it cannot be in practice with aerials of all shapes and sizes.

A Special Feature

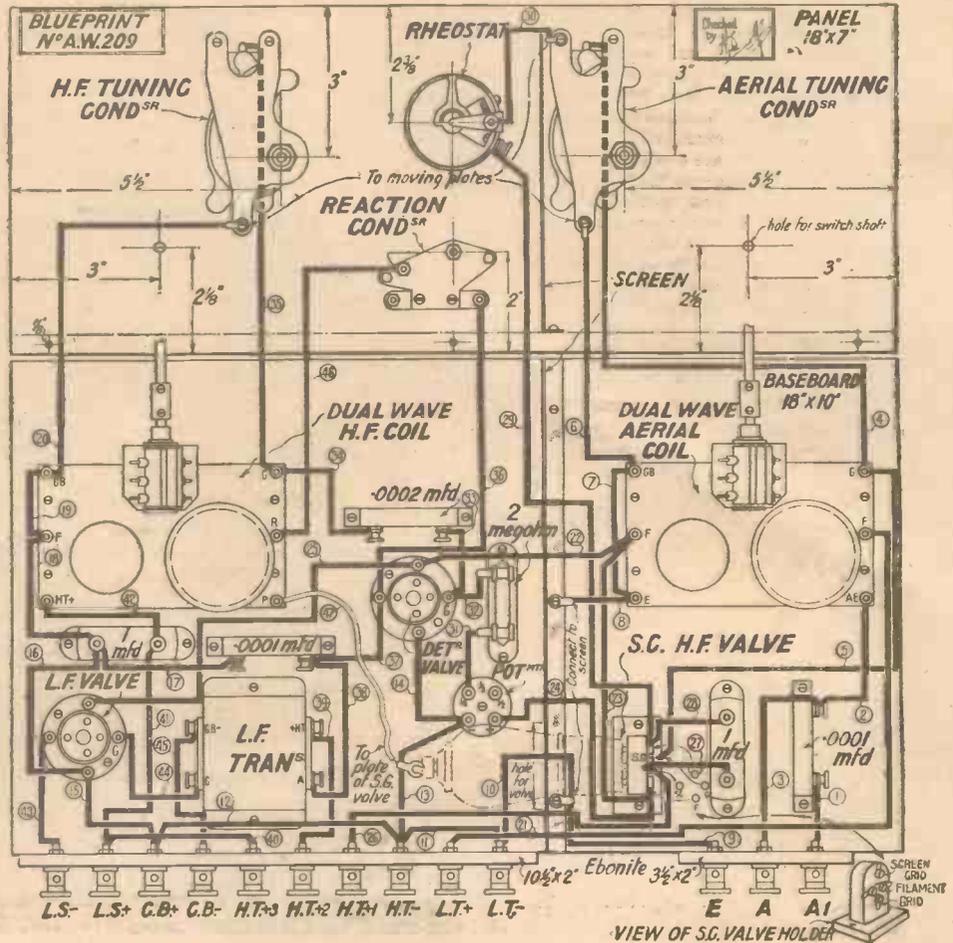
Transformer couplings are only better than the tuned anode from the points of view of both selectivity and amplification when the coils are well designed. When using small coils of fine wire one may as well use the tuned-anode system, but the transformer offers great advantages when properly designed.

In the set illustrated the medium-wave coils are wound with wire as thick as No. 22 d.s.c.

A leaky-grid detector is used, the grid condenser being of .0002 microfarad and the grid leak of 2 megohms. A value of .0003 microfarad is often used, but the quality is better when the lower value is fitted.

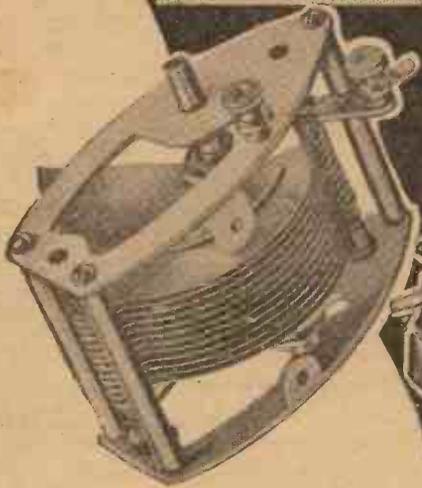
used, but it was decided to fit an inexpensive type of potentiometer in this set.

The next point to be given attention is the anode circuit of the detector. Notice that a fixed .0001-microfarad condenser is included between the anode and filament



The wiring diagram of which a full size blueprint may be obtained, price 1-

**A REAL
LOW-LOSS
CONDENSER**



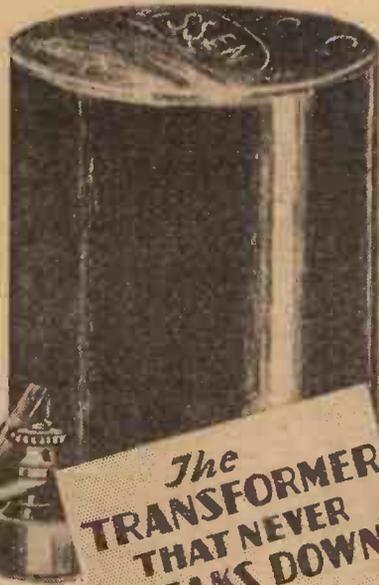
When you put a Lissen Variable condenser into your set, you get a new sense of mastery in the control. Because not only is the variation of capacity even and accurate over its capacity range, but movement is free without being slack. Notice the unshakeable rigidity of the construction of the Lissen condenser—the long bearing and the absence of end pressure or distortion of the vanes.

The Lissen Condenser is a real low-loss condenser; because of this stronger signals are passed to your valves and you get greater volume from your set. It is fitted for one-hole fixing or baseboard mounting; the spindle is extended for ganging; ebonite bushes are available for metal panel mounting—so that you can use it for absolutely any published circuit. If you are experimenting, you can use it for one circuit after another and it is universally adaptable. Remember this when buying a condenser and get a Lissen!

LISSEN
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CONDENSERS

PRICES:-

- .0001 mfd. capacity 5/9
- .0002 mfd. capacity 6/-
- .0003 mfd. capacity 6/-
- .00035 mfd. capacity 6/3
- .0005 mfd. capacity 6/6



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If your chosen circuit calls also for a Super Transformer, use a Lissen Super Transformer. You cannot get a better one.

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embodies an accurately rated .01 condenser which delivers all its stored-up energy and resistances that will never vary, no matter what the current load, interchangeability of resistance values.

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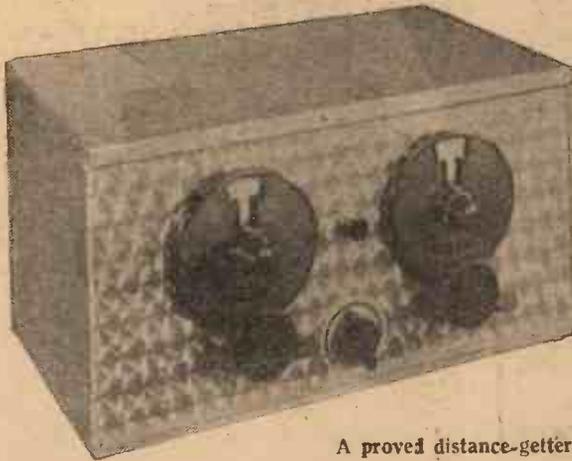
- .0001 to .001, price 1/- each.
 - .002 to .006, price 1/6 each.
 - .01 price 2/- each.
- Obtainable of all radio dealers.

**LISSEN
FIXED
GRID LEAKS**

These resistances are unvarying in value, and all have been tested.

All values each **1/-**
With terminals 1/3 each.

World-Wide Results with the "World-Wide Three"



A proved distance-getter

"THE proof of the pudding is in the eating," and the AMATEUR WIRELESS Technical Staff realised that it was no good giving the title "World Wide" to the "World-wide Short-wave Three" unless the results justified it.

So when the receiver was complete and had been roughly tried out, it was taken to a laboratory in the West of London and given a thorough trial. Results really did exceed expectations, and the total sum of stations received leaves no room for hesitation in advising all short-wave enthusiasts to make up the "World-wide" set.

It may come as something of a surprise to those who are newcomers to the field of short-wave reception to know that the dials literally teemed with stations. Commercial stations roared in, amateur morse and telephony stations were there in abundance, and a really good logging was made of American and Continental broadcasters on the "wavelets."

Despite the entirely satisfactory results, the "three" proved essentially simple to operate. Partly this was due to the all-metal construction and efficient shielding, and partly to the most convenient slow-motion tuning controls which enable hair-like precision to be obtained. This latter is a vital factor.

An ordinary B.B.C.-type aerial was made use of, though obviously not the best that could have been designed, and a normal earth connection was used. The majority of the reception was carried out on the loud-speaker, though phones were, on occasions, used for tuning in.

The aerial is partly screened (and what aerials in the London district can ever be

ideal, particularly for short-wave working?) so that the results obtained are therefore all the more creditable.

As a guide to other users of the "World-wide Short-wave Three," the following dial readings may be of use.

With the three-turn coil: 5SW, 75 degrees of the H.F. condenser; KDKA, 70 degrees; and 2XAO, 63 degrees. With the eight-turn tuning coil, W2XAF came in at 15 degrees.

The reaction condenser settings depend almost entirely on the H.T. value, that is, the H.T. applied to the detector valve.

This, of course, is controlled by the variable Clarostat at the back of the set, on the terminal strip, and careful adjustment is really needed to get the best results.

As a guide, however, the reaction settings obtained during our test will be given. If readers find that their reaction settings for the given stations do not correspond it does not follow that a mistake has been made. The value of H.T. applied will depend largely on the valves used.

The reaction settings were as follows: W2XAF, 65 degrees; 5SW, 92 degrees; KDKA, 83 degrees; and W2XAO, 80 degrees.

Valves

The valves should be carefully chosen in order to get the utmost from the set. Most screen-grid valves are suitable. Two-volt valves were used throughout in our test. A Marconi S215 was used in the screen-grid holder.

For the detector an Osram HL valve having an impedance of 23,000 ohms was found very suitable. For 'phone work, where great output volume is not required, a moderate impedance power valve is required. A Cossor 220P was quite satisfactory, and was generally used, particularly for 'phone work.

The H.T. supply is rather important. Dry batteries or accumulators really are preferable to eliminators whenever the mains are apt to be noisy, as they are in the district wherein the set was tested. For this reason two 60-volt triple-capacity batteries were used to supply the H.T. to all valves. Certainly not less than 120 volts should be used.

"EVERYBODY'S 3"

(Continued from page 834)

For the long waves a reversed or astatic winding is used. There is a slotted former, two slots of which are wound in one direction and two in the reverse. The fifth slot contains the primary coil.

A combination of a plain and an astatic winding results in the minimum of damping as between one coil and another, and, further, as the intervalve H.F. transformer is wound in the opposite way, the magnetic couplings of one circuit with the other are negligible. This results in stability and also allows the simplest of shielding to be used.

The H.F. Coupling

The H.F. intervalve transformer therefore has an astatic medium-wave coil and a plain long-wave coil. There are, in addition, reaction and primary windings. The medium and the long-wave coils have separate primary and reaction coils in order to obtain the greatest efficiency. For this reason three-pole change-over switches are used, as in Fig. 2.

Each coil unit therefore comprises a medium- and a long-wave transformer, with switch ready wired by the makers to the terminals fitted to the base. There are six terminals on a base, but as only four are needed for the aerial transformer two are used in the filament circuit. This is clearly shown in Fig. 2.

The set is therefore switched off by turning the pointer of the switch knob upright. When it and the H.F. intervalve switch points to the left the medium-wave coils are connected; when they point to the right the long-wave coils are in circuit. The wavelength ranges covered by a .0005-microfarad tuning condenser are from 200 to nearly 600 metres and from 850 to 2,000 metres. Naturally, the tuning of the aerial circuit will be not quite the same, owing to the effect of the aerial and how it is connected.

Components

The components required to build the receiver are from the accompanying list:—

Ebonite panel, 18 in. by 7 in., and two strips, one 10½ in. by 2 in. and one 3½ in. by 2 in. (Raymond, Becol, Trolitax).

Baseboard, 18 in. by 10 in. (Camco, Pickett, Clarion).

Two .0005-mfd. variable condensers (Igranic, Lissen, Jackson, Burton, Ormend, Polar).

.0003-mfd. reaction condenser (Cyldon Bebe, Formo).

15-ohm panel-mounting rheostat (Lissen, Igranic, Wearite, Bulgin).

Pair of 1930 Binowave dual-range coils complete with extension spindles (Wearite).

Screen-grid valve holder (Parex type L, W.B., Peto-Scott).

Two anti-microphonic valve holders (Lotus, Benjamin, W.B.).

(Continued on page 838)

LISSEN

4 POLE BALANCED ARMATURE UNIT (Adjustable)



The Lissen 4-Pole Balanced Armature Unit brings something approaching loud-speaker perfection within the reach of everybody who owns a radio set. You can build any type of cone loud-speaker with it; you can use it with a big baffle board, or put it in a cabinet. You can build a linen diaphragm loud-speaker with it, or you can buy it completely assembled and ready to connect up to your set. It has a fine adjustment, and you therefore get the utmost volume from it without chatter.

Obtainable from all radio dealers; insist upon hearing Lissen before your buy

PRICES

In brown moulded case, with attachment for fitting to any type of cone.

PRICE **12/6**

Cast aluminium Chassis, specially designed to give the best results from the unit. 13-in. cone for use with the above.

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COMPLETE ASSEMBLY OF LOUD-SPEAKER UNIT, CHASSIS AND CONE. PRICE **22/6**



The current you get from Lissen Batteries is the purest form of current you can get for radio. But if you want to use an eliminator, use a Lissen Eliminator. You'll then get H.T. current from your mains smoother, steadier, better than before.

There are 4 types of Lissen Eliminators: one of them will almost certainly be just right for your set. Tell your dealer what voltage your mains supply is and whether it is A.C. or D.C.; tell him what output you require, or what valves you are using, and he will demonstrate for you the Lissen Eliminator to suit your needs.

TYPES AND PRICES

D.C. MODEL "A"		D.C. MODEL "B"	
Employs 3 H.T. + tapplings: H.T. +1 giving 80 volts for S.G. valves; H.T. +2 giving 60 volts at approx. 2 mA for detector valves; H.T. +3 giving 120/150 volts at 12 mA.		Employs 3 H.T. + tapplings: H.T. +1 and H.T. +2 are continuously variable (by means of two control knobs) and capable of giving any desired voltage up to 120/150 volts at approx. 2 mA.; H.T. +3 giving 120/150 volts at 12 mA. for power valves.	
PRICE	27/6	PRICE	39/6

A.C. MODEL "A"	
Tapplings as in D.C. Model A,	
LN 576 for A.C. Mains voltage	200-210
" 577 " " " "	220-230
" 578 " " " "	240-250
" 639 " " " "	100-110
PRICE	£3 : 0 : 0

A.C. MODEL "B"	
Tapplings as in D.C. Model B,	
LN 579 for A.C. Mains voltage	200-210
" 580 " " " "	220-230
" 581 " " " "	240-250
" 640 " " " "	100-110
PRICE	£3 : 15 : 0

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One more triumph of Lissen production—the Lissen L.T. Accumulators. Here is a complete range of highly efficient Accumulators, sturdily built by Lissen to give absolute satisfaction in use and long life. These accumulators are designed to give absolutely trouble-free service. The plates of all are very thick, the containers are strongly made, and the general appearance and finish of Lissen L.T. Accumulators is far in advance of usual standards.

Lissen Accumulators will hold their charge without deterioration for an exceptionally long time

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Type G.M. Two-Plate Type, Glass Containers.	
LN.503 2-Volt 20 Amp. Hours, 4/6	
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(Managing Director: T. N. COLE)

Advertisers Appreciate Mention of "A.W." with Your Order



At a dinner given by the Comrades of the East African Campaign, on December 2 at the Holborn Restaurant, listeners to 2LO and 5XX are to hear speeches by General Smuts, of South Africa, and General Von Lettow-Vorbeck, who was in command of the German and native troops.

Following the Dunmow example, the second annual Porthcawl Fitch Trial for couples who have lived happily together for at least a year and a day will be relayed to Cardiff from the Coney Beach Pavilion, Porthcawl, on December 4.

Holt Marvell has adapted Anthony Hope's play, *The Prisoner of Zenda*, for the microphone, and its first performance will be broadcast from the 2LO studio on December 20.

The Carl Rosa Opera Company's rendering of Offenbach's *The Tales of Hoffmann*, as presented at the Lewisham Hippodrome, will be relayed to 2LO and 5XX on December 9.

It is interesting to recall that Billy Thorburn, who broadcasts from 5GB on November 28, is one of the eight members of the Savoy Orpheans who in November, 1925, performed in an aeroplane flying 10,000 feet above the Croydon Aerodrome. He was the first pianist to play "in the air."

The new Louvain-Velthem (Belgium) transmitter, which can still be heard testing outside programme hours under the call "Station 22,401," is being worked jointly by the Flemish Catholic Association and the Socialist Workers' Broadcasting Company. Separate transmissions are carried out by the programme organisers, and when the latter are responsible for the entertainments, listeners will hear the call, "*Radio Velthem, S.A.R.O.V.*"

In March, 1930, the German Reichsfunk proposes to broadcast the departure on her maiden trip of the new transatlantic liner *Europa*. An attempt will be made to relay a concert from the steamer during her crossing of the Atlantic Ocean.

Interesting experiments in wireless telephony are being carried out at present on the German State Railways. On the Berlin-Stolp and Berlin-Gleitwitz main lines for goods traffic, locomotives have been equipped with receiving apparatus in order that special instructions may be transmitted at any time to their drivers.

At the Hamm (Westphalia) station, through which some three hundred and fifty goods trains pass daily, the authorities are in touch by wireless with the shunting



Lissenden's idea of Stuart Robertson

"EVERYBODY'S 3"

(Continued from page 836)

- .0002-mfd. fixed condenser (Lissen, Dubilier, Graham-Farish, T.C.C., Watmel).
- Two .0001-mfd. fixed condensers (Lissen, Dubilier, Graham-Farish, T.C.C., Watmel).
- Two 1-mfd. fixed condensers (Lissen, T.C.C., Dubilier).
- 3-megohm grid leak (Dubilier, Graham-Farish, Lissen, Ediswan).
- Grid-leak holder (Bulgin, Lissen).
- Fixed potentiometer (Polar, Lewcos).
- Low-frequency transformer (Cossor, Lissen, Varley).
- Partition screen, 10 in. by 6 in. (Parex, Ready Radio, Peto-Scott).
- Panel brackets (Bulgin).
- Thirteen terminals, marked: Aerial 1, Aerial 2, Earth, L.T.-, L.T.+, H.T.-, H.T.+1, H.T.+2, H.T.+3, G.B.-, G.B.+, L.S.+, L.S.- (Ealex).
- Connecting wire (Glazite).
- Two dial indicators (Bulgin).

The set is easily constructed, as the panel and baseboard are of ample size. On the front panel are two tuning condensers and switches; also the reaction condenser and

engines, and tests have proved the utility of the system.

The inhabitants of Lapland up to the present have only been able to pick up the transmission of the Finnish stations. In the near future the Swedish authorities have promised an extension of telephony cables by which the Stockholm broadcast programmes will be made available to all subscribers.

According to Paris newspapers, there exist in that city some three hundred unlicensed wireless transmitters. During the last few days many of them have been located by the French Post Office authorities, one of the captures proving to be an installation broadcasting on the 5XX wavelength!

THE SELENIUM CELL AS A POLICEMAN

THE reaction of selenium to variations of light and shade has been utilised by various inventors as a deterrent to crime. The entrance of a burglar can, for instance, be detected in the dark. His body intercepts a ray of infra-red rays focused upon a selenium cell, and the latter automatically rings an alarm bell. The entry even in daylight of any unauthorised person into a forbidden room can similarly be used to set off an alarm directly his shadow falls across a selenium "watch dog."

The latest use of the light-sensitive cell is to count passing traffic. The Holland Tunnel between New York and New Jersey has been fitted with a photo-electric cell which is impulsed each time a vehicle passes. The cell energises a relay which, in turn, operates a counting machine to keep a complete record.

M. A. L.

volume control. They are really arranged for ease of control, and it was not thought worth while to complicate matters by trying to conceal the controls. The two switches might be joined, but this adds to the cost and difficulty of fitting. A feature of the switches actually fitted as part of the coils is that they are robust and not likely to go wrong.

A metal screen is used, as usual, between the two tuning condensers and the shielded valve is fitted horizontally. The coil units have extension spindles for the switches, which therefore settles the distance between the panel and the coil bases.

Any good low-frequency transformer may be used, and this also applies to the fixed condensers and those used for tuning. The coils themselves will be described at a later date, and it is also proposed to show how this set may be used with valves of the A.C. type for mains working. The high-tension unit will be separate from the set. Further constructional details and how to deal with various aerials will be given in the next issue, together with operating notes.

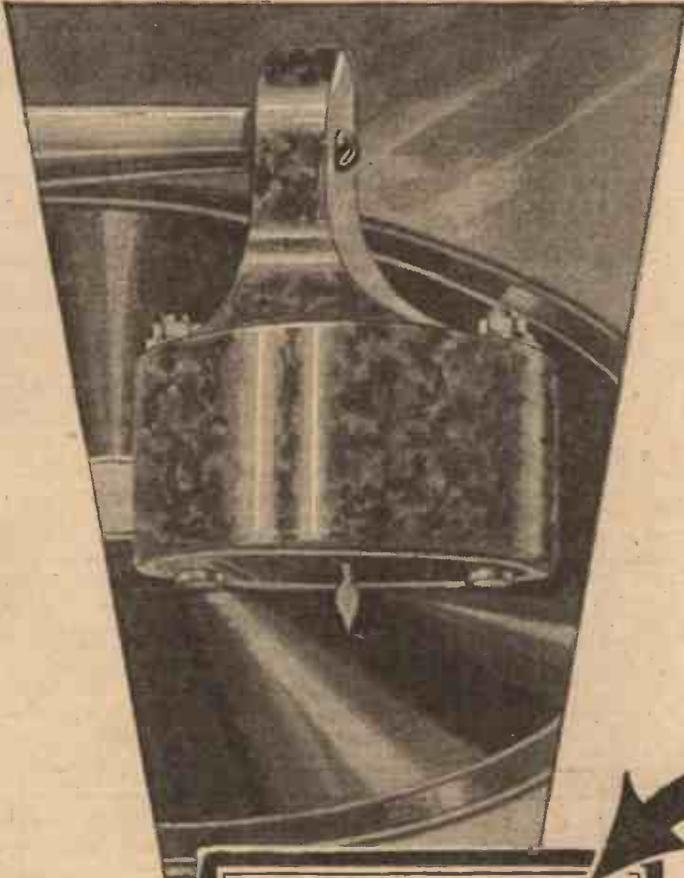
Revolutionary new Lissen Pick-up

TRUE RE-CREATED SOUND at last

"Here's an orchestra, playing just inside this doorway. There are people laughing—talking—singing—what jolly place is this?"

That's the illusion everybody gets when they hear the reproduction of the Lissen 1930 Pick-up. Every note of audible frequency is present in the right proportions, so that you get true re-created sound at last.

The needle armature is the secret of the Lissen Pick-up.

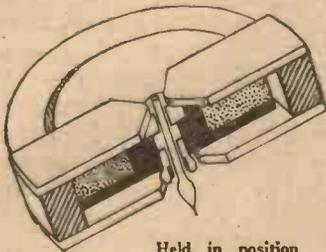


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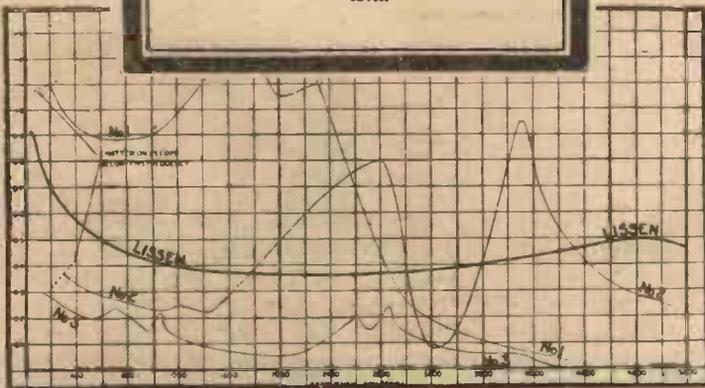
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Held in position by magnetic attraction, without restriction by mechanical contacts.

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Look at curve 1. A particularly fine response for part of its curve, but notice the peaks and depressions and the very serious falling off in output after 2,800 cycles—after 200 cycles it would not remain on the record. In curves 2 and 3 the same deficiencies exist. Now look at the Lissen curve. It is the only even curve. These are actual tests under ordinary conditions. The real significance of the Lissen curve is that you get true musical values from one end of the scale to the other.



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OUR INFORMATION BUREAU



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, lay outs, diagrams, etc., on separate sheets containing your name and address. See announcement below. Address Queries—AMATEUR WIRELESS Information Bureau, 58/61 Fetter Lane, London, E.C.4

Litz Coils and Screen-grid Valves

Q.—In view of the fact that for greatest efficiency Litz wire coils are used, why is it that such coils are not made use of in connection with screen-grid valves? Surely if such coils give more efficient results than ordinary wire coils and the screen-grid valve gives such great amplification, it would be a highly successful combination? I am considering the design of a highly efficient set with one stage of screen-grid H.F., and would like to incorporate Litz wire coils in the circuit. Before experimenting, however, I should value your opinion.—F. C. (Windsor).

A.—Coils wound with Litz wire are certainly more efficient than coils wound with ordinary wire, but it is owing to the great amplification obtainable from screen-grid valves that prevents the use of Litz wire coils. The reason is that from any given valve combination it is only possible to obtain a certain overall degree of amplification, and any attempt to exceed this introduces instability. If you attempt to use Litz wire coils with a screen-grid H.F. valve, you may get instability. It is necessary to sacrifice a certain amount of the actual efficiency or amplification from the receiver in

order to effect complete stability, and it is only by experimenting that the greatest degree of

When Asking Technical Queries

PLEASE write briefly and to the point

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

amplification, coupled with complete stability, can be obtained.—C. A.

Cossor Melody Maker

Q.—I have a Cossor Melody Maker receiver and wish to know if this will be suitable for the efficient operation of a moving-coil loud-speaker. If it is not, I would like to know of suitable alterations to make.—B. B. (Bognor).

A.—The receiver you mention is quite suitable for the operation of a moving-coil speaker provided that a super-power valve is used in the output stage of the set. This will entail applying as much as 200 volts or more H.T. to the anode of the last valve and adding grid bias accordingly.—C. L.

"Hartley DX Three"

Q.—I have made up the above set and get very good results on the ordinary broadcast wavelengths. Not knowing the size of coils required for reception on the Daventry 5XX waveband, I have been unable to try my hand at receiving any of the long-wave stations. Can you assist me in this respect?—W. L. A. (Manchester).

A.—For the reception of long-wave stations such as Daventry 5XX, we advise the use of a No. 200 centre-tapped coil. Such a coil should enable you to get very satisfactory results on other long-wave stations also.—C. L.

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by Public
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at OLYMPIA

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FOR EVERY WIRELESS SET

SUMMED up in a few words, the secret of success with a High-Tension Battery is to choose the correct type of battery for the load it is expected to bear.

Useful information on this point is given in a special table which appears in "Inside Knowledge," a booklet by Mr. Full O'Power, which also contains many other hints and tips which every owner of a wireless set will find both interesting and instructive.

One point in particular should be borne in mind—always use a *power* battery whenever a *power* valve is used. The cost of a power battery is *less than double* that of an ordinary battery, whilst its working life is approximately *three* times as great.

"INSIDE KNOWLEDGE" (On the correct use of Radio Batteries)

is obtainable from Radio Dealers and is free for the asking. If any difficulty is experienced please write direct to

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REFLECTIONS ON THE PARIS WIRELESS EXHIBITION

THE sixth French National Wireless Exhibition was undoubtedly a great advance on previous shows, and the record attendance indicates that the apathy of the French towards broadcasting is passing. The slow development is due to various reasons; primarily there is no proper broadcasting organisation, the stations being run either by private enterprise or by the Post Office, and the natural result is that the programmes lack interest.

This state of affairs has, of course, had its influence on receiver design, for the enthusiastic French listener must be in a position to pick up foreign stations at full loud-speaker strength. The British, German, and Spanish stations are just as popular with the average French enthusiast as the French stations. Until recently, therefore, the super-het. has received the most attention, and sets with seven or more valves were the rule; and it appeared that the greater the number of the valves the more attractive was the set.

Recent Progress

This year, however, there is a noticeable change of policy, and serious attention has been turned to the screen-grid valve for receiver construction, the result being that

the most popular type of set at the exhibition had four valves—two H.F., detector, and L.F.

The introduction of the screen-grid valve has also obviated another difficulty with French listeners. In Paris, landlords object to having the buildings spoilt by aerials, and in the provinces, particularly in southern and central France, because of the great frequency of thunderstorms in summer, there is some reluctance to erect outdoor aerials. Frame aerials are therefore the most popular.

A striking feature in the French sets is the beautiful cabinets, generally of polished mahogany, which are used. Most of them have only one or two control dials, and on the whole they are most artistic productions.

Loud-speakers do not show any remarkable development since last year. Moving-coil speakers have not attained any degree of popularity, and there were not many on show. One that particularly attracted attention is made by the Etablissements Kraemer.

Compared with England, the percentage of listeners who make their own sets is very small indeed. Consequently, components such as transformers, resistances,

chokes, switches, etc., are not nearly so attractive in design and finish as they are in this country.

One novel component was a very interesting instrument called the Autorcx, comprising two gapped condensers operated by a single knob, which is connected to two pointers moving along a curve indicating the wavelength of the station received.

The leading French valve manufacturers, Radiotechnique and Metal, were showing their new series of valves of which the characteristics are exactly similar to those of the British manufacturers. One noticed among the new valves many screen-grids and pentodes. Mains valves are increasing in popularity, and the Radio Reseau valves are to be found in several of the mains sets manufactured by leading makers.

The general impression obtained of the Salon is that the progress of wireless in France is slower than over here, but this is probably due to the fact that any systematic broadcasting organisation is not in being. The public, however, is displaying an increased keenness, and there is no doubt but that wireless sets will be found in practically every home as soon as there are interesting programmes which may be listened to with fairly inexpensive sets.

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7/9

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SUPERIOR (Single Capacity)	1/6
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108 "	12/9
SUPREME (Triple Capacity)	13/6
60 volts	14/3
63 "	15/0
100 "	22/0

Ask your dealer for a copy of "A Bit about a Battery."

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This reproduction shows part of the filament of a badly coated valve before use, showing a serious gap in the coating. A gap such as this starts the valve off in its life with a poor performance. The valve then prematurely fails.

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LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

The Programmes

SIR,—May I express to you some comments on the B.B.C. programme policy that seem to be in accord with some of those expressed by Mr. Moseley from week to week.

I think we have too large doses of the best music and that we should have none of those conglomerate, unharmonising sounds called "modern" music; that we have too much of noisy bands; that all insistent repetition of certain notes or musical phrases should be absolutely avoided, such noises being most irritating to those with nerves (and who hasn't nerves since 1914); that we have too much talk; that on Sundays we are the victims of religion-mad puritanicals, and, to cap it all, that the tuning dials of a very large number of wireless listeners are now swamped with an overdose of powerful signals.

On former occasions, I have often written approvingly to Savoy Hill *re* some

of their programme features. But, after a tactless and rather insulting reply to my adverse criticism, I not only listen-in much less often, but have my switch handy and use it—in disgust.

Are you not rather bored also by the super-abundance of yankee twang and twaddle?
H. S. H. (London, W.).

Are We Progressing?

SIR,—I have been very interested in the correspondence under the above heading, and should like to take this opportunity of saying that I have proved the contentions of P. (London, S.E.) to be right by practical test. A friend of mine suggested the following for obtaining quality results from Daventry: Crystal detector, Marconiphone 8-1 ratio transformer, PM1, B.T.H. 4-1 ratio transformer PM2 output to L.S. through Pye 20-henry choke and 2-mfd. condenser. The aerial circuit is the same as used in the B.B.C. crystal circuit. I may say that I showed

this arrangement to another friend who is a "pukka" wireless engineer, and he held up his hands in pious horror condemning it wholesale, suggesting that I should get three stations at once, etc. I am delighted with the results: splendid volume with a delightful purity on 5GB and 5XX, and, as I am a trained singer, I understand something about what one ought to hear in orchestral and singing reproduction. My speaker is a Primax Sterling about five years old, and I intend to try the above with a double linc-diaphragm speaker shortly. I should be interested to hear the comments of "Thermion" on this correspondence.

S. (Leicester).

Radio Catalana

SIR,—In the issue of AMATEUR WIRELESS, November 16, M.D.A.K. (Sheffield) reports having heard EAJ13 on October 30 on a wavelength below that of Kaiserslautern. The wavelength of 268 metres (1,121 kilocycles) was allotted to Spain in the *Plan de Prague*, and Radio Catalana on occasion has broadcast on that wavelength. On the other hand, I have ample confirmation, not only from personal observation, but from reports received, that this station has been working on 464 metres, as I mentioned at the time.

As to the transmission between Barcelona (EAJ1) and Brno, I am of opinion
(Continued on page 848)

HELLESEN

DRY BATTERIES



Verb. Sap.

RIDLEY told me at the Club last Monday that he had been consulted regarding the purchase of a Portable for a friend. There had been sixteen makes of set on his original list, but he had whittled the choice down to three when I saw him.

What interested me, though, was that of the original sixteen, every one was fitted as standard with Hellese's H.T. Batteries. "Naturally," he replied when I remarked on this fact, "It's the first thing I look for. If a manufacturer standardises Hellese's, the odds are that the other components he fits will be up to the same high quality. And anyway an H.T. Battery that has to fit a small space and yet supply four or five valves with juice for months on end needs to be a Hellese's and nothing less."

"Verb. Sap." I thought.

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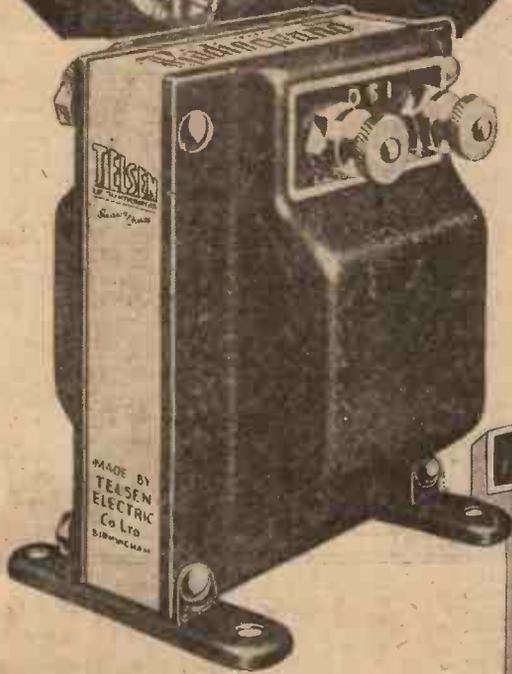
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(See this issue)

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Broadcasting stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is aerial energy.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN											
25.53	11,751	Chelmsford (5SW)	15.0	*286		Montpelier (PTT)	0.2	*441	680	Rome (Roma)	3.0
*200	1,500	Leeds (2LS)	0.13	288.5	1,040	Mont de Marson	0.3	453	662	Bolzano (IBZ)	0.3
*242	1,398	Belfast (2BE)	1.0	291.4	1,029.3	Radio Lyons	0.5	*501	599	Milan (Milano)	7.0
*288.5	1,040	Newcastle (5NO)	1.0	*294	1,020	Limoges (PTT)	0.5	YUGOSLAVIA			
288.5	1,040	Swansea (5SK)	0.13	304	986	Bordeaux (PTT)	1.0	308	973	Zagreb (Agram)	0.7
288.5	1,040	Stoke-on-Trent (6ST)	0.13	305.6	981.7	Agen	0.25	429	698	Belgrade	2.5
288.5	1,040	Sheffield (6LF)	0.13	309	970	Radio Vitus	1.0	575.5	521.2	Ljubljana	2.5
288.5	1,040	Plymouth (5PY)	0.13	*316	950	Marseilles (PTT)	0.5	LATVIA			
288.5	1,040	Liverpool (6LV)	0.13	329	914	Grenoble (PTT)	0.5	*525	573	Riga	3.0
288.5	1,040	Hull (6KH)	0.13	331.4	903	Petit Parisien	0.5	LITHUANIA			
288.5	1,040	Edinburgh (2EH)	0.35	364	824	Algiers	12.0	*1,935	153	Kovno	7.0
288.5	1,040	Dundee (2DE)	0.13	368	815	Radio LL (Paris)	0.5	NORWAY			
288.5	1,040	Bournemouth (6BM)	1.0	*381	788	Radio Toulouse	8.0	240	1,250	Rjukan	0.18
288.5	1,040	Bradford (2LS)	0.13	411	729	Radio Maroc (Rabat)	2.0	*283	1,058	Notodden	0.05
*301	995	Aberdeen (5BD)	1.0	447	671	Paris (Ecole Sup. PTT)	3.0	384	824	Bergen	1.0
*310	968	Cardiff (5VA)	1.0	468	640	Lyons (PTT)	5.0	*394	761	Frederiksstad	0.7
356	849	Brookman's Park 30		1,444	207.5	Eiffel Tower	12.0	453	662	Tromsø	0.1
*377	797	Manchester (8ZY)	1.0	*1,725	174	Radio Paris	12.0	453	662	Aalesund	0.3
*390	753	Glasgow (5SC)	1.0	GERMANY				453	662	Porsgrund	0.7
*479	626	Daventry (5GB)	25.0	*218	1,373	Flensburg	0.5	*493	608	Oslo	1.5
1,554	493	Daventry (5XX)	25.0	*227	1,319	Cologne	4.0	POLAND			
AUSTRIA											
*240	1,220	Linz	0.5	*234	1,283	Muenster	3.0	959	959	Cracow	0.5
*283	1,058	Innsbruck	0.5	*239	1,256	Nurnberg	2.0	385	779	Wilno	0.5
*352	851	Graz	7.0	*246	1,220	Kiel	0.35	*488	734	Kattowitz	10.0
*453	666	Klagenfurt	0.5	*246	1,220	Cassel	0.25	*1,411	212.5	Warsaw	8.0
*517	581	Vienna	15.0	*253	1,184	Gleitwitz	2.0	ROUMANIA			
CZECHO-SLOVAKIA											
*263	1,139	Morava-Ostrava	10.0	*259	1,157	Leipzig	1.5	*394	761	Bucharest	12.0
*270	1,076	Bratislava	12.5	*270	1,113	Kaiserslautern	0.25	RUSSIA			
*293	1,022	Kosice	2.0	*276	1,085	Koenigsberg	2.5	*351	855.5	Leningrad	1.0
*342	878	Brunn (Brno)	2.4	*283	1,058	Magdeburg	0.5	*427	702.5	Kharkov (NKO)	4.0
*487	617	Prague (Praha)	5.0	*283	1,058	Berlin (E.)	0.5	*483	621.5	Hemel	1.2
BELGIUM											
235.5	1,273.3	Scharleroy (LL)	0.25	*283	1,058	Stettin	0.5	825	364	Moscow (PTT)	20.0
250.9	1,196.6	Schaerbeek-Brussels	0.25	*319	941	Dresden	0.25	1,000	300	Leningrad	20.0
250	1,200	Ghent	0.5	*319	941	Bremen	0.35	1,090	283	Tiflis	10.0
270	1,112	Radio-Binche		*325	923	Breslau	1.5	1,100	272.7	Moscow Popoff	40.0
294	1,020	Liege	0.1	*360	833	Stuttgart	1.5	*1,304	230	Kharkov	4.0
312	961.4	Arlon	0.25	*372	806	Hamburg	1.5	1,481	202.5	Moscow (Kom)	40.0
339	887	Louvain	8.0	*390	770	Frankfurt	1.5	SPAIN			
*509	599	Brussels	1.0	*418	716	Berlin	1.5	251	1,193	Almeria (EAJ18)	1.0
DENMARK											
*281	1,067	Copenhagen (Kjobenhavn)	0.75	*453	662	Danzig	0.25	314	956	Oviedo (EAJ9)	0.5
1,153	260	Kalundborg	7.5	*450	657	Aachen	0.35	*349	860	Barcelona (EAJ1)	8.0
ESTHONIA											
*297	1,020	Reval (Tallinn)	0.7	*473	635	Langenberg	13.0	368	815	Seville (EAJ5)	1.5
FINLAND											
*221	1,355	Helsingfors	0.0	*533	563	Munich	1.5	403	743	San Sebastian (EAJ8)	0.5
*1,706	167	Lahti	40.0	*560	536	Hanover	0.35	428	700.9	Madrid (EAJ7)	2.0
FRANCE											
31.65	9,479	Radio Experimental (Paris)	1.0	*566	529.8	Augsburg	0.25	453	662	Salamanca (EAJ22)	1.0
175	1,714	S. Quentin	0.1	675	521.7	Freiburg	0.35	465	645	Barcelona (EAJ13)	8.0
212.8	1,410	Fécamp (Radio Normanie)	0.5	*1,635	183.5	Zeesen	30.0	SWEDEN			
220	1,364	Beziers	0.1	2,100	142	Norddeich	10.0	231	1,301	Malmö	0.6
237	1,265	Nice (Juan-les-Pins)	0.5	2,290	131	Norddeich	10.0	*257	1,160	Hoerby	10.0
288	1,260	Bordeaux (Radio Sud-Ouest)	1.0	31.4	9,554	Eindhoven (PCJ)	25.0	270	1,113	Trollhattan	0.45
239	1,256	Radio Nimes	0.25	*238	1,004	Hilversum (until 5.40 p.m. G.M.T.)	6.5	*322	933	Goeteborg	10.0
*255	1,175	Toulouse (PTT)	1.5	*238	1,004	Hilversum (5.40 p.m. G.M.T.)	6.5	322	933	Falun	0.5
*265	1,130	Lille (PTT)	0.7	*1,071	280	Hilversum	6.5	*436	669	Stockholm	1.5
268	1,121	Casablanca	0.5	*1,071	280	Scheveningen-Haven	5.0	*542	554	Sundsvall	0.6
268	1,121	Strasbourg	0.3	*1,875	160	Huizen (after 5.40 p.m. G.M.T.)	6.5	*770	389	Ostersund	0.6
*272	1,103	Rennes (PTT)	0.5	550	545	Budapest	20.0	1,200	250	Boden	0.6
GERMANY											
GRAND DUCHY											
HOLLAND											
HUNGARY											
ICELAND											
IRISH FREE STATE											
ITALY											

All wavelengths marked with an asterisk have been allotted according to the Plan de Prague.

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

- Nov. 27 Louise, an opera.
- " 28 Hallé concert, S.B. from Manchester.
- " 29 Roland, a play adapted by E. A. F. Harding.

DAVENTRY EXPERIMENTAL (5GB)

- Nov. 25 Louise, an opera.
- " 26 Roland, a play adapted by E. A. F. Harding.
- " 27 A symphony concert.
- " 29 An hour of requests.
- " 30 You're Through, a revue.

MANCHESTER

- Nov. 29 Hallé concert.

during the coming season. Groups of players who are to participate include the Garrick Players, the Ardrossan and Salt-coats Players, the Kirkintilloch Players, the Lennox Players, the Dumfries Guild of Players, and the New Trows Players, among country organisations, while the cities will be represented by the Labour College Players, the Locksmiths, and the Kelvinside Dramatic Club, from Glasgow, and the Edinburgh Philosophical Institution Players.

The longest transatlantic telephone call that has ever been made from London to New York was one which lasted ninety-five minutes and cost £285.

Productions of numerous Scots plays are being made by the B.B.C. in Scotland

10/- brings this everlasting H.T. Unit

NEVER RUNS DOWN
NEVER NEEDS RENEWING



Model A.C.16. for Alternating Current.

Our Wonderful offer to radio listeners

To those who have electric light in the home, this "Atlas" H.T. Unit Model A.C.16, represents the last word in the perfecting of their Radio Sets. It has been produced to supply from the Mains the High Tension demands of any set from one to five valves and specially caters for sets using Screen-Grid Detector and Pentode

Valves, and is ideal for use with any portable set when used in the home. It is yours for a first payment of 10s. (less than the cost of an H.T. Battery) the balance you pay in nine monthly instalments after which the cost for H.T. current is practically finished for all time as the current consumed is practically nothing. Technical knowledge is not required to adapt this "ATLAS" H.T. Unit to your Set—all you do is attach it to a lamp socket or wall plug, and connect the terminals to your set as you do a Battery or Accumulator.

The Secret of Perfect Reception is H.T. Current

No matter what your Set consists of, Perfect Reception absolutely depends upon consistently powerful High Tension Current. You cannot get efficiency from H.T. Batteries. They lose power from the moment you connect them to your Set, and their actual life is always an unknown quantity. The expense of Dry Batteries

may be anything from 50s. to £6 per annum, according to your Set. Surely this is a matter for serious consideration. Why tolerate the trouble and expense of Batteries? "ATLAS" High Tension Units provide the ideal method of obtaining High Tension supply, cheaply and absolutely efficient from either A.C. or D.C. Mains at a cost now well within the reach of every radio listener having electric light in the home.

CLARKE'S "ATLAS" BATTERY ELIMINATORS

are made to provide maximum safety in use and are fully covered for twelve months by the "ATLAS" guarantee. Send for our New Folder No. 44, which gives details of all "ATLAS" H.T. units, any of which can be had on our easy payment system.

Model A.C.16, for Alternating Current is the finest H.T. Unit yet produced at anywhere near the price and is suitable for any set from one to five valves. Provides two fixed tapplings of 120 and 150 volts, respectively and one variable 0/100 volts. Output, 150 volts at 25 m/A.

CASH PRICE £4 : 10 : 0
If you are on D.C. Current order Model D.C. 16.

POST THIS COUPON TO-DAY
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Messrs. H. Clarke & Co. (M/cr), Ltd. (Dept. 3N), Atlas Works, Old Trafford, Manchester. Please send your Folder No. 44, along with particulars of your easy payment scheme.

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ADDRESS

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9'6

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LONDON, N.W.1

BROWNIE

"LETTERS TO THE EDITOR"

(Continued from page 844)

that M.D.A.K. refers to the new Belgian 8-kilowatt station at Louvain-Velthem, which now works regularly on 339 metres. The only two vacancies existing between 342 metres (Brno) and 349 metres (EAJr) are (a) 347 metres occupied by a small Russian transmitter (Piatigorsk) and (b) 345 metres reserved to the new Strasbourg (France) station under construction; but the latter berth does not yet appear to have been jumped by any interloper.

JAY COOTE (London).

Two Fine Combinations

SIR,—I think it only fair to tell you that my friend and I built the "All-Britain Three" and linen-diaphragm speaker. I must say the tone is splendid: music and voice all are so natural.

I have since built the wavetrap suggested for the "Knife-edge Three," and it suits admirably. I can get Hamburg any night quite free from the London regional.

Thanking you for such a fine combination, "ALL BRITAIN" (Bushey).

"Is the Regional Scheme Possible?"

SIR,—Your contributor, Mr. Hallows, may be expressing the views of listeners living close to the regional transmitter, but he would do well to remember that the largest part of the population need high power to obtain good results from simple valve sets.

Neither do the majority bother much about foreign stations, so much of whose transmissions are not understood by them.

A. H. P. (Topsham, Devon).

Accorchage?

SIR,—Under "Have You Noticed" on page 762 of last week's issue of AMATEUR WIRELESS the writer has used the word "accorchage." This is undoubtedly an error and should read *accrochage*, as I can find no such French word.

In my opinion, it is simple to see how the word came to be applied to the condition of a set in a state of oscillation. Apart from meaning "hanging together," the word also implies "catching" in the sense of locking together, and this obviously refers to a state of coupling which produces self-oscillation. C. H. A. (London)

NEXT WEEK :

PRELIMINARY DETAILS
OF THE
"1930 ETHER SEARCHER"
AND
THE BEGINNER'S
ONE-VALVE AMPLIFIER

Scrap your Old Out-of-date Set!

BUILD A NEW SET NOW
AND PAY AS YOU LISTEN

You can get the very best out of Radio for a small monthly payment. Why not build a new set or bring your old receiver up-to-date? Let us help you.



COMPLETE KITS supplied for all "Amateur Wireless" Circuits and all well-known sets—a few examples of our terms are given below:—

- COSSOR 1930 KIT. CASH £8.15.0. Send only 16/-, balance by 11 monthly payments of 16/-.
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- MULLARD ORGOLA KIT. CASH £10.12.11, including Valves and Cabinet. Send only 17/10, bal. by 11 monthly payments of 17/10.
- EKCO MODEL 3 F.20 (A.C.) CASH £3.19.6. Send only 7/3, bal. by 11 monthly payments of 7/3.
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Loud Speakers, H.T. Units. Accumulators, Moving Coil Speakers, Portables, etc.

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The SOVEREIGN 400 ohms POTENTIOMETER

is being used in thousands for the "Magic Tree" Receiver fully described in recent issues of "Popular Wireless." Bakelite former; terminal connections; silent; beautifully made.

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CONE KIT—a perfect suspension—cute, cheap

The Sovereign Cone Kit provides commercial efficiency at a quarter the cost. Full assembly details in envelope with Cone, the Spider ready for immediate assembly. J. R. products are stocked by all dealers throughout the country. In cases of difficulty apply to the manufacturers:

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ROTARY BATTERY SWITCH

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Pentode attachment only for use with existing Clearer-Tone Valveholders or Vibroiders, 3d. each.



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Designed for use with the new 5-pin valves with centre leg. The well-known Benjamin anti-microphonic feature is incorporated, and also patented contact, which ensures perfect contact for all types of valves

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2/-

The BENJAMIN VIBROIDER was last season's most successful accessory, the self-aligning feature ensuring positive contact with all types of English 4-pin valves.

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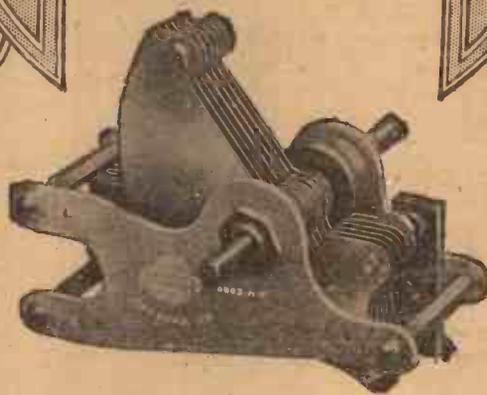
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Bring your present set up-to-date and make your new set a credit to you by fitting Igranic "Lokvane" Condensers.

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PRICE
18/6

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We shall be glad to send you on request our Folder No. 102, showing you how to make up a very fine Loud-speaker from a Kit of parts, also Folder and Blueprint for building up a modern 3-Valve set.

Watmel

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YOUR FINAL CHOICE!



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SAC LEECLANCHE

PERMANENT H.T. BATTERY

NEW CARTRIDGE REFILLS

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There is little doubt that the Cartridge Sac has made this wonderful permanent Wet Battery a really worth while proposition, that no listener who studies facts can seriously afford to overlook.

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IT OUTRIVALS THE DRY BATTERY

There is absolutely no reason why you should continue to put up with the constant expense of buying dry batteries. The Standard Battery is not an experiment, over 10,000,000 Standard cells are in use, proof positive of their efficiency and reliability. The exceptionally steady current they supply improves the clarity and purity of tone, out of all recognition. They stand up to the hardest service far better than any dry battery, because they are self-regenerative and when not in use, the battery is recharging itself.

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YOU CAN REFILL the STANDARD H.T. BATTERY AT HOME

With the wonderful Cartridge Refills. You merely purchase the requisite number of refills at low cost, and the operation of refilling is simplicity itself. The battery is then just as good as new! Upkeep costs, compared with dry batteries are usually 50 per cent. less. These are absolute proven facts. A hundred thousand satisfied users bear testimony to Standard, and we seriously ask all listeners to write now for the famous Standard Battery Booklet, that tells you all about this money saving, super efficient H.T.

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SPECIAL OFFER:
No. 3. Cartridge model battery 95 v. (15 m.a. capacity) comprising 32 cells with lid, electrolyte chemical. Cash £2 13s. 10d. for 9/5 down and 5 equal monthly payments of 9/5.

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Wide research and experience are behind these new components. Every Eliminator is tested to over 1,000 volts A.C. for breakdown and complies in every way with I.E.E. regulations.

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"A" Series : Carrying Capacity		"B" Series : Carrying Capacity	
20 Henries ..	170 m.a.	30 Henries ..	55 m.a.
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	Price 37/6		Price 25/-

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High efficiency with first-class workmanship. Tested to over 1,000 volts A.C. for breakdown. Comply with I.E.E. Regulations in every respect. Blueprint of suggested circuit supplied with each transformer. **AMT/50.**—Primary tapped for all A.C. voltages. Secondary 200+200 volts. Full wave. 45 milliamps output. Filament-heating, 2 volts+2 volts—4 amps. output. 2.5 volts+2.5 volts, 2 amps output. Price 65/- **AMT/100.**—Primary tapped for all A.C. voltages. Secondary 400+400 volts full wave, 100 milliamps output. 200+200, 45 m.a. For G.B. or intermediate or both. Filament heating 4+4 volts—3 amps. output, 2+2 volts—3 amps. output, 2.5+2.5 volts—2 amps. output, 2.5+2.5 volts—2 amps. output. Price 105/-

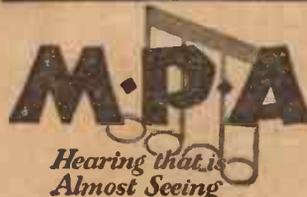
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For H.T. and G.B. supply. Another product of the M.P.A. Research Laboratory. 20,000 ohms resistance for Grid Bias and 2,000 ohms (heavy duty) for H.T. supply. 8 values H.T., 20 tappings G.B. in one-volt steps. Carrying 50 m.a. on H.T. tappings. Price 7/6



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RADIO OR
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AT THE TOUCH OF A SWITCH!

*The Instrument which converts
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Specification: Garrard double spring motor with 12 in. Turntable, B.T.H. Pick-up, double balanced Armature Speaker, handsome Oak Cabinet, french-polished antique finish. Height, 3 ft.; width, 23 in.; depth, 17 in.

PRICE £12 19s. 6d.

The Adaptagram is also supplied as a complete Radio Gramophone, incorporating our famous 3-valve Screened Grid Receiver in the following models:—

Model B.D., for Battery Operation £27 15 0

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Secondary (1) 135 volts, 70 milliamps.
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Operating with Westinghouse H.T.3 and H.T.4 rectifiers, and all 4 volt A.C. valves.

Full lists and diagrams free.

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OFF TO AUSTRALIA

MR. JOHN RITCHIE, lately connected with the Marconiphone Company, Limited, left St. Pancras on Saturday morning, November 9, on his way to take up his appointment as manager of the Australasian branch of the Gramophone Company.



The presentation to Mr. Ritchie, at St. Pancras

Just before the train started his colleagues presented him with the new model Marconiphone portable receiver, the actual presentation being made by Mr. C. W. Charlesworth, the general manager of the Gramophone Company.

A SPARKLESS COMMUTATOR

ONE drawback to the use of an electric motor for driving the turntable in an electric gramophone amplifier is the tendency of the motor to produce noise owing to sparking at the brushes. According to a French inventor this can be remedied by connecting all the commutator segments together through a resistance large enough to prevent any considerable leakage of current, but having sufficient conductivity to make the usual sparking impossible.

B. A. R.

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MANCHESTER EXHIBITION
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**1st PRIZE 1st CLASS
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**1st PRIZE 2nd CLASS
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"EVERYBODY'S 3," SCREEN
10x6 in. as specified - - 2/-

S.G. Valve Holder "L" type, 2/-

WORLD-WIDE Short-wave 3,
Special Cabinet, as specified, 21/-

A.B.C. Coils - - - 5/- each

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STYLE H.T.4
PRICE 37/6

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BATTERY ELIMINATORS
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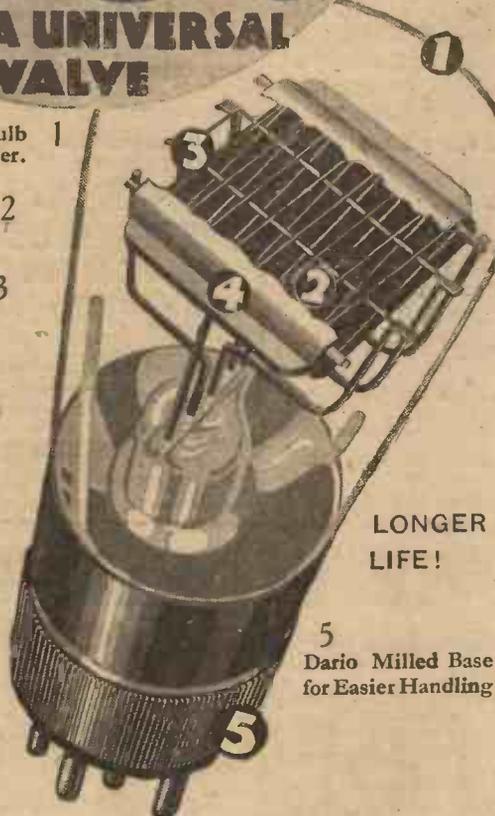
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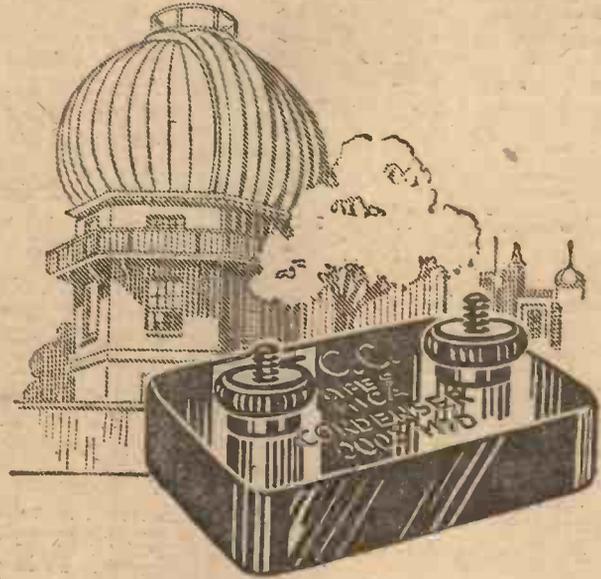
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IN Germany free listening licences are to be granted to persons who through some serious infirmity or advanced age are not able to leave their homes to attend theatrical or other performances.

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Chicago broadcasting station WENR is the latest station in the United States to start television broadcasting. Its low-wave station, W9XR, has just been granted a licence by the Federal Radio Commission. It will broadcast daily from 3 to 4 and 7 to 10 p.m.

Arrangements have recently been made to instal at an early date a short-wave radio telephone equipment on board the *Olympic*. It is anticipated that, as the result of experiments made with this installation, passengers in the *Olympic* will be enabled to telephone from mid-ocean to their homes or places of business.

The transatlantic telephone service was enlarged on October 1 to include all points in Czechoslovakia.

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New, highly sensitive, made on the latest principle, a vast improvement over all other types; will pick up whispered words from a distance of several yards, also strongly amplify and transmit speech and music over a distance, through Loud-speaker or Headphones. Splendid instruments for making Detectaphone, Deaf-aid, Loud-speaking Telephone, Announcements through Loud-speaker, Amplifier for Crystal or Valve Sets, Electric Sound Detector, Experiments. No other Microphone of equal sensitiveness known; each instrument finely black enamelled and fitted with a 3-ft. silk connecting cord. Despatched by return post. 8/6



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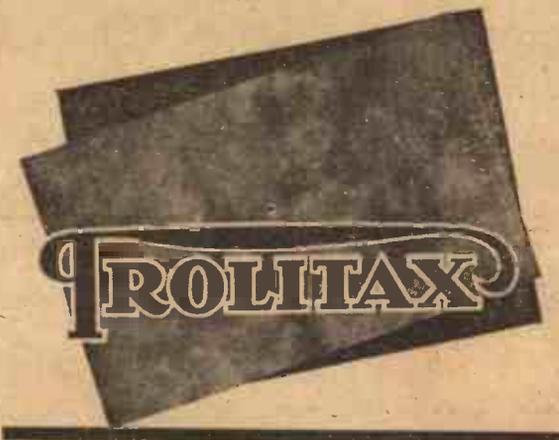
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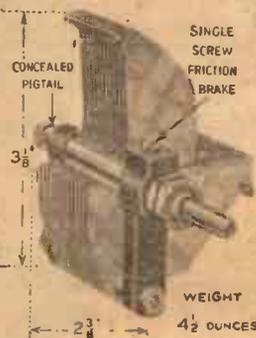


THE WORLD-WIDE SHORT-WAVE THREE



of which details appear in last week's issue, definitely specifies

"1930" LOG CONDENSERS



CAPACITIES

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Price **4/6**

BE WISE. USE ONLY Components specified by the Designer.

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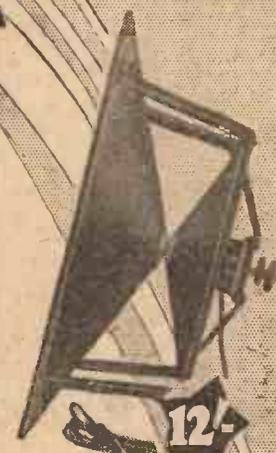
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Inside Your Loud-speaker, by W. JAMES. How various types of instruments actually work.

Tests of the New Season's Best Sets, complete sets, kits and chassis, as well as mains units, reviewed after test in the new "W.M." Laboratory.

Why Signals Fade, by J. H. REYNER, B.Sc., A.M.I.E.E.

"W.M." Set Buyer's Guide—more than 170 sets listed in convenient price groups for easy reference. Free help on final choice available for all readers.

Everybody's Guide to Loud-speakers for 1930. Moving-coil loud-speakers, cone loud-speakers, chassis and units listed for quick reference. Over 70 illustrated and many actually tested by the "W.M." Technical Staff.

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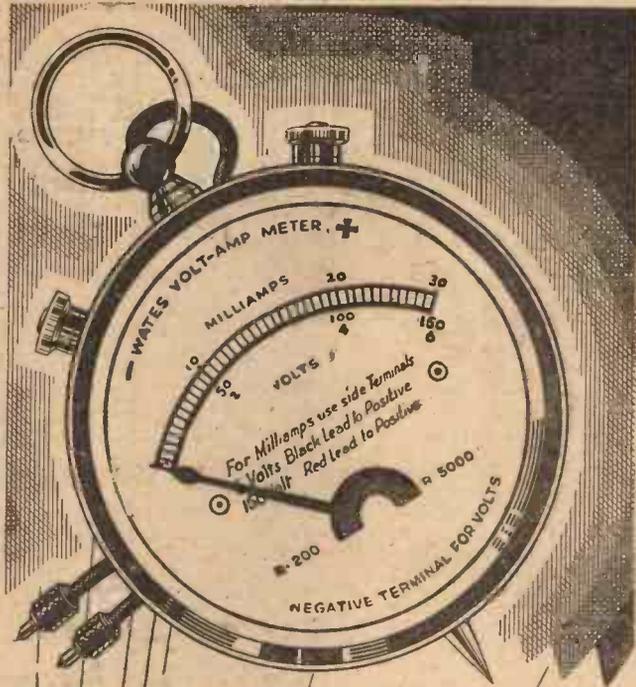


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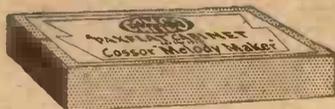
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COMMUNITY 3

(W. Mag. November)
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A RECENT paper in the proceedings of the Institute of Radio Engineers points out that man-made interference with radio reception is becoming so serious as to make further improvements in methods of reception and of elimination absolutely imperative. An analysis of a series of complaints made by broadcast listeners in America to one of the large electric power-supply companies showed the following division of responsibility for artificial "static": 30 per cent. to industrial appliances, such as factory power plant, tram lines, etc.; 25 per cent. to household appliances, such as vacuum cleaners, refrigerators, etc.; and 28 per cent. to miscellaneous causes, including defects in the receiving apparatus; the remaining 17 per cent. was admitted to be due to defects in the supply companies' own generating plant and fittings.

B. A. R.

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MODERN molecular pumps, such as those used in valve manufacture for exhausting the glass bulb, are capable of reducing the residual gas pressure to approximately the one ten-thousand-millionth part of the normal atmospheric pressure. Even with this degree of exhaustion there are more than a thousand million molecules of gas left in each cubic centimetre inside the bulb. It is obvious that we have still a long way to go before we can produce an artificial vacuum comparable with that supposed to exist inter-stellar space.

M. A. L.

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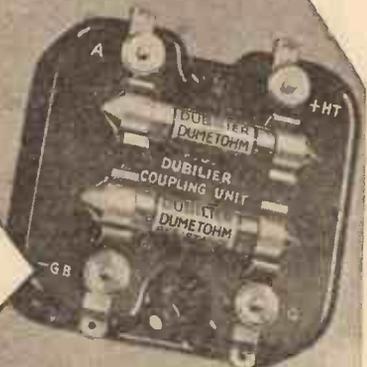
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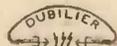
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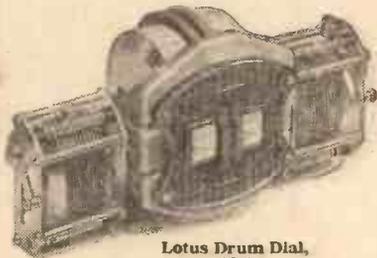
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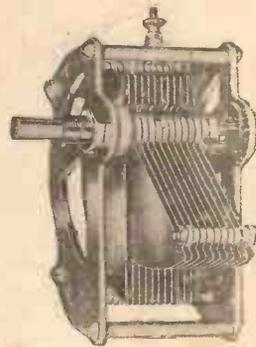
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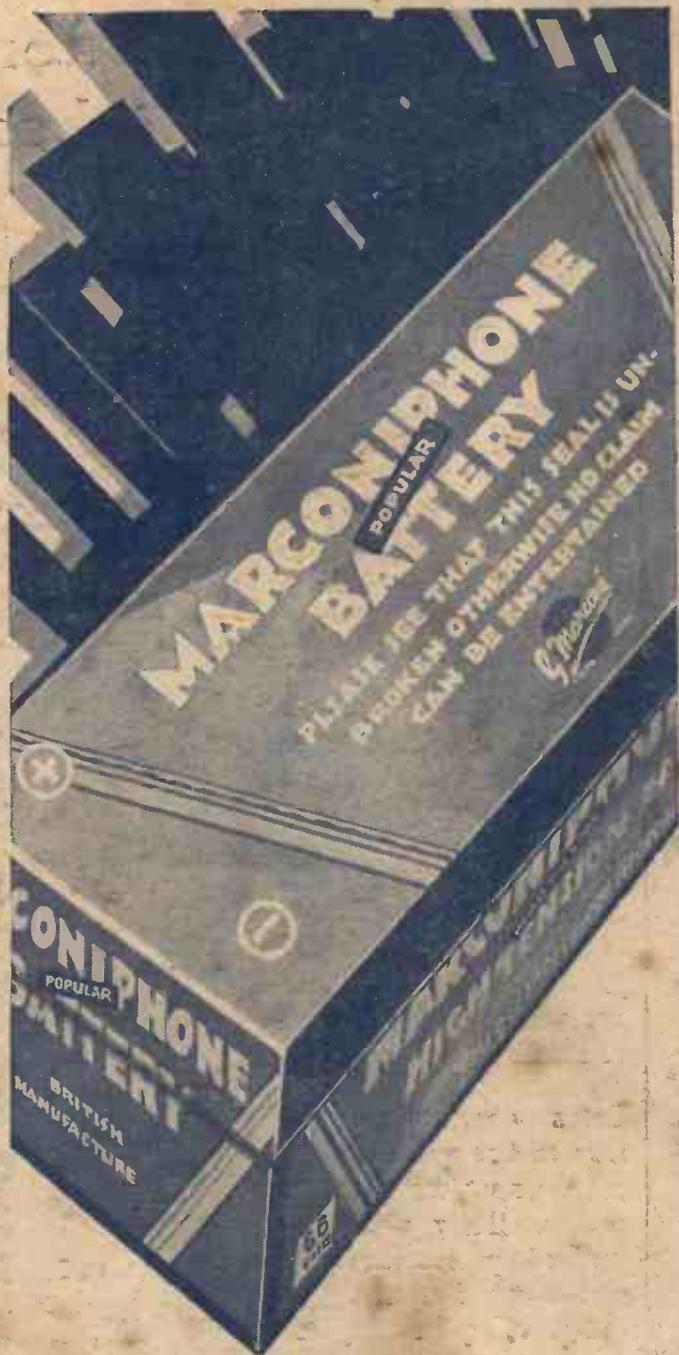
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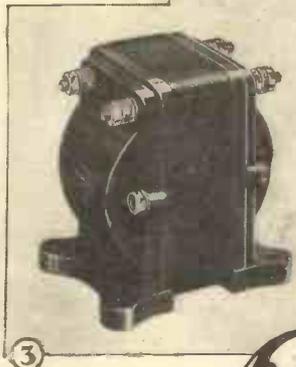
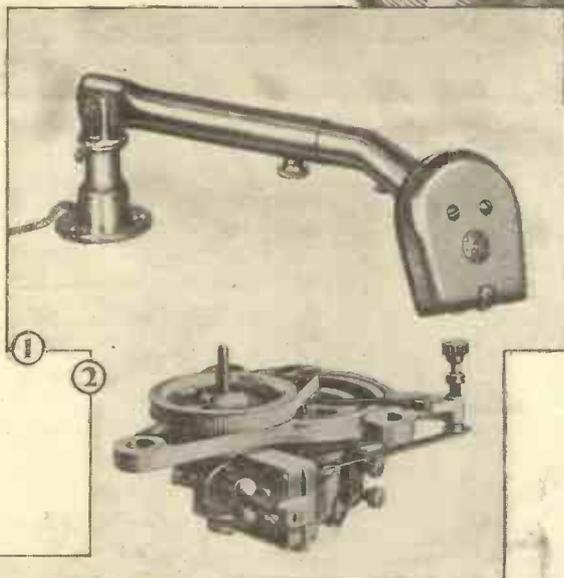
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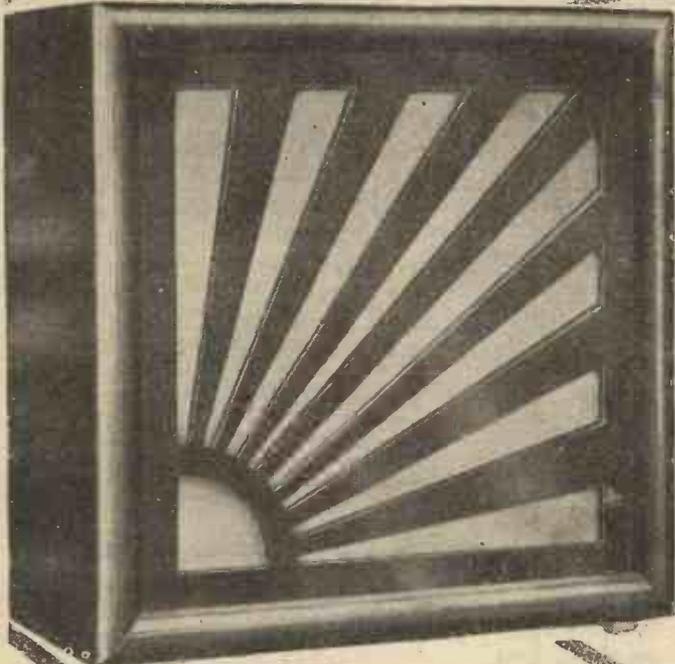
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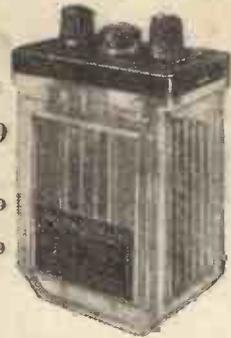
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The beginning and the end in

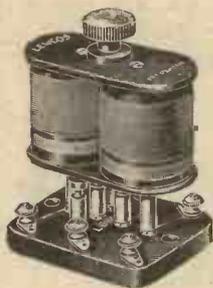
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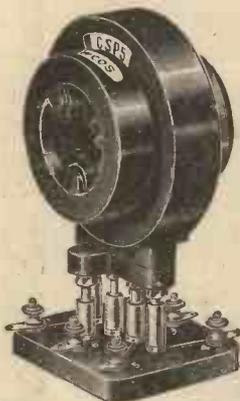
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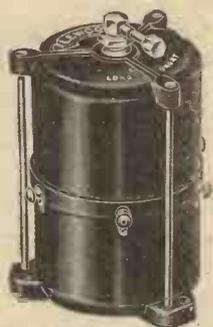
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For Triodes and screened-grid valves. Wavelength range: 235 - 550 and 1,000 - 2,000 metres.



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Fully descriptive leaflets of the Coils illustrated above will be sent on request.



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**2-volt type
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The *NEW* Cossor 220
S.G. (2 volts, 2 amp.)
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Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

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Assistant Editor: H. CORBISHLEY

The New Brookmans Park—The "Palace" Broadcasts—No Kipling—Trouble in the States!—That Television Bugbear—Our Christmas Issue

The New Brookmans Park—Have you heard the second transmitter at Brookmans Park yet? This is occasionally to be heard working at "off" hours of the day. The B.B.C. tells us, though, that matters are not yet quite complete, and the two transmitters won't be working together till about next February.

No Politics, please!—Mr. Winston Churchill will be installed as Chancellor of Bristol University on December 13, and it is expected that his address will be relayed through Daventry 5XX as well as Cardiff.

The "Palace" Broadcasts—With Solomon as soloist and Sir Landon Ronald as conductor, the next B.B.C. concert at the People's Palace, on December 5, should prove one of the most popular of the season. These People's Palace broadcasts are really good, as we had occasion to remark at the beginning of the last season. Last week our radio critic said anent these concerts: "I advise any listener who wants to see as well as hear a cheap and good evening's entertainment to go to the Mile End Road. The bus passes the door."

No Kipling—So we are not to hear Kipling after all, for the B.B.C. announces the cancellation of the proposed broadcast of a speech by Mr. Rudyard Kipling from the annual banquet of the United Associations of Great Britain and France in London on December 12. Mr. Kipling has been ordered abroad for health reasons and will, therefore, be unable to attend the function. Instead, we are to have speeches by Lord Derby, Mr. Arthur Henderson, M.P., and the French Ambassador, M. de Fleuriau.

Trouble in the States!—"Return of favourable radio reception conditions indicates that with the utilisation of the screen-grid tubes possessing such high amplification factors, the Federal Radio Commission has still a considerable problem before it is completing the re-assignment of stations so that heterodyning may be further reduced, if not eliminated. Scores of stations of comparatively weak



A peep inside the van used for detecting oscillators. It is now touring Scotland—so tune with care!

power are now coming through. Stations quite far apart simultaneously using a common wavelength are noticeably clashing." So says one of the most prominent set manufacturers in the States, Mr. Alfred H.

Grebe. The comments on American broadcasting made in AMATEUR WIRELESS, when two of its staff members made a U.S. tour last summer, are now really proving true. The States seems to be having a kind of Prague Plan bother of its own.

That Television Bugbear—It is generally reckoned that a radio television transmission must take up a wider frequency band than a normal telephony transmission. But now we hear that two Chicago radio engineers, Prof. L. P. Garner and U. A. Sanabria of the Western Television Corporation have developed an experimental television system requiring only about half the usual waveband formerly believed necessary for good radio picture transmission and reception.

A Giant C.N.R. "Hook-up"—The Canadian National Railways will give twenty-five national broadcasts this winter over its new Atlantic-to-Pacific wireless "chain." This is the most ambitious programme so far attempted in Canada. It involves the use of sixteen stations, stretching from Halifax, N.S., to Vancouver, and approximately 15,000 miles of land line. Some conception of the engineering difficulties involved in giving effect to the scheme may be gained from the fact that five different time zones are covered, each representing a difference of one hour.

Our Bumper Christmas Issue—Whatever you do, don't miss our Finest Christmas Special Number, on sale Thursday next. It will be the usual price—3d.—so the special features and extra pages will be a kind of advance Christmas present to "A.W." readers! This issue will be full of splendid fare—articles by John L. Baird, Tommy Handley, Baynham Honri, Captain Round, R. W. Hallows, T. Thorne Baker, J. Godchaux Abrahams, to mention only a few. Now turn to page 866, where are given preliminary notes by the designers of the simplest, newest, and most satisfactory "three." And make sure of your copy of next week's issue!

PRINCIPAL CONTENTS

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DESIGNING THE "1930 ETHER SEARCHER"

How Messrs. Sieger and Hunter of our Technical Staff Tackled a Big Problem

FOLLOWING our preliminary remarks last week, many AMATEUR WIRELESS readers—especially those who built the original "Ether Searcher"—will be looking forward to more details of our new set, the "1930 Ether Searcher." First of all, we must make it clear that the new set is entirely new, retaining nothing of the original "Ether Searcher" design.

We did start with the original set and endeavoured to produce a modification that would meet present-day requirements; readers would be astonished if they knew of the many changes that have been involved before the final design took shape! In the beginning, we tried to get the listener's point of view; in doing so we concluded that what the average reader requires to-day is good quality reproduction from a number of stations, with ease of control and cheapness of both initial cost and maintenance cost.

The photograph on page 810 of last week's AMATEUR WIRELESS shows us at work on one of the many designs tried before the final one was decided upon. We have had to collaborate with manufacturers of coils and tuning condensers to achieve our ideals. As a result, readers will be able to obtain accurately-matched pairs of coils and a real precision tuning condenser, at prices so reasonable that no one need be debarred from building the set, however modest his purse may be.

Low Cost

To keep down the initial cost of a set involves a very careful survey of the manufacturers' products; even when a suitable selection of parts have been obtained, it is by no means easy to get them to work well together. It is, in fact, one of the chief functions of the set designer of to-day to try out different selections of component parts in order to give readers satisfactory combinations.

In the interests of ease of control, we tied ourselves down to one-dial tuning, for some time we tried to make use of a circuit

consisting of a detector and two low-frequency amplifying valves, as was used in the original "Ether Searcher." Two designers seldom agree about any given set, but we are both agreed that, try as we might, it is only possible to build a satisfactory three-valve set for 1930 conditions if a stage of high-frequency amplification is incorporated. The immediate complication confronting us was the necessity for two

of a turn; we journeyed out to Romford to make quite certain of this. The coils lend themselves to a remarkable control of selectivity and to a simplicity of wavelength changing that has never yet been equalled. To tune these coils we needed an equally accurate product of a condenser manufacturer. We are using the new Formo gang condenser, the two sections of which are matched to within 1 per cent. of

each other. The mounting is simplicity itself, as our blueprint next week will show. Both coils and condenser, in spite of their precise accuracy, are extremely cheap to buy.

Simple Construction

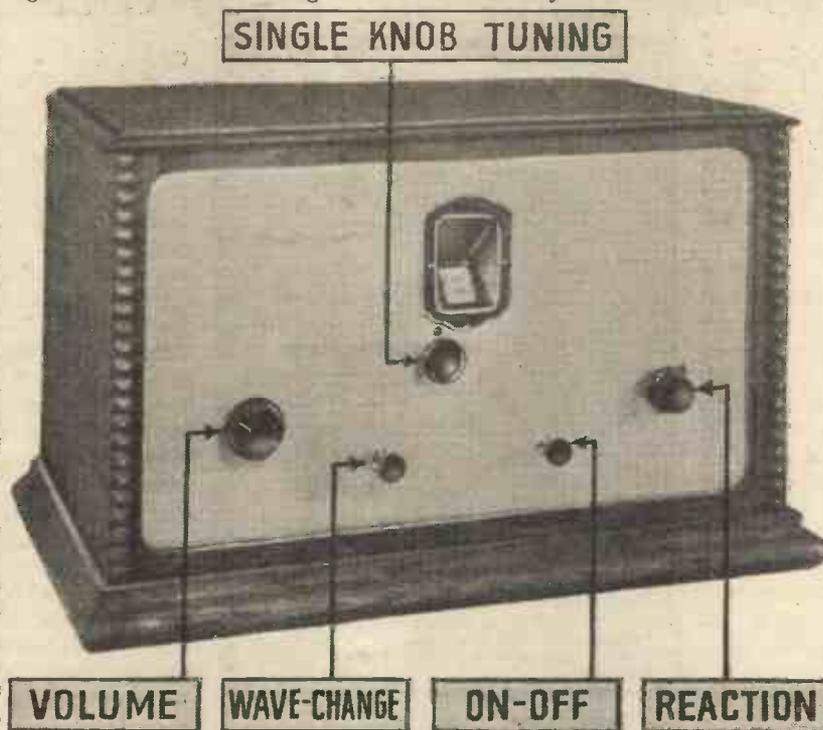
In the constructional work of the "1930 Ether Searcher," the AMATEUR WIRELESS reader can enjoy a new experience in simplicity; we are using an all-metal chassis, consisting of a finely-finished metal panel, supplied already drilled by the makers, a metal base, also ready drilled, and a simple cross-section screen. The advantage of this new system of construction will be readily seen in the greatly reduced number of connecting wires.

The wiring itself follows a different plan from that usually adopted in AMATEUR WIRELESS sets; by following a few simple instructions, the constructor will be able to do the complete wiring in a much shorter space of time than has previously been possible.

Some of the results that can be expected from the "1930 Ether Searcher" have already been ascertained, Brookmans Park can be cut out within three degrees of its maximum tuning point. This exceptional selectivity has not been obtained by sacrificing sensitivity, for by turning the single tuning knob a few degrees, distant stations come tumbling in, one by one, right round the scale. Hardly any adjustment is needed for the reaction condenser; it is simply a matter of turning one knob.

Every listener knows that the local station is very much louder than any other

(Continued on page 900)



This picture gives a general idea of the "1930 Ether Searcher," but the panel hides many unique features of a remarkable set. Note, however, the clean appearance and the absolute simplicity of control

tuned circuits; it became clear that, if we were to retain single-dial tuning, some form of ganging would be essential.

Constructors are usually unfavourably disposed towards ganged tuning; one reason is the expense of the gang condensers and another reason is the difficulty of mounting. Still a further difficulty in ganging has been in the matching. We claim to have entirely eliminated all the difficulties associated with gang condensers, at the same time gaining the tremendous advantage of single-dial control of two tuned circuits. In effect, the reader will have all the simplicity of operation of the original "Ether Searcher," with the amazingly sharp tuning of two accurately-matched tuning circuits.

The new Collinson tuning coils are scientifically matched to within a fraction

Full Details of the "1930 ETHER SEARCHER" IN NEXT WEEK'S SPECIAL CHRISTMAS NUMBER

IT is a significant fact that the trend nowadays is towards simpler sets. At one time there was a demand for sets having two and even three high-frequency stages, and super-hets were popular for quite a while.

But now, probably largely owing to changes in transmitter technique, the number of valves necessary for good reception is being reduced, and, as has been stated often in the pages of AMATEUR WIRELESS, the three-valver is the most popular type of receiver used to-day.

That is not all, however. The coming of high-power large-service-area stations, such as Brookmans Park, has resulted in yet another change in the popularity of certain kinds of receiver. The crystal set will again become immensely popular. Of that there seems little doubt. Again, one-valve sets, such as the B.B.C. officially recommended one-valver described the week before last will have an increasing use, for receivers of this type will enable the local high-power

THE BEGINNER'S ONE-VALVE L.F. AMPLIFIER TO ADD TO YOUR CRYSTAL OR ONE-VALVE SET



"crystalites" and "one-valveites."

The "Beginner's One-valve Amplifier," here described, is purposely made as small, compact, and simple as possible, so that it may be slipped into a corner near the set, or near the loud-speaker, and will not really necessitate a proper cabinet.

It is made up simply on a small baseboard, measuring 5½ in. by 4½ in., and has an ebonite strip carrying terminals and an on-off switch attached at one side.

The circuit is quite simple to follow, and is shown in the usual symbols in the accompanying diagram on this page. A transformer is used to couple the amplifier to whatever is the preceding stage, valve

or crystal. This is simpler than an R.C. coupling arrangement, which has to be modified for various coupling necessities. The secondary of the transformer is connected to the grid circuit of the amplifier valve, and grid bias is, of course, used, so that a valve of almost any output capacity can be employed. The grid-bias battery is included in the amplifier unit, so that if the amplifier is used with the B.B.C. recommended one-valver, for instance, it is necessary to take leads only to the H.T. battery and the accumulator.

In the accompanying list are given all the parts necessary for making up this simple little amplifier. The first-mentioned parts are those used in the original design. Also are given alternatives which can be used with the smallest possible modification of the design.

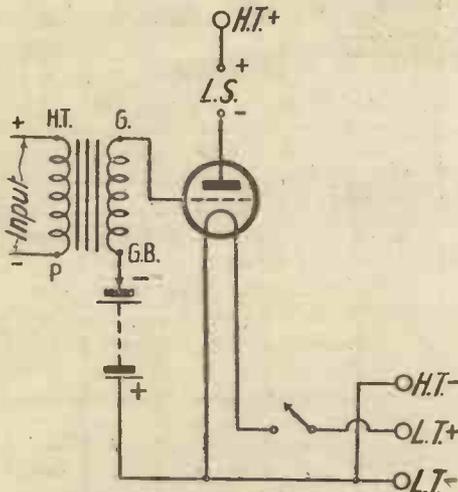
COMPONENTS REQUIRED

- Low-frequency transformer (Lotus 5-1, Lissen, Telsen)
- Valve holder (Benjamin, Lissen).
- Push-pull filament switch (Bulgin).
- Ebonite terminal strip, 5½ in. by 2 in. (Becol).
- Four terminals marked: Input+ Input-, Output+, Output- (Belling-Lee).
- Four wander plugs marked: H.T.+ H.T.-, G.B.+ G.B.- (Belling-Lee).
- Two spade tags marked: L.T.+ L.T.- (Belling-Lee).
- Grid-bias battery clips (Bulgin).
- Six feet of thin flex (Lewcos).
- Connecting wire (Glazite).
- Baseboard 5½ in. by 4½ in. (Pickett).

A number of listeners who use phones in conjunction with a crystal or a valve set will, no doubt, have an occasional wish for loud-speaker reception, particularly when friends are invited to listen and one or two pairs of phones have to be shared!

What is really needed, therefore, is a little amplifier which can be added on occasions without complicating the receiver itself. The addition of the amplifier will enable the set to work a loud-speaker properly, and without forcing the degree of amplification.

There are numerous other uses, too, to which such a single-valve amplifier could be put—say in connection with a single- or two-valve short-wave set—and it is, therefore, possible that it will be made up by many owners of existing large sets, in addition to the ever-increasing army of



The Amplifier Circuit

station to be received without "forcing," and will also ensure good reception from at least one alternative transmitter; and probably more than one in a number of instances.

It must be quite clearly understood, however, that the single-detector type of set followed by no low-frequency amplification will not enable a loud-speaker to be operated.

Probably right under the shadow of Brookmans Park it may be found possible to connect a loud-speaker in the anode circuit of the "Brookmans Park One-valver" and to get loud-speaker reception of a kind;



Here is the complete amplifier ready for use

THE NORTH REGIONAL STATION

AFTER Brookmans Park, Moorside Edge. The North Regional station, the second of the B.B.C.'s twin-wave high-power stations, is now in the first stages of its construction at Moorside Edge, near Slaithwaite, Yorkshire. This station will be similar to that at Brookmans Park and will serve the whole of the north of England (with the exception of the Newcastle area), and a large part of the northern Midlands and North Wales.

The B.B.C engineers have had to overcome very considerable difficulties in selecting a site for the North Regional station. Work commenced last Christmas with the mobile transmitting and receiving stations. Before these stations (mounted on motor lorries) could set about the work of testing, however, a large number of suggested sites were inspected and considered from such view-points as sub-soil, water supply, surroundings, and availability for purchase. Four of the sites were eventually selected for thorough technical investigation by the mobile stations. They were:—

1. Todmorden Moor, which was abandoned

on account of a peculiar difficulty arising in connection with the purchase, apart from all questions of price;

2. A site near Rochdale which was found to be unsuitable technically, owing to the fact that there were undue electrical losses;
3. A low-lying site near Heywood which was tested mainly in order to compare the effect of the sites at greater altitudes;
4. Moorside Edge, which was eventually selected.

The transmissions from the mobile transmitter were picked up in various parts of the north of England by the mobile receiver. The field strength was carefully measured and from the measurements a polar diagram was prepared to show the amount of energy sent out in every direction. In the case of the Rochdale site, the polar diagram showed that that site would be inefficient.

Owing to the large number of measurements necessary, and the consequent enormous number of miles to be travelled by the receiving van, the transmitter stayed from four to six weeks on each of

the four sites, but owing to various delays the investigation was not concluded until June. The Todmorden Moor site, between Bacup and Todmorden, was absolutely suitable, but after the engineers had concluded their work a hitch occurred.

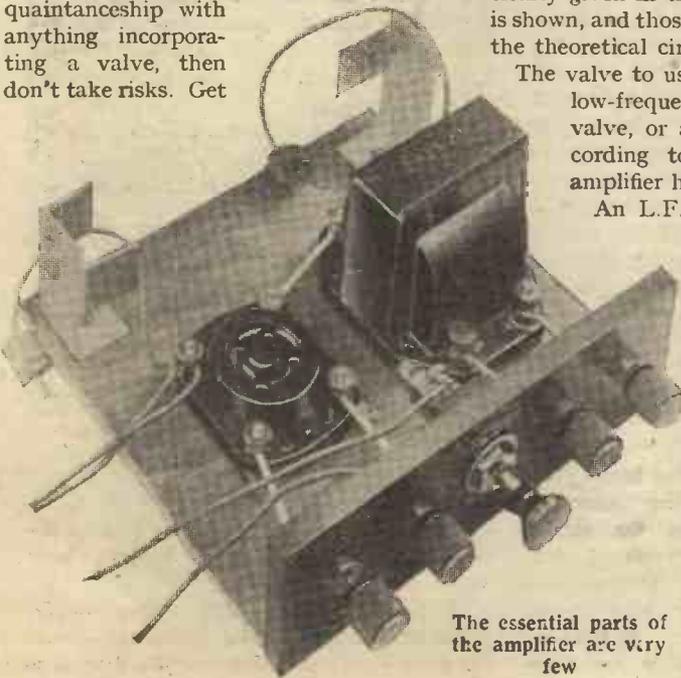
Three engineers, as well as motor drivers, were engaged on this work regularly from Christmas to June. They frequently had very serious difficulties to encounter, owing to the weather. While they were testing the Todmorden Moor site the weather was very severe. The aerial was blown down several times and the transmitter lorry was almost buried in snow drifts. The lorry is very heavy and on several occasions there was great trouble in moving it owing to frozen roads. On one occasion, the lorry got hopelessly bogged and a contractor who was called in to help to extricate it met with an accident and sustained three broken ribs.

The Moorside Edge site is 1,000 feet above sea level, which is considered about right, taking everything into consideration. The tests from this site gave satisfactory results, the polar diagram being reasonably symmetrical.

"THE BEGINNER'S ONE-VALVE AMPLIFIER"

(Continued from preceding page)

On this page is given a reproduction of a blueprint which has been made out to assist constructors. This print shows every part full size, and gives all the wiring in a very easy form, so that you simply can't go wrong. If you are an experienced constructor, then you will possibly be able to make up the unit from the photographs here given, and the written description; but if this is one of your initial attempts at construction, and perhaps your first acquaintanceship with anything incorporating a valve, then don't take risks. Get



The essential parts of the amplifier are very few

the full-size blueprint and copy the construction exactly.

Construction

The ebonite strip should be drilled first, to take the four terminals and the filament on-off switch. Don't forget, too, that two little holes have to be drilled so that the strip can be screwed to the wooden baseboard.

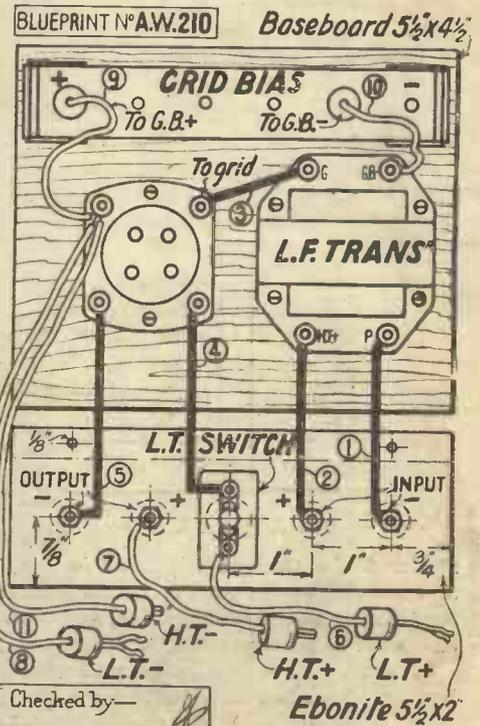
Wood screws should be used for fixing the valve holder, transformer, and grid-bias battery clips to the baseboard. The correct positions of these components are clearly given in the blueprint. The wiring is shown, and those who care can also follow the theoretical circuit.

The valve to use should be an ordinary low-frequency valve, a power valve, or a super-power valve, according to the work which the amplifier has to do.

An L.F. valve is only suitable if phones are to be used—at great strength, of course. A small power valve, such as the DEP210, is best used for working most ordinary types of loud-speaker, while if the input to the amplifier is fairly considerable and a correspondingly greater output is required, say for a number of speakers, or for a moving-coil job, then a valve such as the power "220" or "230" type

is best used. The greater filament current is a sign of a greater emission than is the case with the "210" type valves.

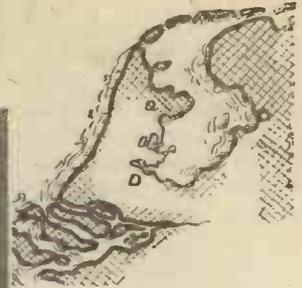
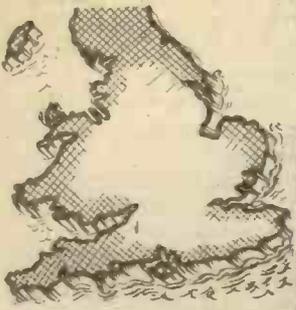
A voltage of less than 100 is not recommended. Anything up to about 150 can be



The wiring diagram. Blueprint available, price 9s.

used with advantage, and the grid bias must be varied in accordance. The full 9 volts will generally be needed with 120 volts H.T., and these values with a "210"-type valve form a very good combination.

"A.W." VISITS PCJ

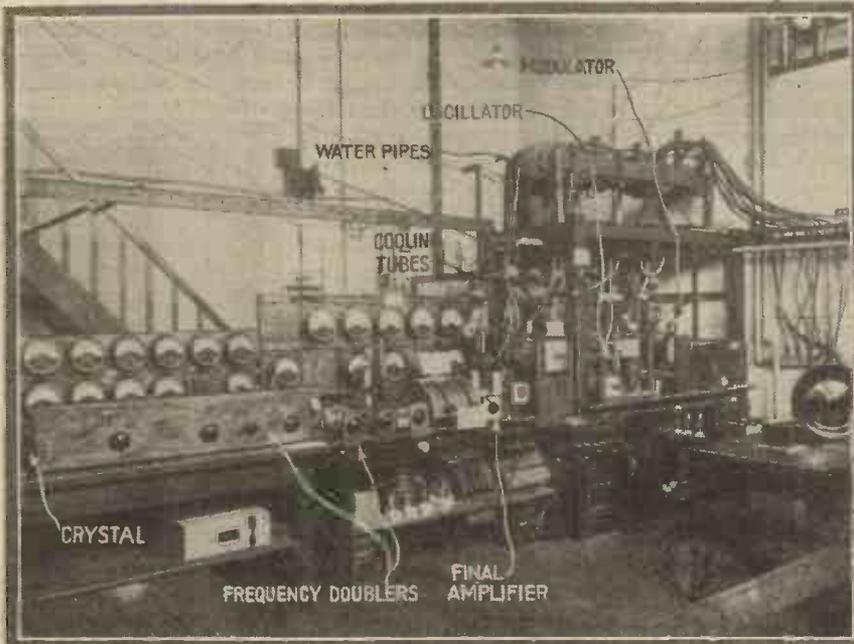


THE title of this article, I understand, is to be "A.W. visits PCJ." Actually, it wasn't half so impressive as that!

What really happened was that I found myself at Hilversum in a taxi one wet night a week ago, trying to find the studio of the world-famous short-waver PCJ. PCJ is, of course, run by that giant manufacturing organisation Philips, of Holland. The multi-language announcer there is world famous and this station is one of the loudest "noises" we have on the short-wave band.

Therefore it was with unusual interest that I eventually arrived at the studio. For the purpose, Philips have taken over a small private house, carrying on a neat plate, the name "My Home."

In one of the rooms is situated the control apparatus and amplifiers, another forms a cosy waiting-room for artistes, a third houses a large library of gramophone records and an electric gramophone, while a fourth forms the studio itself.



View of the transmitter section of PCJ

I arrived at PCJ about half an hour before closing time and saw the control man at work, and, while waiting for the announcer-cum-director, Mr. Startz, to be free, listened to the programme being broadcast through a moving-coil speaker. What a strange feeling it is to know that a station which you have always regarded as a distant one is right at your elbow and literally shouting in your ear! But I wasn't really at PCJ, for the transmitter itself is in a large building about five minutes' walk away across the fields.

The control amplifiers and controls are the envy of anybody who takes an interest in the L.F. side of his set. Philips really do things very thoroughly, and even the low-frequency amplifiers are encased in metal. Where meters are used they are placed *inside* the metal boxes, and small holes are cut so that a very minimum of the dials is visible.

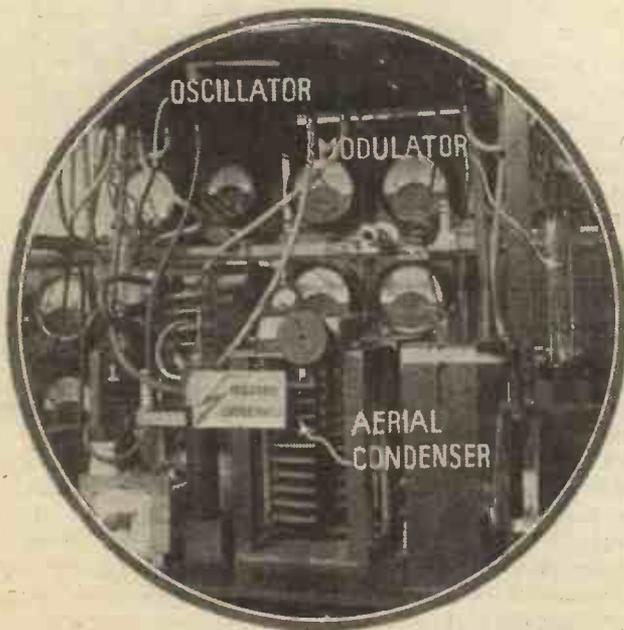
A potentiometer-fader control is used just as in B.B.C. practice, and the control man was busy with this and other knobs all the time that the broadcast was going on.

Through the loud-speaker I heard the announcer "putting on the air," in English, French, German, Dutch, and Portuguese, a greeting and an intimation that some gramophone records would be given.

This left him free for a while to show me round the station; but first came the blow! An hour previously it had been announced that I would give a speech; so I was really "let in for it," and had to make an impromptu ten-minute talk to all the British-speaking listeners of PCJ. No easy matter, I can assure you! The studio is unnerving. It has the old-fashioned grey hangings

and drapings, which alter the echo period so that it sounds as though one is speaking out in the open air. Anyway (I hope to the credit of AMATEUR WIRELESS), I did my little bit with the assistance of some friendly badinage with the announcer!

Then for the remainder of the English hour I watched the method of "putting over" the entertainment from PCJ. Its listeners really do get a good programme



Here are the water-cooled oscillator and modulator valves



Mr. E. Startz, the five-language announcer at PCJ

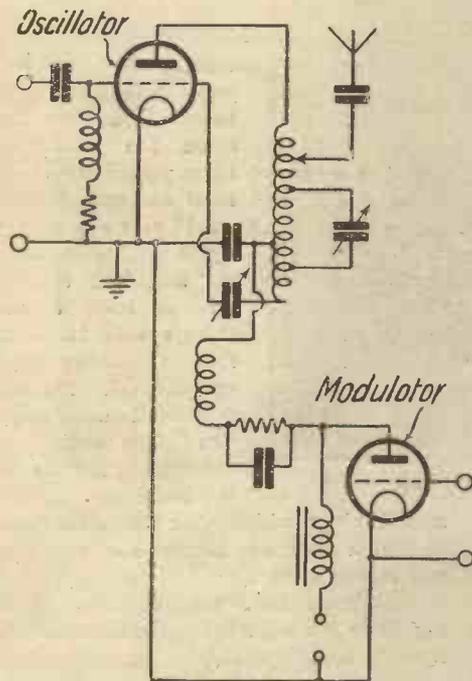
service. The purpose of the station is mainly to act as an experimental *poste* for Philips, and much valuable pioneer short-wave work is done there.

In the PCJ office I saw a map studded with little flags showing that reports have been received from points as far distant as

Vancouver on the far coast of Canada, and Auckland, Christchurch, and other places on the distant islands of Australia. Literally, PCJ does cover the whole world, and, considering that it has a rated power of 25 kilowatts and works on 31.4 metres, this is really remarkable.

It may interest you to know that the programme schedule is a comprehensive one, and the station can be heard working every Thursday and all over the week-end.

The schedule is as follows: Thursday,



A skeleton circuit of the PCJ transmitter

7 to 9 p.m., in English; 12 midnight to 1 a.m., in Spanish. Friday, 1 to 2 a.m., in Portuguese; 2 to 4 a.m., in Spanish; 7 to 9 p.m., in English. Saturday, 1 to 2 a.m., in Dutch; 2 to 5 a.m., in English, French, and Spanish; 5 to 7 a.m., in English.

You have heard the metronome from PCJ? It is given in a very simple manner by placing a small "met." on top of the microphone itself, and the announcer sets it going directly he stops speaking. The control man below fades in this effect, and also fades it out when the electric gramophone is started.

When the Queen Broadcast

PCJ gives many gramophone-record broadcasts, and I suppose this fact might make some people turn up their noses at the idea of receiving "canned" music. But Philips have special pick-up and amplifier arrangements which make it absolutely impossible to tell when, say, the station dance-band session ceases and "jazz" gramophone records are put on. Also, at "My Home" there is a library of some thousand or so records, arranged so that programmes can be given in many European languages and of almost any degree of high-brow or low-brow-ness.

The studio itself is large enough to accommodate a small orchestral combina-

tion, and has been graced by the presence of H.M. the Queen of Holland and H.R.H. Princess Juliana, who broadcast from PCJ shortly after the station first "worked" the Dutch East Indies in 1927. I spoke through the same microphone as H.M. the Queen, so I am doubly honoured.

Before leaving the studio I (as a keen short-wave enthusiast) begged to be given a rough "hook-up" of the transmitter circuit, and this little sketch is reproduced herewith. The modulation is very good, and I am assured that the circuit is an easy one to work. "Fans," please note!

Then off we trudged in the dark through the fields, the only faint glimmer of light coming from a glowing neon-sign on the mast of the Hilversum long-wave broadcaster, to which one end of the PCJ aerial is hitched: no elaborate short-wave aerial arrangement—just a short length of wire!

The "Sender"

A large building, from which came the hum of generators and raucous sounds of the broadcast programme, put at blasting strength over a loud-speaker so that the engineers can hear above the noise of the transmitter, acted as its own signpost in the darkness; and so we entered PCJ itself.

Again I had a real thrill, for to a radio enthusiast it is good to stand at the side of the humming dynamos and glowing "tubes" of a station which you have previously known as hundreds of miles away, and which, while you watch it, is giving music to regular listeners all over the world.

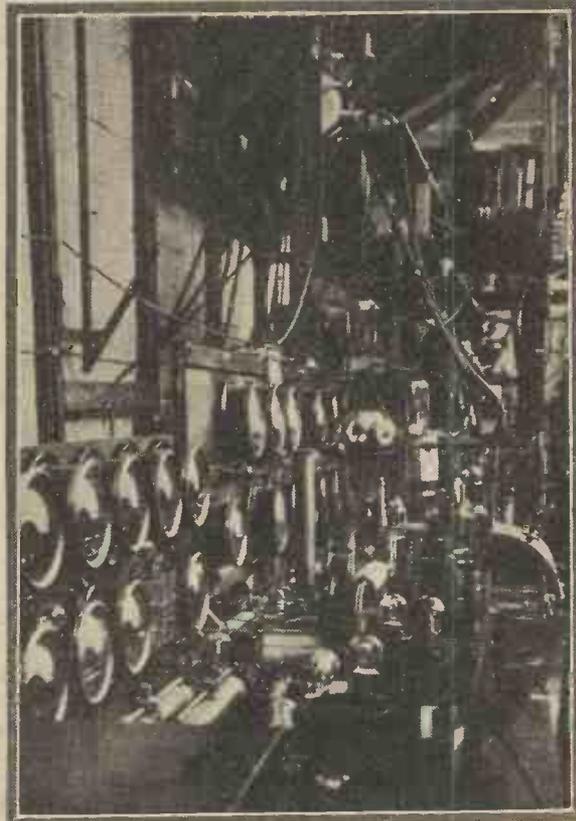
The whole atmosphere is one of the laboratory. The piezo control crystal is contained in a constant-temperature metal box about three feet each way, slung from the rafters and having thermometers projecting from it at awkward angles. The large electric-motor-driven water pumps needed for pumping the cooling water for the valves aren't the things one usually associates with a radio transmitter. Philips water-cooled valves are used for the large-power and modulators stages.

Two engineers sat at a little table in front of the main section of the transmitter. One watched coloured lights which glow in an indicator panel, and had at his hand a main switch to cut off all the power in case of emergency. The other anxiously watched a meter at a distant part of the transmitter frame, and with a long stick occasionally tapped the handle of a large voltage regulator. Notices—"Hoogspanning — Levensgevaarlijk" ("High voltage — danger")—hang everywhere,

and remind one of PCJ's 25 kilowatts.

The noise of the generators, of the water pumps and running water, and the buzzing of the mains transformers, added to the blare of the loud-speaker, is almost deafening, and the heat of the valves makes the room quite "summery."

Switching off is impressive. There are sixty switches, and the two men, on a pre-



View of the transmitter from the crystal end

arranged plan, do the whole job in about half a minute!

Then, while the generators "ticked over" and the water guggled away from the valve anodes, the chief engineer told me that the H.T. voltage on the anodes is 12,000, and with pride he pointed to a roughly written notice above the main oscillator panel: "Hiep, hiep, hoera! Eindhoven — Bandoeng, Maari 1927." This was in commemoration of the first time that the experimental transmitter, then situated at the Philips works at Eindhoven, had been received at great strength at Bandoeng (Dutch East Indies) in March, 1927.

Mr. Startz, who's voice you doubtless know so well (he does all the announcing) speaks English with a marked American twang, and is full of American "pep" in his interests for PCJ; he is the real personality behind the station. And PCJ has received reports from North and South America, from San Francisco to Buenos Aires.

And as we came back through the fields, chatting to the Dutch officials of the station, I felt a patriotic pang in that England boasts no PCJ!

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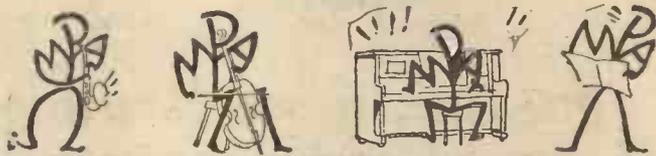
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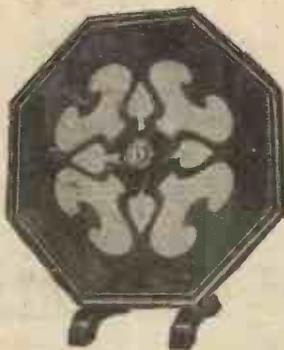
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On Your Wireless!

Some Secret!

THE lay journals not infrequently provide the wireless devotee with a certain amount of amusement when they let themselves go on his pet subject. The other day one of them came out with a splash announcement that Brookmans Park was about to conduct secret tests with transmitter number two. Secret! Ye gods! You can't keep a transmission very secret when you are pushing it out for all the world to hear with 30 kilowatts behind it. What was meant, I suppose, was that B.P. will soon be testing outside broadcasting hours on a second wavelength of 261 metres. I believe that one or two tests have already been made, though I have never picked one up so far. The snag which is most feared as regards B.P. Number 2 is fading, which is usually rather pronounced on wavelengths below 300 metres. A fading area will quite likely occur outside a radius of about fifty miles from the station. How wide this area will be no man can tell until experiments have been made, but beyond these limits excellent signal strength is likely. It is quite possible that the shorter-wave station will be better heard than the longer at Land's End and John o' Groats.

Fading Mysteries

This autumn, though signal strength all round has been remarkably good, has been a particularly bad one for fading so far as Continental transmissions are concerned. All sorts of explanations have been given to show why fading occurs, though none of them seems to be completely satisfactory, for none makes clear why it is that we have epidemics of fading just as we do of measles and 'flu. Everyone knows that distant transmissions within the limits of the medium band are liable to wobble badly in the between seasons, when summer is giving way to autumn and spring to summer. But no one seems to be able to tell us why it is, for example, that fading should be more noticeable in October and November, 1929, than in the same months of 1928. Nor, again, can we say with certainty why certain stations should show sometimes rather rapid fading and at others long, slow, periodic swings from a terrific maximum signal strength to a minimum that may be near inaudibility.

The Three Greatest Problems

The three biggest problems confronting the research worker in wireless at the present time are how to eliminate atmospherics, how to suppress the effects of fading, and how to cram into a particular band more than twice as many broadcast-

ing stations than there is really room for. So far, no means of eliminating atmospherics has been discovered, though scores of patents have been taken out for systems which claimed to do so. Fading has been rather more successfully tackled. On the short waves much can be done by having twin receiving stations some considerable distance apart. It has been found that a signal may be at a maximum in one place whilst it is at a minimum in another. Or two transmitters can be used sending out simultaneously on different wavelengths. At the receiving station arrangements are made for blending the two transmissions into a common output. This does away to a very great extent with fading, but it has the drawback of bringing in a double ration of atmospherics.

Quart and Pint Pot

What we do really need is some system of telephony which will enable stations to transmit without requiring channels 9 kilocycles or more in width—or, alternatively, a system of reception in which a very high order of selectivity can be employed without detriment to quality. I may be wrong, but my own belief is that before we are so very much older we shall see a revolution in methods of reception, for, though it is heresy to say so, I am not at all sure that in certain principles of tuning we have not all been barking up the wrong tree ever since the wireless transmission of telephony began.

Novel Turns

Quite the most surprising item that I have ever seen announced from a broadcasting station is one that the American WLW is putting on. This consists in a roller-skating exhibition of Roly and Poly (!), who claim to be marvels in that line. And it is going to be done, mark you, by means of the microphone and without any help from television. The B.B.C. was pretty good the other day, when it gave us a lady who whistles in her throat. Don't be surprised if one of these days you see billed for 2LO, "Thermion, the man who sings in his bath." Anyhow, we have already had many exponents of the art of talking through one's hat.

S.G. in U.S.A.

Though the first screen-grid valve was brought out, if I remember aright, as a laboratory curiosity in America, people in the United States fought shy of this form of tube for a very long while. It was, in fact, very widely adopted by wireless enthusiasts over here before the majority of their counterparts in America had ever heard of it. There are signs now that on

the other side of the Herring Pond they are awakening to its possibilities. Many of the newest sets incorporate it, with remarkably successful results. From what I have seen of them, American S.G. tubes are not nearly so good all round as our screened valves. We seem to hold the secret of producing uniform valves that will retain their original working characteristics over very long periods. What I find about most foreign valves is that no two of the same type are quite alike and that huge differences are to be found between the curves of a valve when new and those taken when it has seen perhaps a couple of months' service. This point is enormously important with S.G. valves, and even more so with pentodes, for if the valve's characteristics alter when used, and if you can't be sure that a replacement valve is precisely similar to the original, a variety of queer effects may be observed in the modern receiving set with its highly efficient circuits.

Halle Concert Reception

When listening to a recent Hallé concert I was impressed by two things. The first of these was that the bass seemed to come over quite well, considering the length of land-line over which the transmission had to be carried before it reached the transmitter. Usually the loss of bass on a transmission line is quite noticeable. One has only to compare the same item being broadcast from London or Daventry to appreciate the relatively smaller amount of bass from the latter station.

In this particular instance, however, the bass seemed to be in quite good prominence, although not so well as I have sometimes heard it from, say, the Queen's Hall, London. The other point, however, was that the microphone seemed to be badly placed. The *pianissimos* were so intensely soft that one had to strain considerably to listen to them, while if the volume was increased so that the *pianissimos* were comfortably audible, then the climaxes were too loud for pleasantness.

Hamilton Harty, of course, is a conductor who believes in a considerable amount of light and shade. In fact, I rather feel that he is inclined to overdo the contrasts in the music; but, even so, and making all due allowance, it seemed to me that the results were much too extreme. One had the impression, even when the fiddles were playing good and hard, that they were not being received so well as they might, and this led me to the conclusion that the microphone was not placed as well as it might have been.

Personally, I have never attended a Hallé concert, and so I do not know

:: :: *On Your Wavelength! (continued)* :: ::

whether the microphone is suspended in a visible position, as it is in London at Queen's Hall; but, in any case, it would be interesting to know whether the effects which were noticed were due to this cause or whether some other explanation must be found.

Land-lines and Quality

Talking about land-lines, by the way, I see that the Post Office are making special provision for broadcasting in the new land-lines which they are putting up. Hitherto it has not been necessary to cover a very wide band of frequency, something from 200 to between 2,000 and 3,000 being adequate for speech purposes. Indeed, on actual speech, it is possible to cut off a very considerable chunk of the frequency spectrum without losing any intelligibility to speak of. The mean speech frequency is approximately 800 cycles per second, and if one cuts off all the frequencies above this it is nevertheless possible to understand what is being said, although one would not say that the intelligibility was good.

If, on the other hand, one cuts off all the frequencies above 1,700, then the intelligibility remains quite good, provided that the lower frequencies are well reproduced and vice versa. Therefore, the design of a cable to transmit good speech is fairly simple compared with the broadcast problem where one endeavours to reproduce all the frequencies between 50 and 5,000. The present land-lines, of course, will not do anything of the sort, and although they have, in many cases, been improved to cope with the increased demands of broadcasting, they were not originally designed for the purpose and cannot satisfactorily meet the requirements.

Improved Results

The new lines which the Post Office are putting down, particularly the longer ones, are being made specially suitable for broadcasting and will cover a very wide frequency range indeed. It is probable, therefore, that in the future provincial listeners will be able to enjoy the same quality from their local station as is at present the good fortune of the Londoner. Few Londoners realise how much they are to be envied in the excellent quality which is broadcast from their own station as compared with the distinctly mutilated version of the same thing which is of necessity broadcast from provincial stations.

A New Television System?

The other day I saw it announced that a new system in television had been invented; so I went out of my way to get all the details possible, for news of this character, if it were true, seemed too good to miss. It was claimed that only about half the usual waveband formerly believed necessary for good radio picture transmis-

sion and reception was required. However, I must confess that my investigation proved disappointing, for at the outset, when introducing the invention, it was stated that a 100-kilocycle frequency channel had been used to transmit clear images. Garner and Sanabria, of America, were responsible for this remark, and in view of the rather glowing reports of the television efforts of these two engineers, the mystery would appear to be explained if they were accommodated with an "ether band" sufficient to supply the needs of at least ten broadcasting stations.

Nine Kilocycles Sufficient

While it is admitted that all the detail desired cannot be transmitted adequately with a 9-kilocycle waveband, to go to the other extreme and say that 100 kilocycles is necessary would rule out the commercial possibilities of television at once. With the test television transmissions now being sent out both by 2LO in England and Witzleben in Germany (this last station, by the way, being regularly on the air from 9.30 to 10 each morning and 1 to 1.30 each afternoon with tele-cinema), the 9 kilocycles is adhered to. The detail is not quite so good as by land-line alone; but, even so, there is a wealth of detail which surely does not need ten times as much room in the ether to improve. With twice the normal sideband allocation there would be practically no fault to find, according to measured tests which I know have been made.

A Multiple-spiral Disc

To revert to the system which these two engineers have called new, I find that they base their claims on a multiple spiral aperture disc. They use 45-line elements per picture and 15 pictures per second are transmitted. Several partial pictures are interposed at the receiving end, and the eye is said to be capable of retaining and combining these rapidly recurring partial frames into a smooth picture with no noticeable flicker. It is also stated that the "mixing" of the electrical impulses reduces greatly the interference between stations, but this is rather difficult to comprehend at the moment. In any case, well over a year ago, Baird in this country publicly demonstrated a multiple disc.

A Regional Point

An article which appeared a week or two ago in AMATEUR WIRELESS suggesting that the regional scheme could not work in its present form has produced a good deal of correspondence. Many of the letters came from those who live in places far from Brookmans Park and accuse the writer of selfishness, since they now hear the London programmes to perfection. It seems to me that these correspondents are rather missing the whole point of the

article, which was briefly this. A very large district to the north of London is now swamped by Brookmans Park, scores of receiving sets having become virtually obsolete. Matters will be infinitely worse in this district when the second transmission from the same place comes into operation. Those living in other parts of the country must remember that their turn will come as more and more stations are built. What, for instance, of the densely populated West Riding of Yorkshire when Moorside Edge lifts up his voice? And what of the whole country when we have ten high-power transmissions all going at the same time? One has always to take a long view in these matters. We who live within the very extensive wipe-out area of Brookmans Park know what others are going to suffer if the scheme ever goes through on its present basis.

Which Are You?

I was rather surprised the other day to learn that by far the greatest number of the valves in use in this country at the present time are of the two-volt variety. The reason, I suppose, is that a two-volt accumulator costs less initially than a "four" or a "six" and weighs a good deal less when you have to lug it round to the charging station. Personally, I began as a four-volter in the days when all valves had four-volt filaments. But as soon as the six-volt dull-emitter was developed I became a six-volter, and have remained one ever since.

There is no gainsaying the fact that the two-volt valve of to-day is a first-rate component, being probably much more efficient all round than its six-volt counterpart of a few years ago. Still, it seems to me that six-volt valves are just a little better; sufficiently so, in fact, to make their use well worth while for the man who likes to get the last ounce of efficiency and quality from his set. And really the accumulator question, when one comes to work it out, is almost as broad as it is long. Here is what I mean. Suppose that you are using a three-valve set with a high-frequency stage, a detector, and a note-magnifier. Then with two-volt valves your H.F. and detector will each take .1 ampere, but the output valve—if it is, as it should be, of the super-power class—will probably require about .4 ampere. Thus we have for the whole set a total filament consumption of about .6 ampere. With six-volt valves we can manage with .075 ampere apiece for the first two and .25 ampere for the output valve. This gives a total of .4 ampere for the combination. In other words, with six-volt valves we obtain a hundred working hours from a 40-A.H. accumulator, whilst a 60-A.H. is needed to give the same result with two-volt valves.

THERMION.

YOUR AERIAL & SELECTIVITY

HOW TO PREVENT "SWAMPING."

One of the recommendations of the B.B.C. to listeners who are troubled with interference from Brookmans Park is that the aerial system should be shortened. To many people this appears tantamount to an admission by the B.B.C. that Brookmans Park is a failure. This is not so, however, as the following article by our Technical Editor will make quite clear.

necting wire and the earth, so that all the capacity is concentrated in the two plates.

Unfortunately, this ideal arrangement cannot be realised in practice. In the first place, it is not convenient to erect a large metal plate at some distance above the ground, and so we bend the wire over to form a horizontal top. This increases the capacity to earth of the upper portion of the aerial, and so imitates a large plate to some extent. Secondly, the wire itself has a certain amount of inductance and capacity distributed throughout its length,

In other words, the aerial will exercise a dominating control on the tuning and the selectivity will be very poor. As we reduce the length of the aerial we reduce the natural wavelength and so remove it farther and farther away from the wavelength being received. Under such conditions the aerial has less and less effect on the tuning, which is ultimately controlled entirely by the tuning circuit proper.

In practice, therefore, we compromise, usually arranging matters so that the wavelength which we have to receive is around three or four times the natural wavelength of the aerial itself. The standard P.M.G. aerial is 100 ft. long, i.e., almost exactly 30 metres. Consequently, the natural wavelength of such an aerial will be between 120 and 150 metres. Hence the middle of

the broadcast band, which is usually taken as 400 metres, is approximately three times the natural wavelength of the aerial, and it is for this reason that the length of 100 ft. was originally determined.

For all ordinary purposes, this class of aerial is satisfactory, but where we are dealing with special conditions, such as those of Brookmans Park, then we find that working at a point three or four times the natural wavelength of the aerial is not satisfactory and it is not possible to obtain adequate selectivity. We must reduce the natural wavelength of the aerial so that our tuning becomes sharper, as we have already seen. Most people, however, are afraid of losing the efficiency of reception on distant stations, so that although they may get rid of Brookmans Park, they will have nothing left to receive.

This is not the case. Particularly with the modern screen-grid valve set, but even with a simple detector it is possible to receive a surprising number of stations with a very short aerial system. It does not follow that an indoor aerial is necessarily good, because there are all sorts of metallic bodies in the building which are liable to

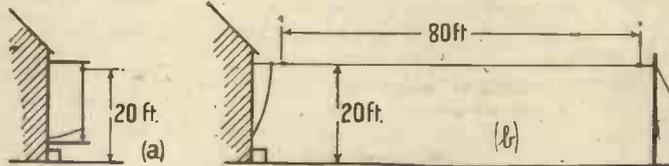
A FRIEND of mine the other day was explaining the difficulty he had in getting rid of the Brookmans Park transmission. He was situated only a few miles away and no ordinary wave trap was satisfactory. He had, indeed, to use a specially-constructed wave trap in order to receive 5GB free from interference, and he seemed quite despondent of ever receiving anything other than these two stations while Brookmans Park was transmitting.

"But," I remarked, "all you have to do is to reduce the length of your aerial system." This suggestion caused him considerable mirth. He said that it was really the best joke he had heard for a long time. When I asked him what the joke was, he said, "Well, it is rather like telling a plumber that you require a new washer on your tap and being told that the best remedy is to cut the water off at the main!"

In view of the difficulty I had in convincing him that this was quite an erroneous view, the following article may be of interest.

Aerial Theory

The theoretical aerial system consists of two plates. One of these can be replaced by the earth, while the other is suspended at some distance above the ground. In this theoretical system we have a capacity between this elevated plate and the ground, and we connect the two together through our tuning coil to form the standard oscillatory circuit, consisting of an inductance and a capacity in series. We assume that there is no capacity between the con-



The first aerial is twice as good as the second so that we cannot assume the capacity all concentrated at the top of the aerial.

Any length of wire, indeed, possesses what is known as a natural wavelength, this being the wavelength to which the self inductance of the wire is tuned by the self capacity. Any attempt to increase the height of an aerial is sooner or later limited by the increase in the natural wavelength, which becomes too great for convenience.

Efficiency

An aerial receives most efficiently at its natural wavelength—which, by the way, is between four and five times the actual length of wire in a simple aerial. Consequently the nearer we make the natural wavelength of the aerial to the wavelength of the station being received, the stronger will the signals become. At the same time it will be clear that if the aerial is receiving on its natural wavelength, no additional inductance or capacity is required, and if we wish to tune the system to any other wavelength, the amount of inductance or capacity necessary will be small compared with the aerial constants themselves.

"YOUR AERIAL AND SELECTIVITY" (Continued)

screen one's reception, but a short outdoor aerial is capable of giving results almost indistinguishable from the point of view of strength, and distinctly better from the point of view of selectivity than the standard P.M.G. arrangement.

An effect which is not generally known and which is of no little interest in this connection, is that the horizontal top portion usually provided in an aerial system is definitely harmful. The signals picked up on the top portion are *not* in phase with

the signals picked up on the down lead, and this effect greatly offsets the increase in efficiency due to the greater natural wavelength of the aerial. This is a point which cannot be explained in a few words, but the fact remains that the single vertical wire is twice as good from the point of view of reception as an aerial of the same height with a horizontal portion four times the height. These two aerials are illustrated in the diagram, and it will be seen that the second aerial is quite a common form, yet

it is only half as good as the simple single wire.

As a matter of fact, it is possible to obtain an intermediate state of affairs with a somewhat reduced aerial having a small horizontal portion, and I hope to go into this in a future article, but the remarks which have been made will serve to indicate that the reduction in the total length of aerial wire employed is not by any means the retrograde step that it appears at first sight.

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A New Three-valver of Wonderful Performance.

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

THE birthday affair was quite good fun. Listeners must remember that the programme was provided almost wholly by members of the editorial and other staffs—all amateurs who preferred to offer more or less informal fun and a pukka show. They all did well, including "sounds off"—not to mention the squawking quintet.

Let us have more of these informal items, with perhaps a little more rehearsing.

If the B.B.C. had taken its listeners into its confidence *before* patching up the matter in regard to the song title scandal, I am perfectly certain that not one listener in a thousand would have helped the profiteers by calling upon the B.B.C. to arrange the matter in the present unsatisfactory manner. One thing the B.B.C. must set its face against: the machinations of the commercial mongers outside.

The news that Sir Walford Davies proposes to disappear for a while will disappoint many listeners, but I am not certain that he is not wise in his generation. To rest a while on the height of his popularity is a good strategic movement.

It was a pity that the "conversation" between Mr. J. L. Garvin and Count Harry Kessler on "England and Germany" had to be postponed. But Dr. Grenfell's appearance was both in the nature of a surprise and pleasure. It was a pity, though, that he had to speak extemporarily because even the most lucid speakers cannot do as well before a microphone as those who know beforehand what they are going to say. He did exceptionally well, and what was amusing was his youthful voice. Had I not known that the author of one of my cherished books was talking I should have thought it was a 'Varsity undergraduate!

I looked forward to *The Beggar's Opera*, but this was spoilt by the interruption of the announcer after each small song. Why on earth was it necessary to break the thing up by this stupid reading out of the titles? People do not interrupt operas by saying what the title of the next song is. The result was that, instead of a continuous half an hour of this beautiful opera, one

had snippets. I feel so angry about this that I had better not write any more. It spoilt what was to be an excellent half an hour's miniature opera.

One of the beauties of wireless is, or used to be, the possibility of listening to music without the senses being assailed by raucous applause, but the B.B.C. seem to be doing their best by the studio claque to render this advantage nil.

Those outside dinners, too, composed usually of people who have dined well, and I hope wisely, resolve themselves into transmissions of ear-splitting noise.

It is a great pity, particularly as the concert provided by the Manchester Unity of Oddfellows was quite well arranged.

If Alec McGill had ceased from interrupting, we might have enjoyed Gwen Vaughan's singing. Why he butted in on her songs baffled me, and they called themselves "The Cheerful Chatterers." Cheerful, what?

I don't seem to remember Marriott Edgar, but he did quite well in his song of the char-a-banc guide. No doubt we shall be hearing some more of Edgar.

By the way, I don't think Mr. Basil

Mayne need worry about the few malcontents' letters. He will always find these people, and they are entitled to be heard, but there is no reason why he should just select them and advertise their letters.

The vaudeville programmes (I hasten to touch wood!) seem to have been better lately. For instance, one in which Harry Hemsley, Clara Evelyn and Gordon Clether, Ronald Frankau, and Mabel Constanduros took part was one of the best I have heard lately.

Curious thing, but Gordon Clether sounded like a voice from the past. Last time I heard him was in the gunroom of our depot ship at the Grand Fleet Base. He then sang "The Devout Lover," and it was the only piece of sentiment I heard in that ship for months.

Why do Ronald Frankau and Leonard Henry remind me so much of each other? They are both clever young men.

I still submit that some of the plays that are put over would be equally strong and realistic if a few of what are called "daring expressions" were omitted.

At the Listeners' Club:—

The Sportsman: "I seem to miss many of the running commentaries on various sporting events, but I happened to listen to one of them recently, and it proved so different that I must comment on it. The item was a football match, and as an old footballer I found this trying. The commentator's words took the form of a technical discourse rather than a first-hand account of how the match was progressing. A general summing-up of the play *after* the match from an expert would be acceptable, but to have to listen to his opinions while endeavouring to follow the ball isn't right."

Jazz Lover: "More interference with the late night dance broadcasts! Jack Payne's Band was due to play at 10.30. They started—through bad programme-timing—at 10.45. They played one number and then followed a surprise talk by Santos Casani on a new-fangled dance step. Then followed a few more numbers, after which Miss Janet Joyce butted in. And so on. . . . I shall start going to bed early for a change."



Cartoonist 'impression of Peter Bernard

Of late there has been a tendency to crowd together the parts of a set in order to make it compact, but I doubt very much whether the saving effected by shortening the panel and cabinet by 2 or 3 in. is a matter of any importance to most of us.

When it can be effected without introducing instability or lowering the magnification, then the extra care that must of necessity be given is repaid.

Performance and ease of wiring is what matters however, therefore "Everybody's 3" was not compressed in any way, but was so laid out that the correct results should be obtained by any builder following the drawings.

The photographs reproduced in last week's issue and those which accompany

might be used. Do not forget to allow room for the shielded valve to be inserted, however.

No doubt many readers have their own method of tackling a set of this description. Personally, I find the best plan is to build in steps. The first is obviously to obtain all the parts and drill the panel and terminal strips. Then those parts that have to be fitted to the panel should be dealt with, including the brackets. These, by the way, must be carefully fitted, as it is easy to split the panel by forcing the brackets when screwing them to the baseboard.

The third step should be to fit the parts to the baseboard, but before finally fixing them it is well to put panel and baseboard together to make certain that all parts clear.

LIST OF COMPONENTS

The components required to build the receiver are as given in the accompanying list:—

Ebonite panel, 18 in. by 7 in., and two strips, one 10½ in. by 2 in. and one 3½ in. by 2 in. (Raymond, Becol, Trolitax).

Baseboard, 18 in. by 10 in. (Camco, Pickett, Clarion).

Two .0005-mfd. variable condensers (Igranic, Lissen, Jackson, Burton, Ormond, Polar).

.0003-mfd. reaction condenser (Cylodon Bébé, Formo).

15-ohm panel-mounting rheostat (Lissen, Igranic, Wearite, Bulgin).

Pair of 1930 Binowave dual-range coils complete with extension spindles (Wearite).

Screen-grid valve holder (Parex type L, W.B., Peto-Scott).

Two anti-microphonic valve holders (Lotus, Benjamin, W.B.).

this article show pretty clearly that the parts are neatly arranged and all wires easily reached. There is no crowding.

Liberties cannot be taken with a set providing the maximum of amplification, but anyone with a little experience could, if necessary, fit the parts a little closer together in order that a cabinet to hand

I should examine all parts before fixing them, making sure that the terminals are satisfactory, that the grid leak fits its holder, and that the condensers are mechanically sound. The filament resistance, too, should be tried; it should have a nice free movement. The coils themselves are quite robust, but take care of the switch connections. Also, do not use great force when tightening the nuts. Be sure to use the right coils, as indicated in the illustrations and by the letters in the diagram. Another little point to watch is that the fixed condensers are not mixed. The grid condenser is of .0002 microfarad, while the two .0001-microfarad condensers are used in the aerial circuit, and between the anode of the detector and earth respectively.

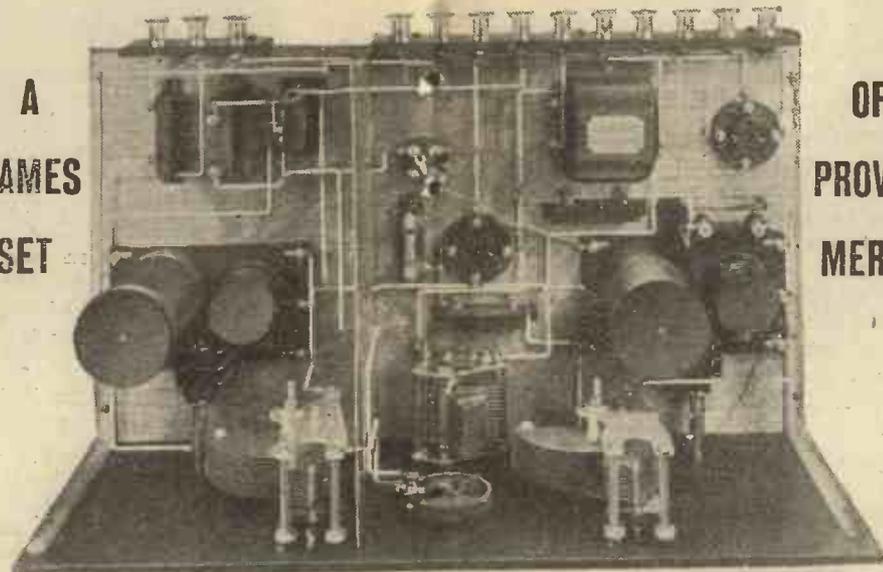
Wiring

Certain of the wiring can be carried out with the panel removed from the baseboard. This is the fourth step, of course, and from my experience is the one most often hurried. Some people will consider a set to be practically completed when the parts are assembled. This is a mistake. A little time should be spent in nicely fitting the wires. There are not many of them, and you may as well fit them neatly

EVERYBODY'S

Continued From Last Week's Issue

A
JAMES
SET



OF
PROVED
MERIT

A MINIMUM OF 20 STATIONS AT LOUD-SPEAKER STRENGTH

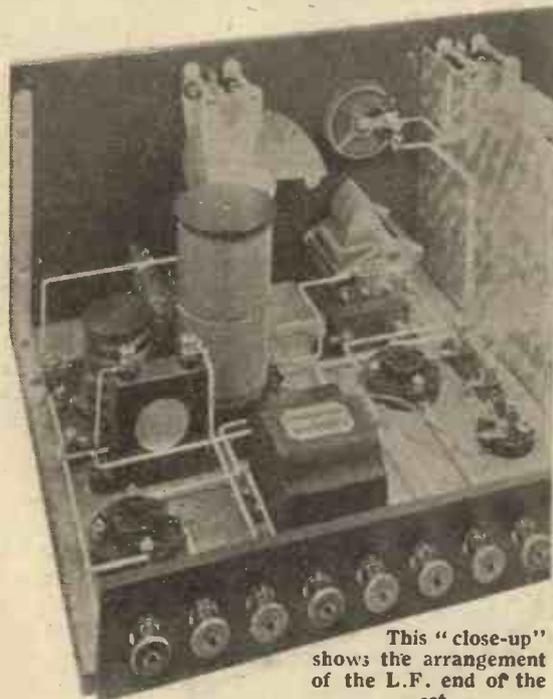
and correctly, preferably soldering them.

Finally, screw the panel and baseboard together and join the remaining parts. For wiring I prefer thin tinned copper wire, such as No. 22, with suitable systoflex. The thick sleeving is rather unsightly, as it can seldom be laid straight. Those who prefer a covered wire may use Glazite, taking care when uncovering the ends not to injure the wire. Also be careful of the wires running through the screen. This, by the way, is earthed, a neat method being to pass the wire below the head of a fixing

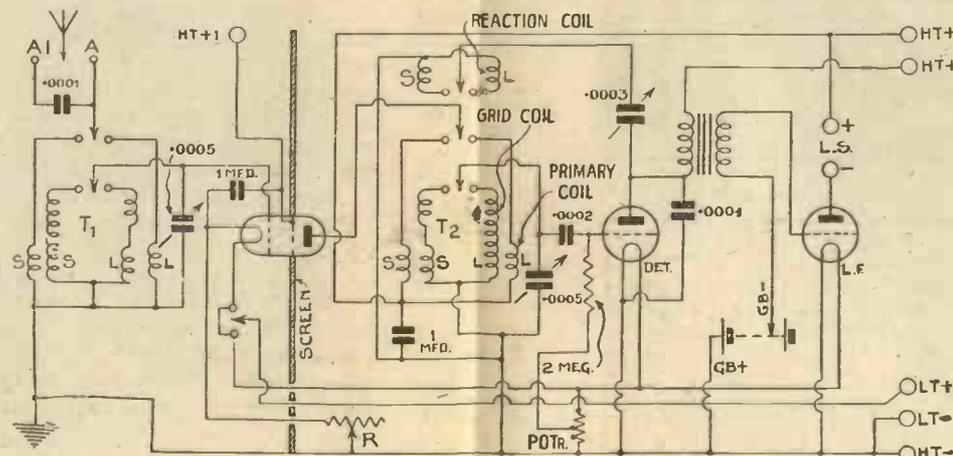
screw and a couple of washers. Alternatively, a soldering tag may be held by a screw and the wire taken to the tag. Actually three wires connect with the screen, one being from the coil base and the others from the earth terminal and negative L T

Suitable Valves

The results obtained are dependent to a large extent upon using the right valves properly. In the first stage a shielded valve must be used. Most of those in the



This "close-up" shows the arrangement of the L.F. end of the set



The circuit of "Everybody's 3"

3"

2-volt series have an impedance of about 200,000 ohms and an amplification factor of from 170 to 200. These are the makers' figures, but tests show that the valves issued may be expected to range from about 150,000 to 250,000 ohms, with correspondingly lower and higher amplification factors. Some valves may even be outside these limits, but they are still good valves. The important point to note is that the valve must have a good amplification factor for its impedance.

It will be clear, for example, that the actual magnification obtained will be only one half of the maximum if the valve used has an amplification factor of 100 and an impedance of 200,000 ohms, as compared with 200 and the same impedance. It does not matter so much when both values are above or below normal, as they may usually be corrected by adjustment of the screen voltage. It is interesting to note that the selectivity may be improved by using a valve of greater impedance, whilst the tuning is made less sharp by using a valve having a lesser impedance. Anyone having two or three valves can easily check these statements. Others, having only one shielded valve, will be able to note the effect of adjusting the screen voltage and filament current.

The L.F. Stage

For the detector position a valve of medium impedance may be used, or, say, a valve whose magnification factor is 20 or more. A valve of the R.C. class may be used, provided its impedance is not too high. This valve and the low-frequency transformer connected to it must be considered from the point of view of quality as well as the efficiency of detection. The quality is usually satisfactory when the transformer is a good one, having a ratio of about 3 to 1, and when the valve has a nominal impedance of, say, not more than 50,000 ohms.

A small power valve will generally

be the best for the last stage. Personally, I always use a super-power valve, because I have large batteries and a mains unit. But a super-power valve is of no great value to amateurs using dry batteries of the "standard" type. The batteries would discharge too quickly.

First Tests

With the valves fitted, connect the filament accumulator and switch on. To do this turn the left-hand coil switch to the left or right.

Then join the grid battery, connecting the value of grid bias recommended by the makers of the power valve. Finally, join the screen voltage for the shielded valve to terminal H.T. +1 (usually from 60 to 90), the detector voltage to H.T. +2, and the

LIST OF COMPONENTS (Continued)

0.002-mfd. fixed-condenser (Lissen, Dubilier, Graham-Farish, T.C.C., Watmel).

Two 0.001-mfd. fixed condensers (Lissen, Dubilier, Graham-Farish, T.C.C., Watmel).

Two 1-mfd. fixed condensers (Lissen, T.C.C., Dubilier).

3-megohm grid leak (Dubilier, Graham-Farish, Lissen, Ediswan).

Grid-leak holder (Bulgin, Lissen).

Fixed potentiometer (Polar, Lewcos).

Low-frequency transformer (Cossor, Lissen, Varley).

Partition screen, 10 in. by 6 in. (Parex, Ready Radio, Peto-Scott).

Panel brackets (Bulgin).

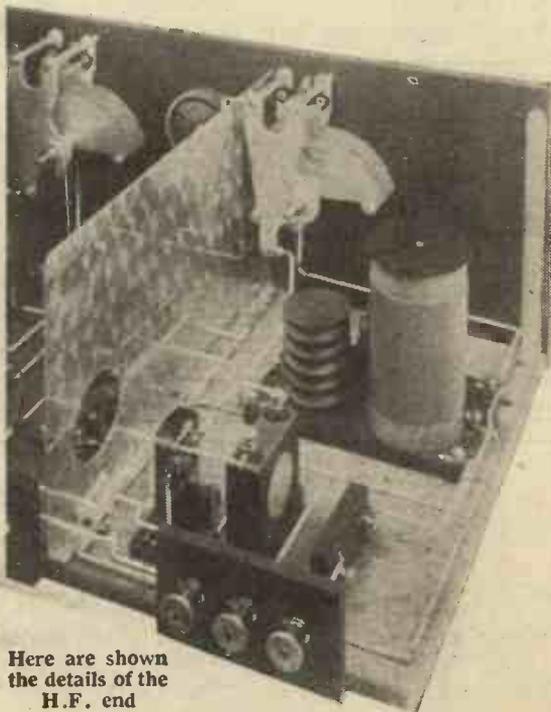
Thirteen terminals, marked: Aerial 1, Aerial 2, Earth, L.T.—, L.T.+, H.T.—, H.T.+1, H.T.+2, H.T.+3, G.B.—, G.B.+, L.S.—, L.S.— (Ealex).

Connecting wire (Glazite).

Two dial indicators (Bulgin).

full voltage of the battery to H T +3 for the anodes of the power and shielded valves. About 90 volts will suit the detector, and 120 or more, if available, the anodes of the other valves. The selective aerial tapping is A1, and the volume will be less than when terminal A is used.

To receive medium-wave stations turn



Here are shown the details of the H.F. end

“EVERYBODY’S 3” (Continued from preceding page)

both switches to the left. Turn the filament resistance full on, and set the reaction at, say, one-third in. When the local station is received, first turn back the reaction condenser, and then the filament resistance. This will reduce the strength.

If the resistance is turned well down, the effect of the reaction condenser can be tried and, if necessary, the H.T. to the detector can be adjusted to enable the right control of reaction to be obtained. Probably the best method of tuning is to turn up the filament resistance a little

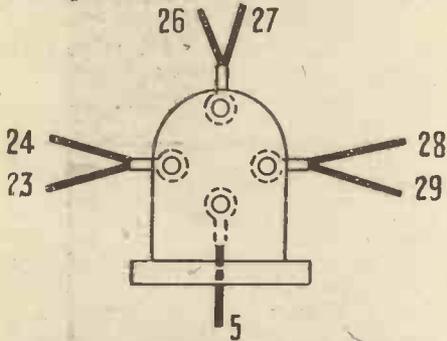


Diagram showing connections to screen-grid valve holder

and to cause the detector circuit to oscillate. Then, when a whistle is heard, the aerial tuning condenser can be adjusted to give the maximum strength.

The set is now exactly tuned to the station which will be received clearly by reducing the reaction a little, or by turning up the filament resistance. Many stations will be received with but little reaction, and even when the set is allowed to oscillate weakly, no interference will be caused,

as the oscillations do not reach the aerial circuit.

For the more distant stations the volume control resistance will have to be full on. A point to notice is that a distant station may be received with less than the full amount of reaction, according to the setting of the volume control.

Condenser Settings of “EVERYBODY’S 3”

MEDIUM-WAVE STATIONS

Right-hand Dial	Station	Right-hand Dial	Station
165	Budapest	105	Toulouse
159	Munich	95	London
153	Vienna	86	?
149	Brussels	84	?
146	Milan	80	Breslau?
140	5GB	76	Cardiff
138	Langenberg	72	?
134	Lyons?	60	?
126	Rome	57	Barcelona
120	Madrid	50	Glewitz?
116	Dublin	46	Belfast
114	Katowice?	38	Cologne?
110	Frankfurt		

LONG-WAVE STATIONS

Right-hand Dial	Station	Right-hand Dial	Station
155	Huizen	108	Eiffel Tower
140	Radio Paris	100	Motala
130	Zeeson	80	Kalundborg
120	Dav. 5XX	70	Hilversum

When interference is experienced, the volume control should be turned back a little. This increases the sharpness of tuning, for the reason that the impedance of the shielded valve is raised. It is best to find the most suitable value of screen voltage whilst tuned to a distant station. Thus, the voltage may be adjusted and the tuning tried again in order to obtain the best results. I do not suggest that the screen voltage be regularly adjusted; after the best value has been found for the particular valve used it should be left. The voltage is not a critical one.

The procedure when tuning long-wave stations is the same as when tuning medium-wave ones, but it will be found that the Continental broadcasting stations are very easy to receive. Good use must be made of the volume control. You should remember that it affects selectivity as well as the amplification. Therefore, reduce the amplification a little when interference is present and restore the strength by increasing reaction.

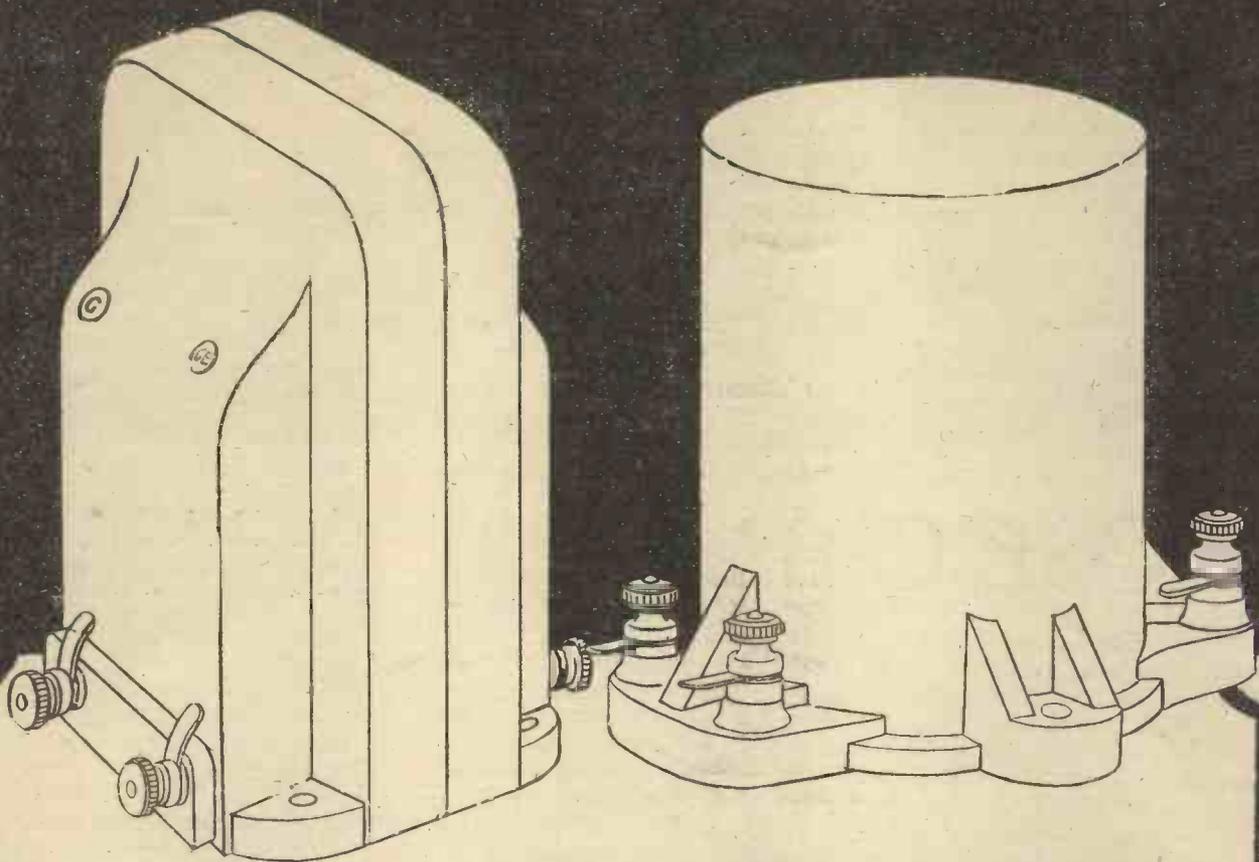
Most stations are received by adjustment of the two main controls, but the volume must usually be adjusted to avoid overloading the last valve. In a further article I will give tuning curves and explain how the aerial circuit should be adjusted for the best results according to the size and position of the aerial. Meanwhile, those who would care to experiment may connect the aerial through a .0001-microfarad fixed condenser to the grid of the shielded valve. This connection is the better one when the aerial is short.

MR. FLEX THOUGHT HE WAS A GLUTTON FOR STATIONS—



BUT HIS FRIEND KNOCKS HIM INTO A COCKED HAT,





not a sound upon the background

A dead silent background is the first thing you notice about the reproduction a Lissen Transformer gives ; you get volume, you get purity, because the notes of music stand out with startling definition.

It is well worth while to replace any specified transformer in any circuit you are building with

THE LISSSEN SUPER TRANSFORMER

—with which you get almost perfection amplification—
The laboratory curves taken of the Lissen Super Transformer prove that there is exceptionally even amplification over the whole band of audible frequencies, and it should be noted that these curves have been taken with ordinary standard valves. Two ratios. $3\frac{1}{2}$ to 1 and $\frac{1}{2}$ to 1. Each **19/-**

a Lissen Transformer ; and if you want to bring your old set up to date, the first step is to get a new Lissen Transformer for it. Because by doing this you get rid of the rustling background which less carefully-designed transformers always will produce ; the notes of music, words of song or speech are amplified in a background upon which no other sound is heard.

The

Famous 8/6 LISSSEN TRANSFORMER

For all ordinary purposes this Lissen Transformer at 8/6 has proved itself the equivalent of many at double the price, and its popularity has been reflected in huge sales. In the two years since it was introduced it has earned the title of "The Transformer that never breaks down." **8/6**
Ratio 3 to 1

LISSSEN

TRANSFORMERS

Obtainable of all Radio Dealers

LISSSEN LIMITED, WÖRPLE ROAD, ISLEWÖRTH, Middlesex. Factories also at Richmond (Surrey) and Edmonton (Managing Director: T. N. C. J. E.)

Don't forget to say that you saw it in "A.W."



A vivid impression of Wembley, before the start of the meeting when the broadcast was made

THOSE O.B.'S! With Particular Reference to the Wembley Dirt Track Broadcast

THERE is one department of the B.B.C. which does not receive so many grouses as do other departments and that is the branch which is concerned with outside broadcasts!

No matter what may be said about the staleness or otherwise of the ordinary programmes, the Surprise Items—and in particular those for which the microphone has

short thrilling snapshot, as it were, ending with a climax of excitement. This particular broadcast is mentioned because it is typical of the many which the B.B.C. O.B. engineers have to tackle.

Just imagine if you were given a microphone and a telephone line through to Savoy Hill, and were told to give a "snappy" description of the racing and to let some

3,000,000 listeners, many of whom have never seen a dirt track, have a good idea of what thrills are worked up in motor cycle racing of this kind. Frankly it wouldn't be easy, would it?

As a matter of fact the B.B.C. engineers were testing at Wembley some six weeks before the actual broadcast. Surprising how much work goes on behind the scenes to result in only a half an hour's broadcast!

Wembley was chosen

because it was the most suitable track for the purpose, and not because there was any financial inducement! When the B.B.C. was tackled on the subject it made the point quite clear that there is never any publicity value attached to these broadcasts. In plain language the B.B.C. receives no £ s. d. for its O.B.'s! On the other hand the expense of testing, and of the installation of land-lines is heavy, and the cost of an O.B. is often very much greater than that of a good studio programme of the same length.

Special Installations

Difficulties often have to be faced in connection with the installation of land-lines

and microphone leads. For instance, at Wembley care had to be taken owing to the large amount of metalwork in the buildings surrounding the track and also owing to the possibility of induction from neighbouring telephone and electric-light cables. To prevent any such troubles, lead-covered cables and conduits were used and really did prevent such interference.

A little sketch on this page shows the arrangement of the microphones on the occasion of this broadcast. The control box in which were situated two microphones is at the extreme end of the Press gallery right at the top of one of the grandstands, the idea being that the commentators could have a clear view of the whole proceedings. The B.B.C. always tries to place the commentator's "mikes" as high as possible, no matter whether it is a dirt-track meeting, a football match, or whatever it is. It is impossible to give a bird's-eye broadcast account unless one has a bird's-eye view.

Some O.B.'s are more than usually difficult because the event to be broadcast happens perhaps only once and a preliminary trial cannot be made. This was not the case, however, with the dirt-track broadcast, and on such occasions, some time previous to the actual event the engineers rig up what is known as a "closed circuit."

The "closed circuit" consists of an approximate arrangement of the microphones, a small amplifier, a volume control, and one or two pairs of 'phones. With this a test can be made to find the best microphone layout and in addition the correct positions for the volume and fade controls can be found. Usually this occupies some time and at Wembley, almost at the last minute, the position of one of the microphones was changed.

Actually the microphone which was used for picking up the noise of the dirt-track

(Continued on page 886)

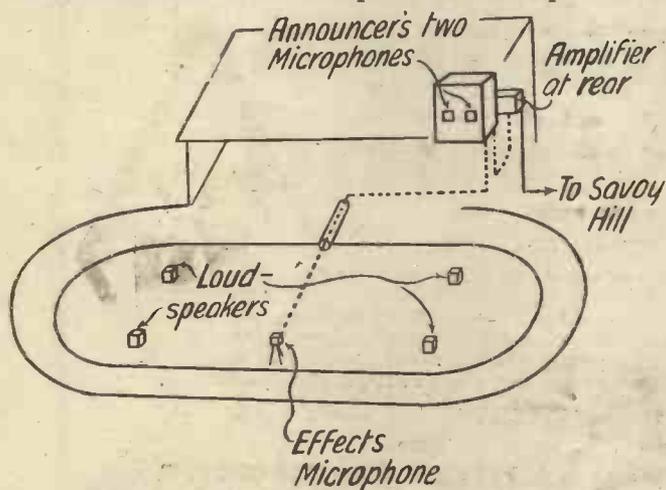


Diagram of track showing the "mike" and amplifier layout

to go out of doors—always have a wide appeal.

O.B.'s are divided into two classes; first, those which necessitate a relay of a complete item such as the Derby, the Boat Race or a football match of some kind; second, there are those O.B.'s which are included in the Surprise Items and generally speaking are only "impression" broadcasts.

For instance, one of these impression broadcasts was the recently-given running commentary of a speedway meeting at the Wembley dirt track. This was given during the ordinary course of the evening's programme and lasted not more than half an hour, all told. The idea was not to give an account of the whole meeting, but just a

MUSIC BROUGHT UP SHARP!



Voices in sharp relief; song clear and true; music full of life; that is what the LISSEN Secret Process does for your radio.

Because the current that flows from the large cells of this battery is produced by a new chemical combination and process which makes it pure, silent and sustained. There is never a sign of ripple in the current, never a trace of hum. It flows smoothly from beginning to end of the longest programme, and throughout months and months of use.

PRICES.

60 volt (reads 66) ...	7/11
100 volt (reads 109) ...	12/11
120 volt ...	15/10
36 volt ...	4/6
60 volt (super power) ...	13/6
100 volt (super power) ...	22/-
9 volt Grid Bias ...	1/6
4½ volt Pocket Battery, 5d. each (4/6 doz.)	
Single Cell Torch Battery	4½d.

You want pure power for your radio; any good wireless dealer will supply you with the Lissen Battery that will give it to you.

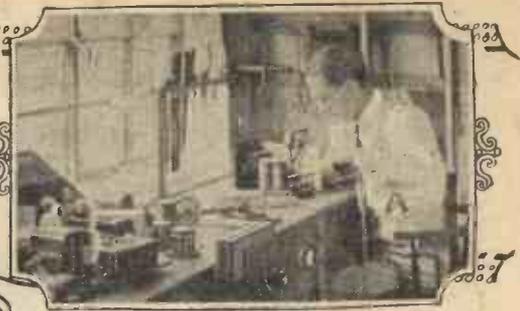


USE LISSEN VALVES WITH LISSEN BATTERIES

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, Middlesex. Factories also at Richmond (Surrey) and Edmonton. (Managing Director: T. N. COLE.)

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

My Wireless Den



Weekly Tips—Constructional and Theoretical—by W. JAMES

Why the Condenser?

THE presence of a condenser in the anode circuit of a detector is usually of considerable benefit, particularly when the anode-bend method is used. This anode by-pass condenser actually improves the selectivity and signal strength.

If you have an anode rectifier you can soon prove this point. First remove the reaction condenser, if one is fitted, and also the by-pass condenser. Then connect between the anode and filament a fixed condenser of .0001 microfarad. An improvement in the signal strength and selectivity will be noticed. You must, of course, tune to a fairly weak station for these tests.

Then connect a larger condenser, such as one of .0002 microfarad, and again notice the improvement. Finally, try a .0005 microfarad. In all probability there will be no improvement in the results by increasing the capacity beyond .0003, but when the tuning coil is a good one .0003 is not too much.

In many sets a fixed .0001 mfd. condenser is used in addition to the reaction condenser.

"Snags" in Ganging

Although the minimum of shielding is used in many three-valve sets having a stage of high-frequency, trouble is sometimes experienced when a two-gang tuning condenser is fitted.

This is because the two valves are not shielded—or, at all events, are not sufficiently well shielded. Hence, an amateur using one of the designs published in this paper as a basis, and fitting a two-gang tuning condenser, instead of two separate condensers, may expect trouble unless the two parts are properly shielded.

Microphonic Valves

Microphonic valves are a thing of the past—at least, that is my experience. The valve makers seem to have discovered a means for preventing microphonic troubles, and we are therefore able to employ rigid valve holders.

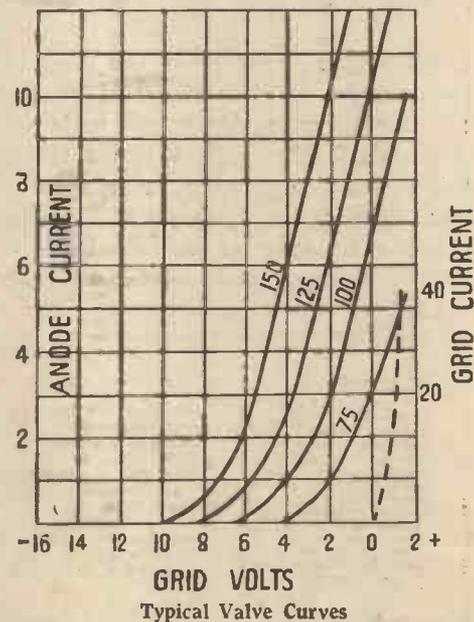
This surely is a relief, for many types of non-microphonic holder were troublesome. At the same time, howls may still be produced on occasions by interference or other effects. Thus the sound waves from the loud-speaker may strike the detector and

start a howl. Similarly, vibration may shake the valves and cause a noise or howl to be set up. It is, therefore, still necessary to exercise reasonable care, as even when a howl is not produced quality may be bad.

Finding Amplification Factors

Do you know how to find the amplification factor of a valve from its characteristic curves? It is very easy.

A typical set of curves, taken from a valve instruction slip, is given below. They show how the anode current varies when the grid bias is changed for four values of anode voltage. The anode current is 6 milliamperes, for instance, when the grid bias is negative 4 volts and the anode



voltage is 150. It is also 6 milliamperes when the anode voltage is 125 and the grid-bias negative 2.2.

A change in the anode voltage of 25 is, therefore, balanced by a change in the grid bias of 1.8. From this it follows that the amplification factor of the valve is $\frac{25}{1.8}$ or 14.

The amplification factor is dependent to an extent upon the values of high tension and grid bias used. Thus, if we take a current of 3 milliamperes, 75 volts high tension and zero grid bias, the magnification factor will be found to be 12.5, according to the curves.

"Anchoring" Those Transformers

Certain transformers being provided with a terminal for earthing the case, one wonders whether it is worth while earthing the case of every transformer.

This is carried out easily enough by fixing a wire between one of the holding-down screws and the case—having cleaned the part, of course. Experience shows that earthing is quite unnecessary in the majority of instances where only the one low-frequency stage is used. But when two transformers are fitted it may be essential to earth them.

"THOSE O.B.'s"

(Continued from page 884)

motor cycles was situated right away from the main grandstand, and quite near to the edge of the track. It was found that if the "mike" was placed on the edge of the track near the main grandstand the sloping roof reflected back most of the sounds and killed the crispness of the reproduction.

As it was, the rattling roar of the motor cycles came out like the tearing of linen, and by sound alone an enthusiast could detect one make of motor cycle from another as they passed round the track.

In the control box two microphones were placed in parallel in case of breakdown and also so that the two commentators could speak with comfort.

At the back of them was the fader control and an "A" amplifier, consisting of three R.C. stages. This amplifier passes the microphone currents on to further lead-covered G.P.O. telephone lines, and thence through a pot-head and the ordinary telephone lines to Savoy Hill.

Here is just one little "trick" which was resorted to. After some of the effects had been given and the commentators had explained the details of the racing, it was arranged that the effects microphone alone should be switched on and allowed to tell its own story of one complete race. And it was arranged that the effects "mike" should be turned so quickly that the deafening roar of the machines came as a sudden surprise to listeners. The broadcast really did work up to a climax of excitement.

And that is the secret of a successful O.B. K.U.



LISSEN ELIMINATORS

The current you get from Lissen Batteries is the purest form of current you can get for radio. But if you want to use an eliminator, use a Lissen Eliminator. You'll then get current from your mains smoother, steadier, better than before.

There are four types of Lissen Eliminators; one of them will almost certainly be just right for your set. Tell your dealer what voltage your mains supply is and whether it is A.C. or D.C.; tell him what output you require, or what valves you are using, and he will demonstrate for you the Lissen Eliminator to suit your needs.

TYPES AND PRICES

D.C. Model "A." Employs 3 H.T. + tap- pings; H.T.+1 giving 80 volts for S.C. valves; H.T.+2 giving 60 volts at approx. 2 mA. for detector valves; H.T.+3 giving 120/150 volts at 12 mA.	D.C. Model "B." Employs 3 H.T. + tap- pings; H.T.+1 and H.T.+2 are continuously variable (by means of two control knobs) and capable of giving any desired voltage up to 120/150 volts at approx. 2 mA.; H.T.+3 giving 120/150 volts at 12 mA. for power valves.
Price ... 27/6	Price ... 39/6

Models working on 100/110 Mains Voltage give output
voltages of approximately 60 per cent. of above values

A.C. Model "A"

Tappings as in D.C. Model A.	
LN 576 for A.C. Mains voltage ..	200-210
" 577 " " " " " " " " " "	220-230
" 578 " " " " " " " " " "	240-250
" 639 " " " " " " " " " "	100-110

PRICE ... **£3 : 0 : 0**

A.C. Model "B"

Tappings as in D.C. Model B.	
LN 579 for A.C. Mains voltage 200-210	
" 580 " " " " " " " " " "	220-230
" 581 " " " " " " " " " "	240-250
" 640 " " " " " " " " " "	100-110

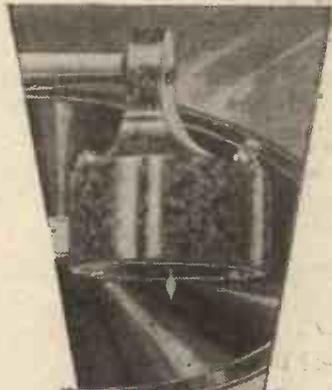
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LISSEN ELIMINATORS

BUY LISSEN BAT-
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Revolutionary New Lissen Pick-up

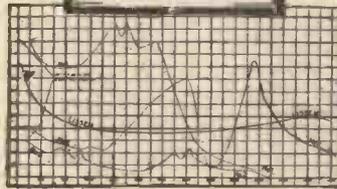
NEW NEEDLE ARMATURE FULLY
FLOATING AND SO LIGHT THAT
RESPONSE IS PERFECT AT ALL
FREQUENCIES!



HOW THE NEEDLE IS SUSPENDED



Held in position by
magnetic attraction
without restriction by
mechanical contacts.



"Better than 'Talking' Picture reproduction"—that is what everybody says who hears a gramophone record played by this new Lissen Pick-up. And actually the reproduction is better than the film experts have achieved—more natural, nearer to reality, because no longer are the high notes thinned out or the lower bass lost.

The Lissen Pick-up is so responsive that even the perfect electrical recordings of to-day can hardly do it justice. It responds to the most minute indentation on the record—the needle-armature is so light that the needle point actually feels its way along the record groove. And you'll find your records almost everlasting when you use this new Lissen Pick-up because the needle-point actually feels and does not plough its way along.

If you want every single record to sound much better than those you hear at demonstrations—if you want radio-gramophone reproduction that comes so near to reality that in a darkened room you would suspect the presence of the artist—get this new Lissen Pick-up and learn what perfection means. Any Lissen radio dealer will demonstrate it for you.

LISSEN

NEEDLE ARMATURE
PICK-UP 30/-



LISSEN 4-POLE BALANCED ARMATURE UNIT (ADJUSTABLE)

The Lissen 4-Pole Balanced Armature Unit brings something approaching loud-speaker perfection within the reach of everybody who owns a radio set. You can build any type of cone loud-speaker with it; you can use it with a big baffle board, or put it in a cabinet. You can build a linen diaphragm loud-speaker with it, or you can buy it completely assembled and ready to connect up to your set. It has a fine adjustment, and you therefore get the utmost volume from it without chatter.

In brown moulded case with attachment for fitting to any type of cone. PRICE **12/6**

Cast aluminium Chassis, specially designed to give the best results from the Unit. PRICE **7/6**

13-in. cone for use with the above **2/6**

COMPLETE AS-
SEMBLY OF LOUD
SPEAKER UNIT,
CHASSIS AND
CONE.
PRICE **22/6**

LISSEN 4 POLE BALANCED ARMATURE UNIT

Obtainable from
all radio dealers;
insist upon hear-
ing Lissen before
you buy.

UNIT
ONLY
12/6

COMPLETE
ASSEMBLY
22/6

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX.

(Managing Director: T. N. Cole.)

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

"A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

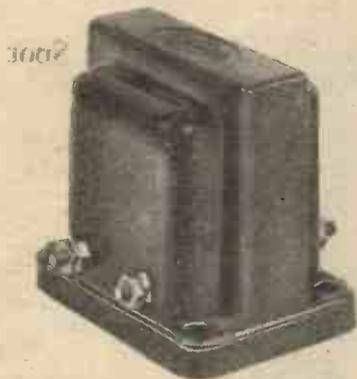
Burton L.F. Transformer

THERE is always a demand for inexpensive low-frequency transformers capable of giving a good performance under normal conditions. One does not expect such an instrument to have an exceptionally high primary inductance; and, indeed, this is hardly necessary with the majority of loud-speakers, since they do not reproduce the lowest frequencies.

The Burton intervalve transformer, manufactured by Messrs. C. F. and H. Burton, Progress Works, Bernard Street, Walsall, is a useful and efficient article of its kind which will operate effectively under average conditions. The windings are placed in two concentric formers, the primary on one side and the secondary on the other; the connections are taken to four terminals, two on each side of the moulded bakelite case, which completely encloses the windings and the core.

On test we took a number of readings of the primary inductance with various values of D.C. polarising current. With 2 milliamps flowing, the inductance was 17.7 henries, whilst with 4 milliamps it was 15.2. Even at 10 milliamps the inductance did not fall below 10 henries. These figures were all taken with a small A.C. current flowing through the windings to duplicate the conditions obtaining in actual practice.

This instrument should give quite satisfactory results when following a grid-leak



Burton Low-frequency Transformer

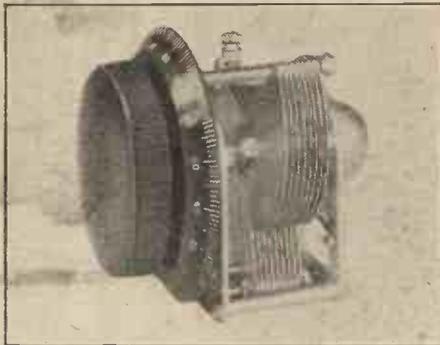
detector valve of medium impedance, whilst it will make an excellent second-stage transformer.

Polar Condenser

POLAR components are well known to readers and in particular the brass vane condensers fitted with the standard slow-motion device.

In addition to the normal capacity of .0005 for the tuning condensers and .0001 for the reaction. Messrs. Wingrove and

Rogers, Ltd., also market a .0003 variable condenser which in appearance is very similar to the standard .0005 article. This value of capacity is particularly suitable for a number of purposes, including reaction and short-wave work; in the latter case, .0005 microfarad is rather more than is



Polar .0003 microfarad Slow-motion Condenser

required to cover the necessary wave band and, in fact, becomes more critical to operate.

It is interesting to note that these condensers can be supplied with special phosphor bronze ball bearings for short-wave work. Steel balls in contact with brass give an unpleasant grating noise at short wavelengths, which is entirely obviated by the use of bronze balls. Indeed, these condensers give a very pleasant control on such wavelengths, owing to the smoothness of the slow-motion gear and the silence of operation, two qualities which we can vouch for from personal use.

The design and workmanship of these condensers are both excellent, and they can be thoroughly recommended.

A Good Crystal

ALTHOUGH crystal reception in the London area has been affected by the new Brookmans Park station, in the districts outside London it has greatly improved, and many listeners living some distance away have had their first opportunity of good reception on a crystal set. It seems safe to predict that in many districts these simple receivers will become popular.

This week we have tested a Yep crystal, made by the Yep Manufacturing Co.; this is supplied complete with holding clip and cats-whisker for the modest price of 2s. 6d. The crystal is generous in size, and tests show that it is almost equally sensitive over its entire surface.

No better test could have been applied to this crystal other than trying it in the "B.B.C. Brookmans Park Crystal Set," published in AMATEUR WIRELESS No. 386,

November 2. At a distance of only six miles from Brookmans Park it was just possible to receive 5GB. The aerial coupling naturally had to be decreased as much as possible in order to perform this feat.

With the cats-whisker supplied, no difficulty was experienced in finding a sensitive spot, whilst the optimum pressure of the whisker on the crystal was not unduly light.

The "Yep" crystal can be recommended for its sensitivity and ease of adjustment.

M.P.A. Cabinet Speaker

ONLY a few years ago loud-speakers were treated as scientific instruments, and in consequence the matter of appearance was hardly considered. In time, however, manufacturers and cabinet makers put their heads together and produced articles which in appearance harmonised with the normal furniture of a room.

The popularity and good reproducing qualities of the cone loud-speaker have undoubtedly aided cabinet makers in their task, for such a speaker can be readily mounted in an attractively shaped cabinet.

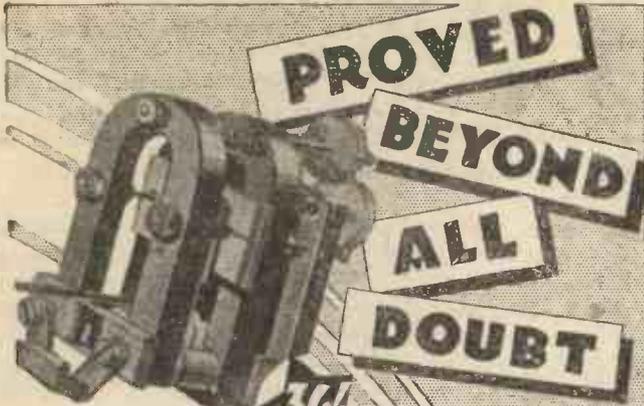
A cabinet loud-speaker received for test this week is made by the M.P.A. Wireless Co., of 62 Conduit Street, W.1. On seeing this speaker, one is immediately attracted by the finish and design of the cabinet with its dignified fret. The overall dimensions are 15½ by 7¼ by 15½ in. high, and it is



A Good Cabinet Loud-speaker—the M.P.A.

therefore possible to fit a large size cone. The operating unit is the standard type fitted successfully by the M.P.A. Wireless, Ltd., to many of their speakers, including the well-known plaque.

We were quite favourably impressed with this speaker when tested in our laboratories. The reproduction is pleasant without undue resonance, whilst the high notes have not been sacrificed for the sake of a booming tone. This instrument can be recommended.



**PROVED
BEYOND
ALL
DOUBT**

**AMAZING
LEAP TO
WORLD-WIDE
POPULARITY**

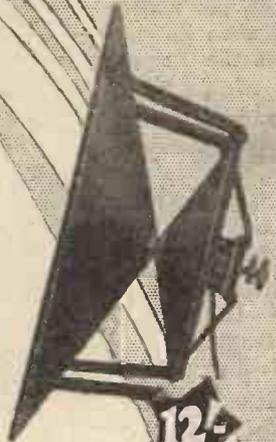
Thousands a week have been sold to delighted listeners all over the country. The demand has risen to enormous proportions, and in response to constant requests, we are now supplying a specially designed Double-cone Chassis, for use with the Star Unit, or the complete speaker is available in pleasing cabinet form, as illustrated—so now every need is catered for. Everyone can enjoy the pleasure of the Wates Stars Experts, critics and listeners alike—acclaim it—the best reproducer yet, irrespective of price!

The Wates Star Duplex Unit, double magnets, eight poles, four coils ... **36/-**
Double-cone Chassis, with brackets **12/-**

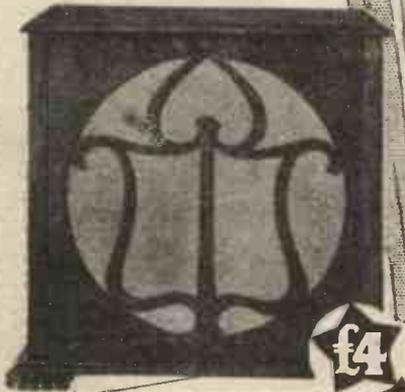
Wates Star Duplex complete Speaker with Double-cone Chassis in Oak **£4.0.0**

Mahogany **£4.6.0**
If unable to obtain locally can be supplied direct.

SHAFTESBURY RADIO CO.,
(Dept. A.W.)
184-188 SHAFTESBURY AV.
LONDON, W.2



**Introducing the
Double Cone
Chassis & Cabinet**



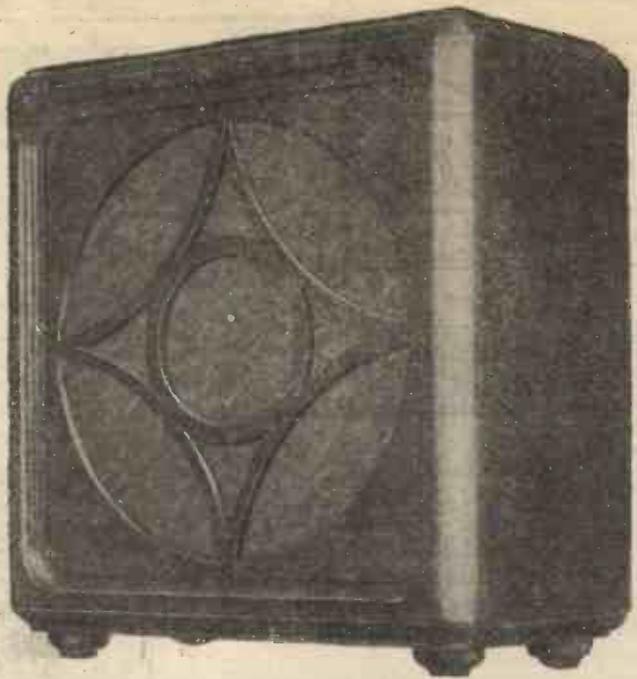
**NOW
UNIT.
CHASSIS.
CABINET.**

*Your Set
is only as
good as its
Speaker -*

**WATES
STAR
LOUD SPEAKER UNIT**

**THE STARS
OF THE
RADIO WORLD**

M.B.



**BLUE SPOT
GOLIATH**

£6.6.0

The name "Blue Spot" represents all that is faithful and true in loud-speaker reproduction.

And the finest model of all is Blue Spot Goliath, Blue Spot's greatest speaker.

Ask your nearest dealer to demonstrate this speaker and you will hear the finest reproduction that to-day is possible.

Six guineas is the price of this superb instrument.



F. A. HUGHES & CO., LIMITED.

204-6 Great Portland Street, London, W.1.

Phone: Museum 8630 (4 lines.)

Distributors for Northern England, Scotland and North Wales: H. C. RAWSON (Sheffield and London), Ltd., 100 London Road, Sheffield, (Phone: Sheffield 28006) and 22 St. Mary's Parsonage, Manchester, (Phone: Manchester City 3329.)



ONE of the most popular concerts of the season should be the one broadcast from the People's Palace, Mile End, on December 5. Sir Landon Ronald will conduct the orchestra, Solomon being the solo pianist.

John Watt, a member of the B.B.C. staff at Belfast, and George Barker, of the Harley and Barker vaudeville combination, have made of Dr. Arne's *Love in a Village* an up-to-date jazz opera. It is to be broadcast for the first time from 5GB on December 12 and from 2LO and 5XX on the following evening.

It is understood that the Wagner Festival which takes place annually at Bayreuth (Bavaria) will be relayed to British listeners next year. In the meantime the famous conductor, Franz von Hoesslin, who directs the orchestra at the Festspielhaus at Bayreuth, will conduct the B.B.C. symphony concert at Queen's Hall on December 6.

On Friday, December 13, listeners will

hear three contrasted quarrel scenes, the first two being portrayed by Shakespeare in *Richard III* and *The Taming of the Shrew*; the third is a short play by Edwin Lewis, entitled *Sea Silence*.

The Berlin Philharmonic, which ranks with the Philadelphia Symphony Orchestra as the finest in the world, will pay a visit to London on December 3, when its programme will be relayed from the Queen's Hall to 2LO and 5XX.

The Golden Stream, a pantomime first given at Belfast in 1882, has been prepared for the microphone from memory by the stage manager of the original production. The new version will be heard from the Belfast B.B.C. station on December 12.

The Cardiff station will relay from Bristol on December 12 *Smooth Crossing*, a new play in one act from the pen of Mr. Froom Taylor. It is to be presented by Bristol's Little Theatre Company.

The Champion Band of the "W" (Brixton Division) Metropolitan Police has

been invited to give a concert at the 2LO studio on December 7.

Wilkins, or the Other Side of the House, an original opera written by members of the Bermondsey Central School for Boys, is to be broadcast through 2LO and 5XX on December 14.

It is reported from Reykjavik that the new 15-kilowatt broadcasting station now in course of construction will be officially inaugurated in June, 1930, with a National Festival in celebration of the thousandth anniversary of the discovery of Iceland. The transmitter will work on 1,200 metres.

During the last few days, in its endeavour to find a comfortable position in the wave-band, Nice-Juan-les-Pins has worked on 237, 246, 250, and 256 metres. Although still advertising its programmes on 237 metres, the transmissions on most nights can be picked up on 244 metres.

The latest of the two Barcelona high-power broadcasters, namely, Radio Catalana (EAJ13), still remains in an experimental stage. In a series of nightly tests, on 268 metres, the call is put out in both Spanish and English.

According to a law passed in France in 1928, all owners of wireless receiving apparatus must register with the local postal authorities. The form to be filled in also bears a 3-franc stamp (6d.), the only tax the French radio fan is called upon to pay

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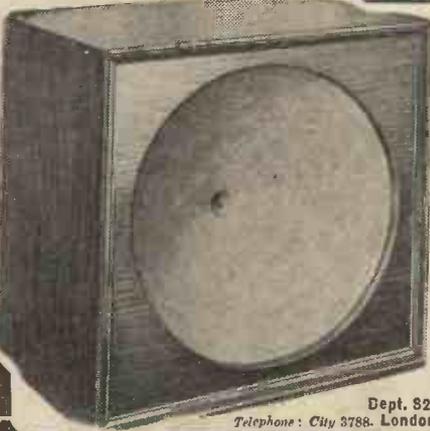
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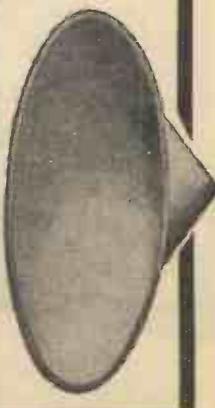
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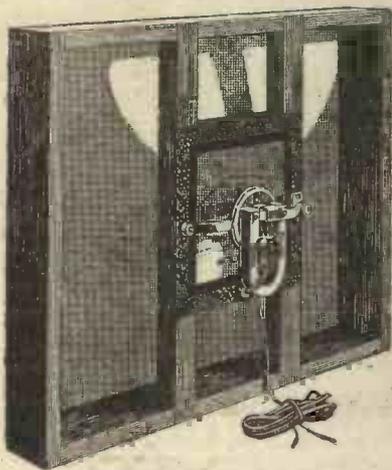
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288.5	1,040	Stoke-on-Trent (6ST) 0.13		309	970	Radio Vitus ...	1.0	LATVIA			
288.5	1,040	Sheffield (6LF) 0.13		*316	950	Marseilles (PTT) ...	0.5	*525	572	Riga	3.0
288.5	1,040	Plymouth (5PY) 0.13		329	914	Grenoble (PTT) ...	0.5	LITHUANIA			
288.5	1,040	Liverpool (6LV) 0.13		331.4	905	Petit Parisien ...	0.5	*1,935	155	Kovno	7.0
288.5	1,040	Hull (6KH) ... 0.13		364	824	Algiers ...	12.0	NORWAY			
288.5	1,040	Edinburgh (2EH) 0.35		368	815	Radio LL (Paris) 0.5		240	1,250	Rjukan	0.18
288.5	1,040	Dundee (2DE) 0.13		411	729	Radio Maroc (Rabat) 2.0		*283	1,058	Notodden	0.05
288.5	1,040	Bournemouth (6BM) 1.0		447	671	Paris (Ecole Sup. PTT) 3.0		345	869	Frederiksstad	0.7
288.5	1,040	Bradford (2LS) 0.13		468	640	Lyons (PTT) ...	5.0	364	824	Bergen	1.0
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*310	968	Cardiff (5WA) ... 1.0		*1,725	174	Radio Paris ...	12.0	453	662	Aalesund	0.3
356	842	Brookman's Park 30 (2ZY) 1.0		GERMANY							
*377	797	Manchester (2ZY) 1.0		*218	1,373	Flensburg	0.5	*313	959	Cracow	0.5
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*517	581	Vienna	15.0	*276	1,085	Koenigsberg	2.5	251	1,193	Almeria (EAJ18)	1.0
CZECHO-SLOVAKIA											
*263	1,139	Morava-Ostrava	10.0	*283	1,058	Magdeburg	5.0	268	1,121	Barcelona (EAJ13)	10.0
*279	1,076	Bratislava	12.5	*283	1,058	Berlin (E.)	0.5	314	956	Oviedo (EAJ19)	0.5
*293	1,022	Kosice	2.0	*283	1,058	Stettin	0.5	*349	860	Barcelona (EAJ1)	8.0
*342	878	Brunn (Brno)	2.4	*319	941	Dresden	0.25	314	956	Oviedo (EAJ19)	0.5
*487	617	Prague (Praha)	5.0	*319	941	Bremen	0.35	*368	815	Seville (EAJ5)	1.5
BELGIUM											
235.5	1,273.5	Charleroy (LL)	0.25	*325	923	Breslau	1.5	403	743	San Sebastian (EAJ8)	0.5
246.1	1,218.8	Schaerbeek-Brussels	0.25	*360	833	Stuttgart	1.5	428	700.9	Madrid (EAJ7)	2.0
244	1,229	Ghent	0.5	*372	806	Hamburg	1.5	453	662	Salamanca (EAJ22)	1.0
270	1,112	Radio-Binche		*390	770	Frankfurt	1.5	SPAIN			
294	1,020	Liege	0.1	*418	716	Berlin	1.5	251	1,193	Almeria (EAJ18)	1.0
312	961.4	Arlon	0.25	*453	662	Danzig	0.25	268	1,121	Barcelona (EAJ13)	10.0
339	887	Louvain	8.0	*456	657	Aachen	0.35	314	956	Oviedo (EAJ19)	0.5
*509	590	Brussels	1.0	*473	635	Langenberg	13.0	*349	860	Barcelona (EAJ1)	8.0
DENMARK											
*281	1,067	Copenhagen (Kjbenhavn)	0.75	*533	563	Munich	1.5	314	956	Oviedo (EAJ19)	0.5
1,153	260	Kalundborg	7.5	*560	536	Hanover	0.35	*368	815	Seville (EAJ5)	1.5
ESTHONIA											
*297	1,010	Reval (Tallinn)	0.7	566	529.8	Augsburg	0.25	403	743	San Sebastian (EAJ8)	0.5
FINLAND											
*221	1,355	Helsingfors	0.9	575	521.7	Freiburg	0.35	428	700.9	Madrid (EAJ7)	2.0
*1,795	167	Lahti	40.0	*1,635	183.5	Zeesen	30.0	453	662	Salamanca (EAJ22)	1.0
FRANCE											
31.65	9,479	Radio Experimental (Paris)	1.0	2,100	142	Norddeich	10.0	SWEDEN			
175	1,714	S. Quentin	0.1	2,290	131	Grand Duchy Luxembourg	3.0	281	1,301	Malmö	0.6
214	1,400	Fécamp (Radio Normandie)	0.5	31.4	9,554	Eindhoven (PCJ)	25.0	*257	1,160	Hoerby	10.0
220	1,364	Beziere	0.1	*298	1,004	Hilversum (until 5.40 p.m. G.M.T.)	0.5	270	1,112	Trollhattan	0.45
238	1,260	Bordeaux (Radio Sud-Ouest)	1.0	*1,071	280	Hilversum (5.40 p.m. G.M.T.)	0.5	*322	932	Goeteborg	10.0
239	1,256	Radio Nimes	0.25	*1,071	280	Hilversum	0.5	322	932	Falun	0.5
244	1,229	Juan-les-Pins	0.3	*1,071	280	Scheveningen-Haven	5.0	*436	689	Stockholm	1.5
*255	1,175	Toulouse (PTT)	1.5	(from 10.30 a.m. to 5.40 p.m. B.S.T.)				*542	554	Sundsvall	0.8
*265	1,130	Lille (PTT)	0.7	*1,875	160	Huizen (after 5.40 p.m. G.M.T.)	0.5	770	389	Ostersund	0.8
268	1,121	Strasbourg	0.3	GRAND DUCHY							
*272	1,103	Rennes (PTT)	0.5	223	1,346	Luxembourg	3.0	1,200	250	Boden	0.6
*286		Montpellier (PTT)	0.2	HOLLAND							
HUNGARY											
ICELAND											
IRISH FREE STATE											
ITALY											
TURKEY											

All wavelengths marked with an asterisk have been allotted according to the Plan de Prague.

CHIEF EVENTS OF THE WEEK

- Dec. 4 LONDON AND DAVENTRY (5XX)
 - 4 *Deirdre of the Sorrows*, by J. M. Synge.
 - 5 People's Palace concert.
 - 6 Symphony concert relayed from Queen's Hall.
- Dec. 2 DAVENTRY EXPERIMENTAL (5GB)
 - 2 *Deirdre of the Sorrows*, by J. M. Synge.
 - 7 Vaudeville programme.
- CARDIFF
 - Dec. 7 Eye-witness account of the Welsh Trial Match at Pontypool.
- GLASGOW
 - Dec. 7 Running commentary on Glasgow v. Edinburgh inter-city Rugby football match, by Mr. G. E. R. Young.

Education authorities in Scotland are beginning to include wireless as a subject in their evening classes syllabus. The Paisley authorities have already taken such a step, and in Glasgow classes of a similar nature for enthusiasts are held in the High School.

Radio Salamanca, a Spanish station which has not been heard for some time, has resumed its broadcasts on 456 metres.

The Tunis-Kasbah (North Africa) military station has resumed its radio-telephony broadcasts on 1,350 metres, a musical transmission is carried out daily at 8.15 p.m. G.M.T.

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BOW.—Eastern Wireless Co., 147 Roman Road; H. Harrison, 119 Roman Road; Louis Saverta, 19 Roman Road.
BRINTON.—P. Stern, Atlantic Road; Marcelle, Stockwell Road.
CANNING TOWN.—P. W. Radio, 47 Barking Road.
CITY.—Perfecta Cycle & Radio Co., Ltd., 223 Shoreditch High Street.
CHADWELL HEATH.—Cheffey & Fuller, Becontree Avenue.
CLAPTON.—Clapton Radio, 32 Lower Clapton Road; Humphries, 8 Chatsworth Road.
CLAPHAM.—H. D. Atkins & Co., 6 Clapham Road.
CROYDON.—Busy Bee Radio, 14 Surrey Street; The Handy Shop, 11 Church Street.
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EAST HAM.—Gas Light and Radio, 80 High Street; East Ham Wireless Supply, 427 Barking Road.
FALING.—W. Northfield Radio, 137 Northfield Ave.; Scraze, 241 Northfield Ave.
FRIITH.—H. Miller, 114 West Street.
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sworth Bridge Road; Pryce's Corner, 106 Little Road.
FOREST GATE.—H. Bayliss, 96 Wood Grange Road; A. W. Lay, 10 Station Road; C. H. Gibbins, 56 Tracey Road.
FINSBURY PARK.—Electron Wireless Co., 208 Seven Sisters Road.
GOODMAYES.—Cheffey & Fuller, 668 Green Lanes; Rylands Electrical Co., Goodmayes Road.
GREENWICH, EAST.—A. W. Rose and Son, 163 Trafalgar Road.
GREENWICH.—Radio Box, 18/18a Blackheath Road.
HOLLOWAY.—S.O.S. Wireless, 149 Holloway Road; S. Laws, 326 Holloway Road.
HAMBURGHEATH.—Economic Lighting Stores, 24 Fulham Palace Road.; Gas Light Fittings Co., 128 King Street.
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WALTHAMSTOW.—Gas Light Fittings Co., High Street; R. Wilkin, 12 Blackhorse Lane.
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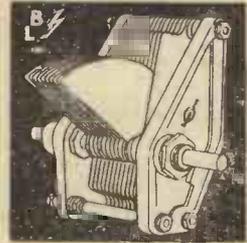
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	PR 9	3.5-4	.063	24 000	14	A.F. Det.
	PR10	3.5-4	.063	15 000	8.7	L.F.
	PR11	3.5-4	.063	65 000	40	H.C.
	PR17	5-6	.5	24 000	17	A.F. Det.
	PR18	5-6	.5	15 000	9	L.F.
	PR19	5-6	.15	80 000	40	H.C.
	POWER 6/6 EACH Post 4d.	PR20	2	.15	7 000	6
	PR30	4	.15	8 000	6	"
	PR63	6	.5	8 000	6	"
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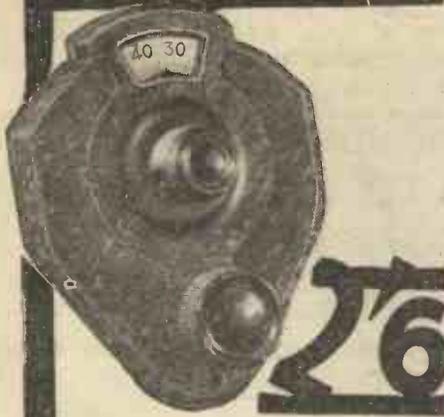
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LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

"What is a Good Power Valve?"

SIR,—I have read with interest Mr. Reyner's article entitled "What is a Good Power Valve?" in AMATEUR WIRELESS No. 385, and hope he will not think it impertinent if I raise one or two points.

1. He wrote "Let us consider that the power developed in the anode circuit is mEg , where Eg is the grid voltage and m is the amplification factor." I consider that "power" should read "voltage."

2. He also wrote: "The anode current therefore is this voltage (mEg) divided by the resistance of the valve and loud-speaker in series." Surely the anode current depends upon the values of H.T. and grid voltage, as well as the impedance of the valve and the external impedance. Should not the article read, therefore: "The anode current change . . ."

3. Is the formula

$$P = \frac{m^2 Eg^2}{r} + \frac{n}{(n+1)^2}$$

correct. Should not the + sign be a multiplication sign?

Personally, I think the essential points of this article are not sufficiently explained for the average amateur.

F. E. D. (Cranwell).

SIR,—With reference to the points raised by the letter above, the first point is clearly a slip, mEg being the voltage developed in the anode circuit, and not the power.

With reference to the second point, we are considering the dynamic condition of the valve in which we deal with alternating currents and voltages, and in this sense my statement is correct. Strictly speaking, one should refer to the variable component of the anode current or voltage, as the case may be.

With reference to the formula, this is a printer's error, as can be seen by following the line of argument developed in the article. The plus sign should be a multiplication sign, the correct formula reading as follows:

$$P = \frac{m^2 Eg^2}{r} \times \frac{n}{(n+1)^2}$$

J. H. REYNER (Elstree).

Transmission Quality

SIR,—I am interested in the remarks made by your correspondents W.D. and W.J.F. regarding the harshness of many of the programmes recently broadcast by the B.B.C., and I must say that

I fail to agree with their reasoning. They point out that the harsh nature of the music is unsuitable for reproduction with any kind of speaker.

I do not usually praise the B.B.C., but so far as the quality of their transmissions is concerned I have nothing but praise, and I believe that their broadcasts are as near perfection as possible. The trouble lies not with the transmitter, but with the receiver; and it is up to us to bring our apparatus into line with theirs. I am afraid that we have become so accustomed to the high quality of present-day transformers and valves that we spend far too little time in making final adjustments.

There are many people who do not even experiment with the grid-bias voltage, merely taking the voltage recommended by the makers as final.

It seems evident, too, that many builders of receivers do not appreciate the very great importance of matching valves with the transformer or resistance. There is no excuse for this kind of thing now that all valve manufacturers and all makers of high-class transformers state the impedance of their products. In all cases it will be found that best results are obtained by arranging that the valve has an impedance of one-half to one-quarter that of the transformer or resistance in its anode circuit.

In mentioning these facts, I do not wish to infer that W.D. and W.J.F. have not knowledge of them, but I do feel that many people who make similar complaints do not pay sufficient regard to these things.

In conclusion, I should like to say that I feel absolutely sure that if your correspondents will experiment a little on the lines suggested they will notice a disappearance of the harshness. Of course, one always assumes the use of a fairly good speaker, and nowadays there are very few poor ones.—2BJO (Liverpool).

South-coast Interference

SIR,—Re letters now appearing in the columns of AMATEUR WIRELESS regarding south-coast interference, I can endorse the complaints up to a point. Since the Prague Plan was adopted one needs a very selective receiver here, and if your correspondents would pay attention to this, much of the trouble would be eliminated. I was troubled in the same way as your correspondent L.B. (Hailsham, Sussex) at the commencement, when Eiffel Tower first went down to its present wave-

length, but the trouble was soon obviated with hardly any diminution of signal strength by simply shortening the aerial from 100 ft. to 20 ft.

"ENTHUSIAST" (Brighton)

Faulty Components

SIR,—I notice in a recent issue reference to a correspondent's complaint about certain makers not being willing to replace faulty components. The following are my experiences:—

1. Some months ago I sent an L F transformer (that had broken down after four years' use) back to the makers (a well-known firm) and it was replaced free of charge.

2. A few months ago a Mullard valve I had broke down; when tested, the filament was touching the grid. I returned it to Messrs. Mullard, who replaced it immediately. I also returned to them an S.G. valve that was not functioning quite up to standard, and a new one was handed to me.

3. A Blue Spot unit after being in use about six months did not reproduce bass notes as good as when first purchased. Messrs. Hughes & Co. replaced it free of charge.—E. G. S. (Banstead).

Will the Crowborough reader who sent a request to Messrs. Peto-Scott, Ltd, for a catalogue kindly send his full name and address, which were omitted?

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General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

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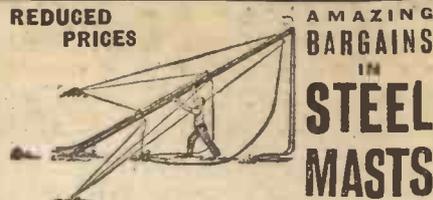
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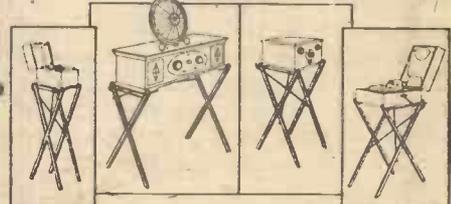
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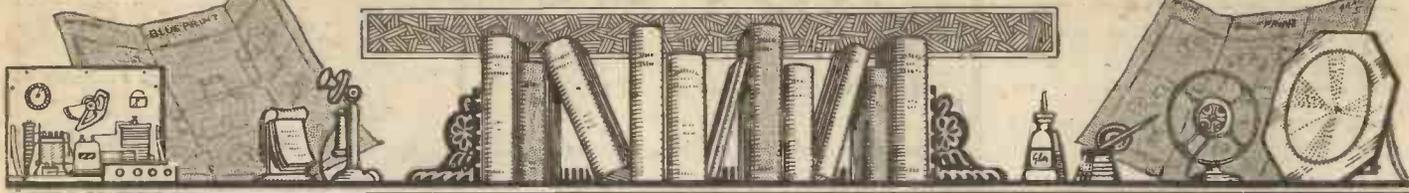
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RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details! Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address: See announcement below. **Address Queries**—AMATEUR WIRELESS Information Bureau, 58/6r Fetter Lane, London, E.C.4.

“B.B.C. Official Crystal Set”

Q.—I have constructed the B.B.C. crystal receiver, as described in “Amateur Wireless” dated November 2, 1929, and I fail to get any response from it. The same components have previously been used in other crystal receivers and have previously been found to be satisfactory. Perhaps you will be able to elucidate this apparent mystery for me.—A. S. (London).

A.—We are of the opinion that you have misread the wiring plan. It will be seen that wires Nos. 7 and 11 go to the outer edge of the circle representing a plan view of the crystal detector. This point of connection is actually the end metal plate or bush on the crystal detector nearest to the panel. The detector should be slackened off from the panel and the two wires passed round the spindle of detector between detector and panel. The detector should then be screwed up tightly to clamp on these two wires. The wire No. 9 should go to the top end of the detector under the terminal, which is arranged at the end of the detector remote from the panel.—C. L.

Missing Blueprint Numbers

Q.—I have often wondered why it is that

certain of your blueprints are periodically omitted from your printed lists. In my case I have one of your older designs of sets which, by

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Technical Queries
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A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

the way, is giving entire satisfaction. The blueprint of this set has long been omitted from your

lists and I have secretly wondered whether this has been due to the receiver not giving the satisfaction originally professed and anticipated for the receiver. In my case the receiver is giving me entire satisfaction, possibly because I adhered strictly to specifications, but knowing that there must be some concrete reason for omitting this set from your lists, I am now taking my courage in both hands and asking the reason. Can you enlighten me.—F. R. (Cornwall).

A.—The reason for omitting certain print numbers from our lists is mainly that the issues of our journal describing the actual constructional details of these sets are out of print. For the benefit of those readers who have built certain receivers which have been very popular and who require to replace prints and obtain certain constructional matter, we have instituted a service through our blueprint department which enables readers to obtain the blueprints and a typewritten sheet giving all of the salient points relating to the construction of the receiver. We withdraw the print from our list, however, in order that readers who see the particular title and order the number from this office do not get disappointed with regard to the issue describing it.—C. A.

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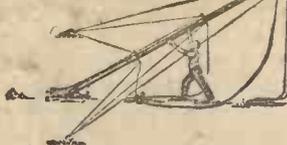
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OUTFIT with MAST.—Mast rings, ample galvanised wire (cut to lengths). Pulley, Cleat, Solid Metal foot rest and strong galvanised stay fasteners. Note.—Our Masts are stayed at 4 ground points (not 3) which ensures safety.

ACCESSORIES.—Best Manila Rope Halyards (will not rot), 60 ft. 1/6, 100 ft. 2/6. Special Anti-rust paint (sufficient for mast) 1/6. Coppered earthing tube 1/9. Special Aerial. Has 14 strands of No. 28 gauge Enamelled high conductivity pure copper wire, 100 ft. 3/9.

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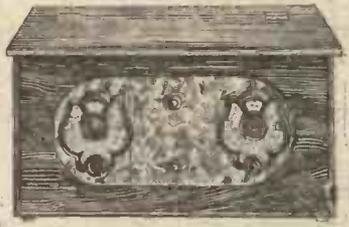
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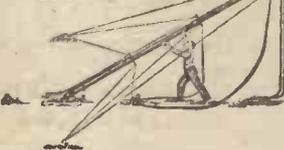
(Continued from page 866)

station, and for this reason some definite system of controlling the volume is desirable. In the new "Ether Searcher" volume can be controlled from a mere whisper right up to the immense maximum intensity of sound possible.

Nearly every listener has an aerial with characteristics peculiar to itself; that is why some sets work well on some aerials and not on others. We have made special provision for this variation in aerial characteristics; as a result, every constructor can adjust his set to suit his own particular aerial. The set will then tune in dozens of stations on exactly the same dial readings as our original set. We are, at present, compiling a full list of dial readings of every station picked up on the "1930 Ether Searcher." It is a formidable list and should prove of great value as an identifier of foreign stations.

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- 26ft.** STEEL MAST, tapering 1 1/2" to 1". Carriage: London, 1/6; Midlands, 2/6; Elsewhere, 3/6. Weighs 28 lbs. **8/-**
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- 40ft.** Tapering 1 1/2" to 1". Carriage: London, 2/6; Midlands, 3/6; Elsewhere, 4/6. Weighs 50 lbs. **16/6**

OUTFIT with MAST.—Mast rings, ample galvanised wire (cut to lengths), Pulley, Cleat, Solid Metal foot rest and strong galvanised stay fasteners. Note.—Our Masts are stayed at 4 ground points (not 3) which ensures safety.

ACCESSORIES.—Best Manila Rope Halyards (will not rot), 60 ft. 1/6, 100 ft. 2/6. Special Anti-rust paint (sufficient for mast) 1/6. Coppered earthing tube 1/9. Special Aerial. Has 14 strands of No. 23 gauge Enamelled high conductivity pure copper wire, 100 ft. 3/9.

Money refunded if mast returned intact and carriage paid within 7 days.

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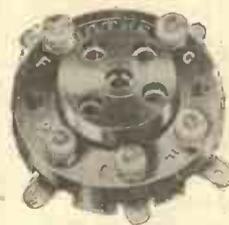
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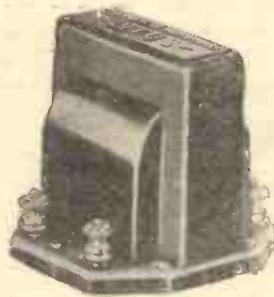
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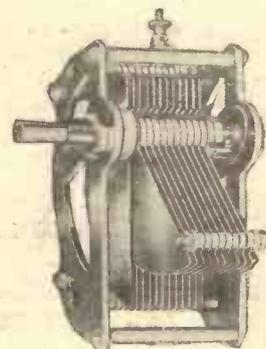
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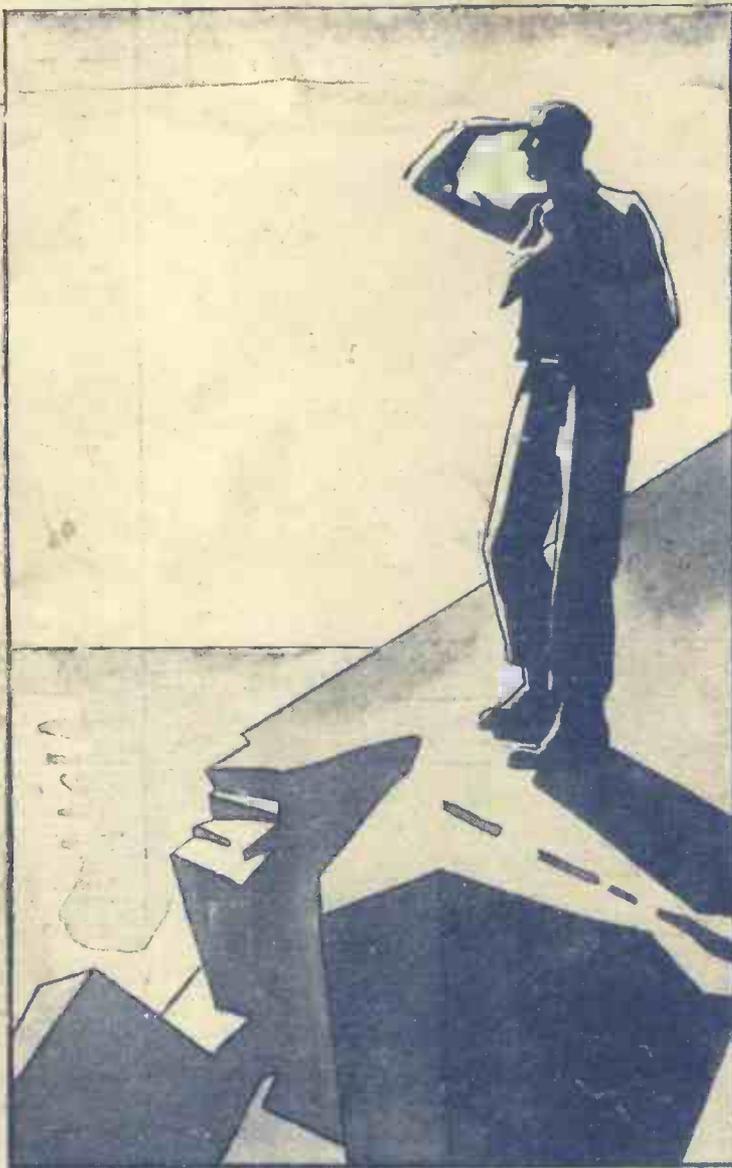
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