A SET FOR HOME AND HOLIDAY

Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XIV. No. 366 Saturday, June 15, 1929

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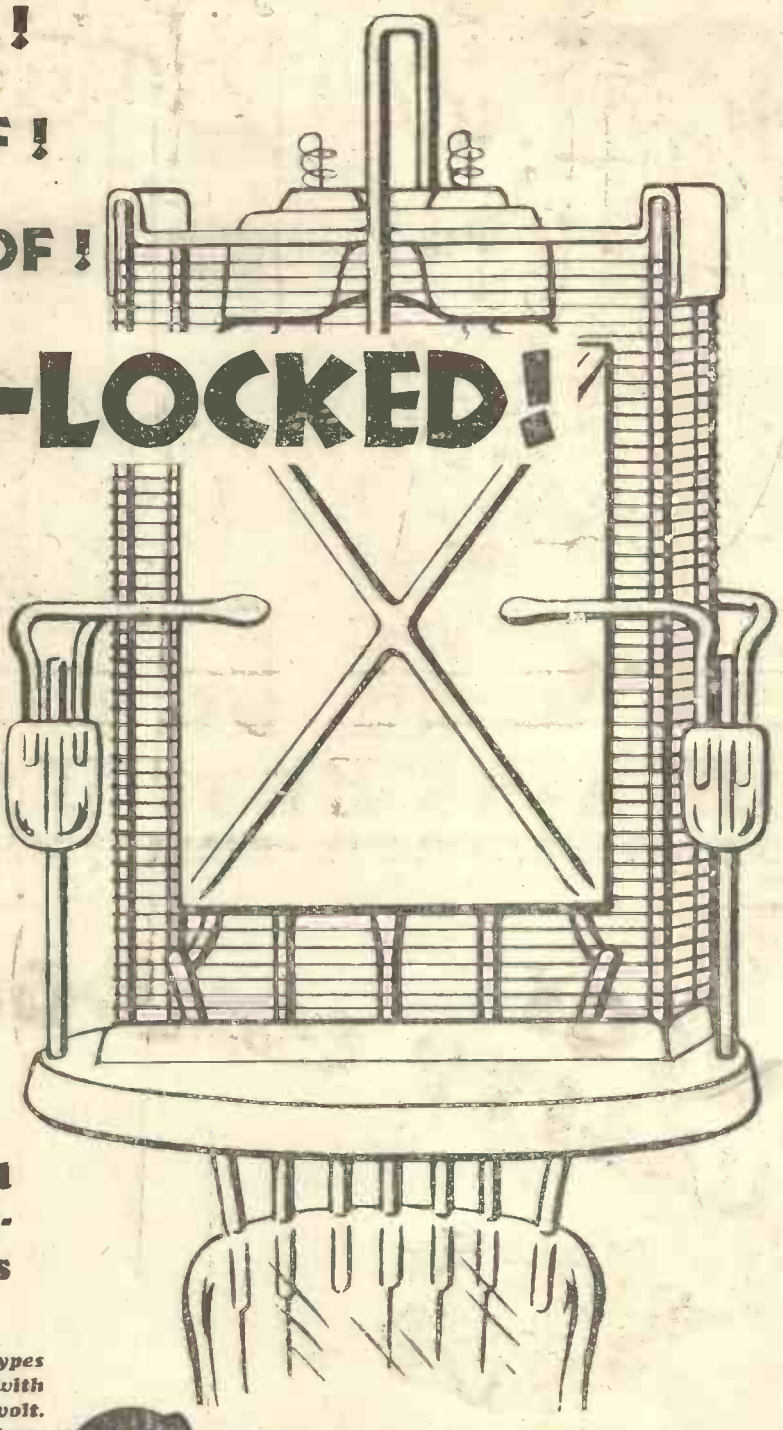
NOISE PROOF!

BREAK PROOF!



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Screened Grid

BRITAIN'S FINEST S.G. VALVE

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JUNE 15, 1929 No. 366. Vol. XIV

Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

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Capt. Eckersley—His Successor—The "Well Done"—Other Resignations—A New B.B.C. Suggestion—Election Night

Capt. Eckersley—The resignation of Capt. P. P. Eckersley from his office as chief engineer of the B.B.C. was not unexpected, and there is no reason to suppose that he resigned in anything but happy circumstances, the fact that he carries with him the office of consultative engineer being sufficient to reassure everybody on that point. The Engineering Department has lost many good men in recent months, among them being Capt. A. D. G. West, who has joined the engineering staff of H.M.V., and some nine or ten other members of staff, practically all of whom have been absorbed by the "talkies."

Giving out the news. An Election-night scene in the apparatus room at Barkers of Kensington, where, by means of Philips apparatus, the results were broadcast to a waiting and anxious crowd.

The "Well Done" — Capt. Eckersley has done fine work for the B.B.C. He had just the right personality for just the right occasion; his experience, initiative, his zeal, his humour and his energy, his eloquent, persuasive and forceful talk, all helped him to do great things for broadcasting in its early years, and his name will ever be associated with the initiation and growth of broadcasting not only in this country, but throughout the world. He was broadcasting before there was a B.B.C. He was a wireless officer in the Royal Air Force during the war, and it was his position later in Marconi House that made possible in 1923 the initiation of an occasional broadcasting service which soon evolved into the British Broadcasting Company. All honour to a pioneer who has earned the "well done," and from whom much will yet be heard in other and allied spheres. The public will be very glad to know that the B.B.C. will still have the benefit of his advice in a consultative capacity.

His Successor — There remains after Capt. Eckersley's departure a fine engineering staff at the B.B.C. Mr. Noel Ashbridge is an efficient and competent engineer who knows his job, and we are rather expecting that Capt. Eckersley's technical mantle will fall upon him.

Other Resignations—By the way, a well-known B.B.C. announcer, Mr. Eric Dunstan, has resigned in what the newspapers have told us are "dramatic circumstances," since last we went to press. We rather think, though, that the papers made too much of the affair. The going of Mr. Eric Dunstan was simply the fading out of a "golden voice" to which the public had grown happily accustomed, but it will soon fade in again somewhere—probably in the "talkies." On the subject of these B.B.C. resignations generally, a well-informed writer in the *Wireless Magazine* this month contributes, under the interesting title "The Trek to the Talkies," an article in which he attempts to account for the sudden rush of B.B.C. officials after outside jobs. He makes the point that until quite recently there was no alternative job open to most of the B.B.C.'s trained men, and the coming of the "talkies" has given them an opportunity of earning salaries which were impossible at the B.B.C., which, after all, must be run rather on Civil Service lines.

A New B.B.C. Suggestion—Writing in a recent issue of the *Sunday Pictorial*, Shaw Desmond suggests that the B.B.C. should do the transmission only and that programme-making should be thrown open to competition. Well, there might be something in the scheme, but now that the B.B.C. is a Corporation and not a Company it is rather late to come forward with new proposals. The B.B.C., like most other Government Departments, is "a sure thing" and is thus a safe thing at which to grumble!

Election Night—The excitement in connection with Election night is now, perhaps, being forgotten, but it will be some time before we forget radio's part in giving out the election results with the least possible delay. A number of technical folk assisted by putting up public-address equipment at convenient points and broadcasting results through loud-speakers as soon as they were received. An accompanying photograph shows the microphone and equipment at a well-known London stores. Radio dealers found that outside loud-speakers proved very popular and crowds collected like magic whenever there was any news!

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ON THE ROAD WITH RADIO

By KENNETH ULLYETT

Listening to radio music on Bury Hill. The batteries and loud-speaker are separate from the set, as advised in this article

Reproduced by permission from "The Motor"

HERE we are in the middle of June, with dust, flies, and police traps to make the open road objectionable! Yet it is the most opportune time to consider the advantages of radio out of doors and in the car.

Forgetting the Motorists

Portables are more than ever popular this year, but, to be truthful, in my own small sphere of motoring acquaintances I do not find any greater anxiety to combine the pleasures of radio and the road. I think perhaps the reason is that motorists have been largely overlooked by the manufacturers of commercial portable sets, and it is up to home-constructor motorists to make their own portables suitable for the job in hand.

I myself cover quite a deal of country in the car in company with a portable set which is used exclusively for motoring, and there are quite a number of points which force themselves upon one after a little experience of this kind.

Two snags which one finds right at the start are, first, the liability of the average set to put out of action by road vibration and, secondly, the difficulty of keeping dry H.T. batteries constantly "up to scratch."

Battery Bothers

This battery business is quite a bother in winter time, when the car may be left unattended for several days on end and the damp air causes a short-circuiting film of moisture to spread over the battery surface; the result is that the H.T. "juice" mysteriously disappears. What is wanted, of course, is a rotary H.T. converter to operate from the starter battery. I have tried a home-made gadget of this description, but the best solution of the H.T. problem for the average man is to use triple-capacity batteries (weight is of no importance in a car portable) in a case lined with thin rubber sheet.

I find it a good plan to keep the H.T. batteries wrapped in thin rubber balloon sheet in an attaché case, with tappings at 60 and 120 volts, brought out to a small socket at the side. The case is stored in the dickey until required; and one such "box of high-tension" lasts about six months if used frequently with a four-valve portable.

The receiver itself is stored down by the passengers' feet; that is, on the inside of the scuttle dash. There is generally plenty of space to spare here, and the only slight disadvantage is that one corner has had to be "knocked off" the case so that it is not fouled by the floor boards. The set is supported by four springs about 3 in. in length. This insulates the whole receiver from vibration and, of course, anti-microphonic valve holders are employed. In my opinion, it is not a practical proposition to have the frame aerial incorporated in a car portable; that is, if the set is to be used extensively while the car is running. In nine cases out of ten an improvised external aerial, consisting of only a few feet of rubber-covered cable, is more effective and less directional. An earth connection can always be made to the car chassis frame or to one pole of the electrical system.

External Loud-speaker

Neither should the loud-speaker be an integral part of the receiver. It is wise to have the receiver itself more or less attached to the car, as I have mentioned, and to string the aerial over the hood sticks or over the body top in the case of a saloon, and to carry the loud-speaker, attached to a length of flex, to the scene of operations.

L.T. can be obtained from the starter battery, but as the voltage of this battery varies somewhat it is wise always to "float charge" a small battery in the set in the manner I described in AMATEUR WIRELESS No. 353 in my test of the "House Portable" in a car.

So far as circuit arrangements are concerned, many AMATEUR WIRELESS portables can be slightly modified to suit the scheme of things necessitated by a car. A screen-grid stage is an asset, though, of course, not a vital necessity. At the present state of development it is hardly wise to use more than one H.F. stage, though probably another twelve months will see the introduction of an efficient system of ganging. There should be at least two L.F. stages, because plenty of "punch" is needed in portable reception.

All portable-set operators, motorists or otherwise, will forgo a big DX "bag," provided that the strength on one or two locals is equal to that given by a portable gramophone.

Finally, I favour a switching arrangement to cut out one of the L.F. valves and to allow phones to be used. The number of portables one comes across which can be operated successfully while a car is in motion can be counted on the fingers of one hand if loud-speaker reception is needed. But with phones this is quite a different thing, and, uncomfortable as they are, there is much to be said in their favour if they allow a set to be used successfully while the car is travelling.

According to the percentage of the 15,000 post cards and letters from broadcast listeners arriving monthly at the United States Department of Agriculture, women contribute at least 80 per cent. of this mail.

TAKE WIRELESS WITH YOU!

A good place for the set is down by the passenger's feet, in front, on the inside of the scuttle dash.

H.T. batteries can be carried separately in an attaché case, and wrapped in rubber sheet to keep out the damp.

The accumulator can be charged, while the set is working, from the starter battery. Don't work direct from the starter battery.

Shielding is bad if the car is metal-panelled. Don't rely on a frame aerial, but use an outside aerial strung over a tree or round the hood sticks or saloon top.

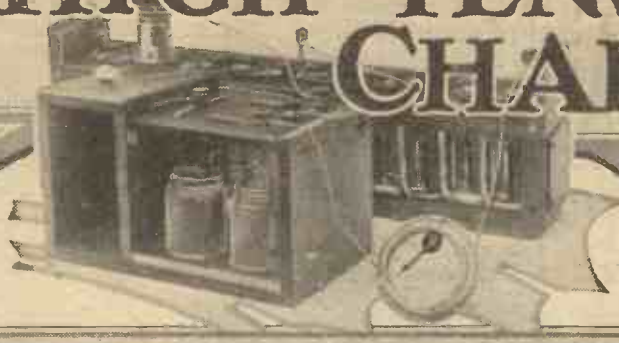
Earth the set by a connection to the chassis or to one pole of the electrical system.

Anti-microphonic valve holders are needed, and be wise and support the whole receiver on springs.

Two L.F. stages will generally be needed to give enough "punch."

Phones are useful for working when the car is in motion.

A New HIGH-TENSION CHARGER



ECONOMICAL, RELIABLE AND CHEAP

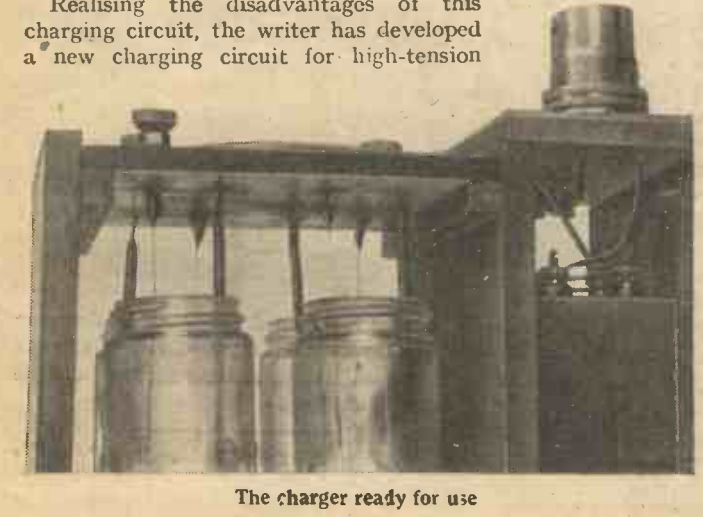
By W. W. WHIFFEN

THE tantalum electrolytic rectifier has proved itself entirely suitable when working at low voltages as in the charging of low-tension accumulators from alternating current. When handling high voltages, however, the system cannot be said to have been altogether satisfactory. The chief difficulty lies in the comparatively low breakdown voltage of the metal. This is the voltage at which the desired rectifying action ceases, allowing current to flow in both directions. One way out of the difficulty is to increase the number of cells in a series arrangement. This has practical limitations and the disadvantage of increasing considerably the resistance of the circuit.

A Standard Circuit

A standard high-tension rectifying circuit is illustrated in Fig. 1, where eight cells are employed in the charging of a 100-volt accumulator. The course of each positive charging cycle from the mains supply A B is indicated by the arrow marks. The positive cycle from B to A is shown by tailed arrows for distinction. The drawback to the circuit arrangement is that the two cells at C (when A is positive with regard to B) or D (during the opposite half-cycle) must withstand the whole mains voltage if rectification is to continue.

Realising the disadvantages of this charging circuit, the writer has developed a new charging circuit for high-tension work which has certain unique advantages. The circuit is shown in Fig. 2. Only half the number of rectifying cells are required to do the same work, all cells being joined in series, and then connected to the positive and negative terminals of the accumulator to be charged. The mains supply is applied at the electrical centre of the accumulator and to the centre of the rectifying cells. Thus the circuit is divided into two branches, each cycle choosing the path which offers the less resistance. In this circuit the resistance is approximately halved to that shown in Fig. 1, as the accumulator voltage is virtually halved. It follows that any reduction in the resistance of one half of the circuit will lighten the load on the other half. Again, as the back E.M.F. is reduced, so can the charging voltage be lowered.



The charger ready for use

Low-voltage Charging

An interesting feature of the circuit is that the apparently impossible is attained, for an accumulator, retaining its series arrangement, can be successfully charged from supply mains of lower voltage than the accumulator itself. This is easily explained from Fig. 2, where it will be seen that, although the accumulator cells are all in series, only half of them are being charged at one time.

The only practical considerations to be made to the circuit are the means for fixing or regulating the charging current, a suitable safety fuse, and an "on-off" switch. The most convenient means for limiting the mains voltage is by a fixed condenser placed in either of the mains leads. A variable resistance could be used, but there is little to recommend it. In the first place, a resistance of suitable type would be expensive and, further, would not provide the same economy of operation as a reactance due to capacity or induction. The writer has used the latter successfully in the form of a choking coil with a withdrawable core and having an inductance of 5 henries. This method gives a fine control over the charging current, but to keep the latter steady constant adjustments must be made to allow for the increase in back E.M.F. of the accumulators, as their voltage rises in charging.

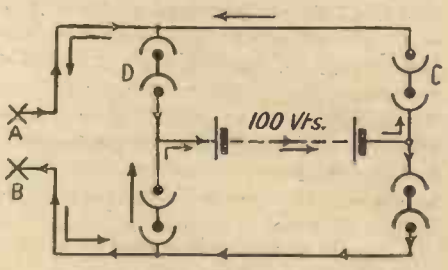


Fig. 1. A standard circuit

Description

The high-tension charger to be described and illustrated by the photographs employs capacity reactance, the fixed condensers, the values of which may be chosen to provide the charging rate required, being housed in the small compartment to the left of the illustration. It was not considered necessary to incorporate a double-pole switch in the instrument. The charger will be used only occasionally, as a fully charged accumulator will run for a considerable time. Instead, a flush-mounting lamp-holder is screwed to the top of the instrument, connection to the mains being made by inserting a standard lamp plug. Any convenient fuse may be used, that shown consisting of a pocket flash-lamp bulb mounted in a small screw holder adjacent to the lamp-holder. If the charging current exceeds 50 milliamperes, a higher current bulb may be necessary or a cartridge type fuse used instead. A fuse of this type can quickly be made with a

"A NEW HIGH-TENSION CHARGER" (Continued from preceding page)

fixed resistor and base. The resistance wire is removed and in its place is arranged a piece of "silver paper" of about $\frac{3}{16}$ in. in width.

Construction

There is no reason why the charger should not be made to any desired shape

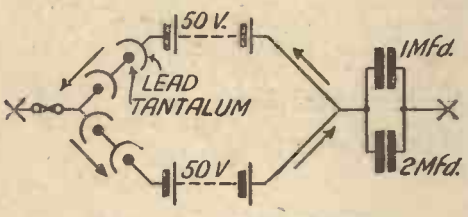


Fig. 2. The circuit employed

or design. Working drawings and measurements have been purposely omitted. It is probable that the constructor will prefer to use measurements enabling him to use material to hand and possibly to occupy a certain space. It is necessary, however, to keep the acid fumes or spray well away from the wiring or metal parts of the charger. This is accomplished in the charger illustrated by providing a separate compartment for the rectifying part of the apparatus.

It is advisable to follow closely the method of construction of this portion if the charger is to give lasting satisfaction. There would appear to be little difficulty in connecting the tantalum strips to the lead electrodes, although it is true that tantalum cannot be soldered, but in actual practice it is difficult to make this job permanently sound. If the main reasons for this are explained it will help the constructor to avoid the faults and to appreciate the reason for the particular design used. In the first place, with continued use the acid will collect at the top of the electrodes and will rejoice to find a resting-place at the junction of the tantalum and the other metal to which it is connected. The latter will soon corrode, if not of lead. This is not the main menace, however. A more serious one is that a direct path will have been created from one lead electrode to another in the next cell via the junction with the tantalum electrode. This will short-circuit the cell and throw upon the next cell a strain which it cannot stand. The rectifying action will then stop, serious sparking and overheating taking place.

Checking "Straying" Acid

Despite all precautions, the acid may in time get to the junction point of the tantalum and the metal connecting it to the next cell. It is important, then, that the whole of the electrode system should be rapidly accessible for cleaning or repair.

The eight electrodes hang from the underside of a piece of ebonite measuring, in the charger illustrated, 4¼ in. square by ¼ in. in thickness. The ebonite top is in turn screwed to two fillets attached to the inside of two upright sides, the latter being fixed to a larger base by wood screws passing through from underneath. The extension of the base at one end, with a third side-piece, forms the second and smaller compartment in which the condensers are housed. The wooden top to this compartment bears the fuse holder and the flush-mounting lamp holder.

The Jars

The jars for the electrolytic cells should be obtained before any wood is cut. Quite small jars, such as are used for honey or potted meats, will be suitable. Those illustrated have a capacity of one fluid ounce each and measure 2 in. high by 1½ in. diameter. The cells are kept in square formation by tacking four strips of wood on the outside and cross pieces in the centre, thus making four shallow trays. The trays are paraffin waxed and the jars set into position. These positions are retained permanently by pouring in more melted wax until the trays are filled. The wooden side pieces should be high enough to allow for a distance of 3¼ in. from the bottom of the jars to the underside of the ebonite top.

MATERIALS REQUIRED

Flush-mounting lamp holder and lamp plug.
Safety fuse.
Four terminals.
Ebonite strip, 4¼ in. × 4½ in. × ¼ in.
20 in. of single lead-covered wire
Piece of tantalum 3 in. × ⅜ in.
Four 1-ounce glass jars.
One 2-mfd. Mansbridge condenser.
One 1-mfd. Mansbridge condenser.
Small quantity of wood.

The Electrodes

About 20 in. of single lead-covered copper wire of about ⅛ in. in diameter is used for making the lead electrodes. A sample of this material will be quite easy to obtain, as it is largely used in outdoor electric wiring. Two parallel sets of four holes are now drilled through the ebonite top, of a gauge slightly larger than the diameter of the lead covering, to enable two electrodes to pass into each jar. Each electrode should clear the rim of its jar by ⅛ in., at the same time keeping them as far apart as possible.

The arrangement of the electrodes is clear from the illustrations. Choosing any one of the four corner holes for a lead electrode, and near it drill and tap a hole for a large-base terminal. Do not allow the hole to enter the underside of the panel. The second and third holes along the same line accommodate a tantalum and lead electrode respectively. The fourth and last hole in this line is for the second tantalum strip. From this hole connection is taken straight across to the nearest hole in the second line to join to a third lead electrode. And so on to the last hole, near which is another terminal to which the last electrode, a tantalum one, is connected. Fix another terminal midway between these two.

Lead-covered Wire

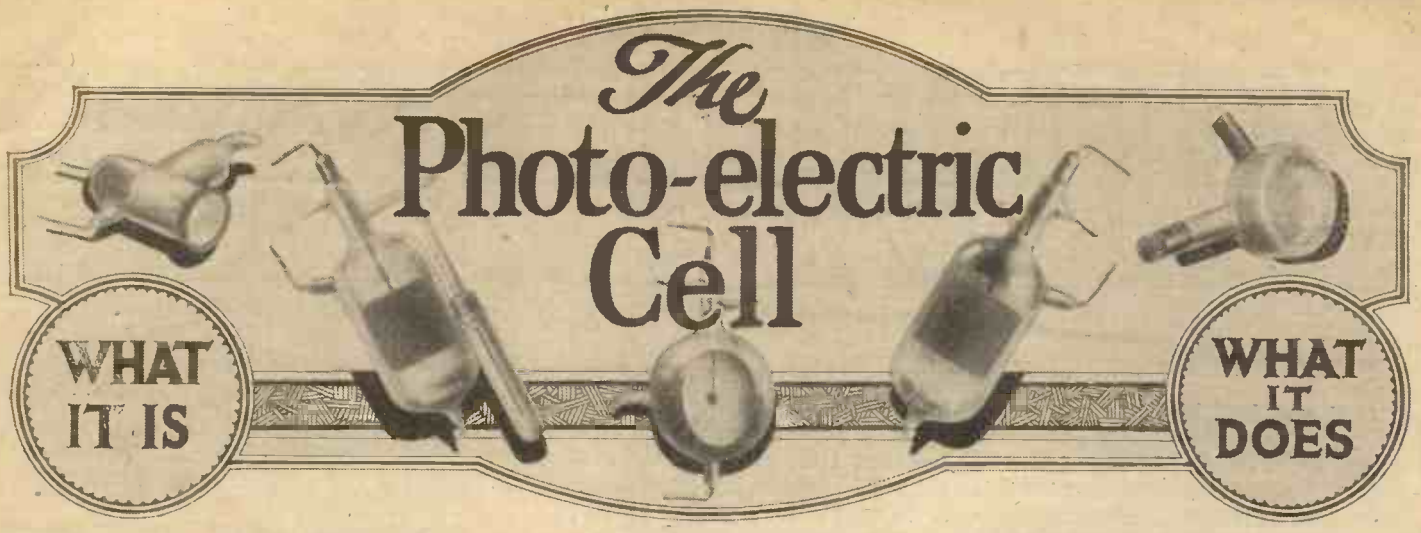
To remove the lead covering from the copper wire, mark off roughly the length required and score round with a knife. Two or three sharp bends will break the lead, allowing it to be drawn off the internal wire. Returning to the first hole, push the lead through until it clears the inside of the bottom of the jar by ¼ in. Bend the lead over at the top close to the panel and clamp under the adjacent terminal. A second lead is fitted in similar manner to the third hole. The free top end is then bent over and pushed through the second hole, and allowed to project only ¼ in. from the underside of the panel. The process is continued in this way for every hole, the ¼ in. projection being left for the tantalum strips. The lead strips from the fourth and fifth holes are connected together under another terminal centrally placed between these holes.

The tantalum metal was obtained from Messrs. G. G. Blackwell, Sons & Co., Ltd., The Albany, Liverpool. In next week's article will be given final constructional details, and some hints on working the charger from the mains. In the meantime it may be mentioned that the running cost is practically negligible, for the current taken is so small. Actual figures will be given.

Here are the components of the unit taken apart

The New South Wales Broadcasting Company has directed that all musical titles shall be Anglicised.

The Photo-electric Cell



By JOHN D. RANKIN

WHEN the first commercially-produced valve was introduced some years ago it was little realized how great an influence this device was to exert in the science of wireless. To-day the photo cell stands in the same threshold position once occupied by the valve; in its own sphere of application—a very wide sphere—the photo cell would seem to have a great future. In the February 23 issue of this journal, reference was made, on page 284, to a new photo cell and something of its nature and application was outlined.

Applications of Photo Cells

The introduction of the Osram photo cell serves to focus attention on the whole subject of photo-electricity, its application to the embryonic science of television and to the more advanced technique known as the "talking picture." The valve links ether waves with an electric current. The photo cell links light waves with the same medium.

The process of a "talking picture" is only indirectly achieved by first converting the voice into an electric current and by utilising this current to work a neon lamp, which is a current-to-light converter.

An application of the photo cell, familiar now to every newspaper reader, is picture telegraphy; in the majority of these systems a photo cell is required at the transmitting end to convert a projected image of successive sections of the original photograph into electric-current variations. The medium of transmission here is a telegraph line and by sufficiently amplifying the weak photo-cell currents, apparatus at the other end of the line can be operated; there the need is for a current-to-light converter, such as an oscillograph.

Other applications of the photo-cell are too numerous to detail; its function as a converter of light variations into current variations renders the photo-cell of immediate practical value in television, in optical science, and the wider field of industry.

Considering its importance, surprisingly little is known to the amateur about the photo-cell. Possibly this lack of knowledge can be attributed to the fact that, so far, the use of the photo-cell has not come within the scope of wireless enthusiasts.

Without taking the reader out of his depth, it is proposed to explain how the photo-cell works.

Three essential characteristics determine the nature of a photo cell, which can be modified in its action by the size and geometrical form of the bulb and electrodes, the material used for the cathode, and the gas filling.

Basic Principles

In the most elementary form of photo cell an evacuated glass bulb encloses two electrodes, the cathode or electron-emitter and the anode or electron collector. Sensitised by a special process, which need not be detailed here, the cathode usually takes the form of a metallic deposit, consisting of a thick layer on the bottom of the bulb. The cathode is a circular wire grid, arranged above the metalised inner surface of the bulb so that while it offers the least impediment to incoming light it is sufficiently close to attract the electrons emitted from the cathode.

An Osram red-sensitive cell

The peculiar action of a photo cell depends on the fact that when light is allowed to fall on certain metals, notably sodium and potassium, they liberate electrons. The simplest possible cell consists of an evacuated glass bulb, with anode and cathode electrodes arranged as explained. In such a cell the photo-electric current constitutes a minute electronic movement between cathode and anode; the value of this current is determined by the amount and nature of the light to which the cell is exposed. This type of cell has the most accurate "response-curve" because although the photo-electric current is very small, being of the order of a few micro-amperes, this current is directly proportional to the light intensity.

Current-to-light Ratio

Apart from accuracy of response, the most useful index of a photo-cell's suitability for any given application is its emission, or the ratio of current to light. Viewed from this aspect the simple evacuated cell is susceptible to improvement; in other photo-cells a gas filling replaces the vacuum, with a resulting increase in the emission, or the amount of current for a given light intensity.

In these gas-filled cells, argon, an inert gas, is pumped into the bulb at low pressure, so that when what is known as the primary current takes place, some of the argon molecules are ionised by collision with the electrons, thus releasing a secondary stream of electrons, which adds considerably to the initial stream.

It has been said that the material for the cathode affects the action of a photo-cell; in practice the variation in emission will be determined by the amount of light and the quality of light to which the cell is exposed.

The practical details will be fully explained in a concluding article.

WATCHING THE WAVES

Following last week's article on alternating currents our Technical Editor shows how these currents may be examined with an oscillograph

I HAVE explained in a previous article that there are many occasions on which some visible indication of the variation of current in an alternating current circuit is of assistance, and have shown that such an effect can be obtained by the use of an instrument known as an oscillograph. In this, a spot of light is caused to move over a suitable screen and to trace out a path corresponding to the variation of the current itself.

The Duddell Oscillograph

One form of oscillograph which is often employed is the type known as the Duddell. This consists essentially of a simplified moving-coil milliammeter. A very small coil of wire is suspended in a very strong magnetic field. Instead of a pointer, however, a small mirror is attached and a beam of light is reflected by this mirror on to a screen. If a current is passed through the coil, the mirror is deflected and consequently the spot of light is caused to move across the screen.

We have to deal with exceedingly rapid variations in the current if we are to observe such frequencies as occur in the higher audio range. In fact, even to follow a frequency of 1,000 cycles per second with a mechanical device is a matter

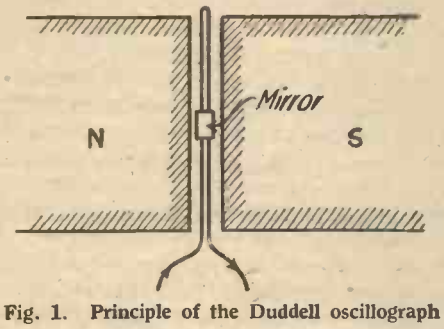


Fig. 1. Principle of the Duddell oscillograph

requiring most careful construction. Any resonance must obviously be avoided or the results obtained will be invalidated, and actually the moving coil becomes a single loop of very thin wire, somewhat as shown in Fig. 1. It will be seen to be relatively long and very thin, being suspended in a very narrow gap to obtain the greatest possible sensitivity.

By taking suitable precautions, it is possible to obtain adequate response from a device of this type, even at fairly high frequencies. If any fairly rapidly alternating voltage is applied to the oscillograph, however, it is obvious that the spot of light will move from side to side so rapidly as to appear merely as an elongated line, An arrangement such as this by itself will not tell us what we want to know. It is necessary to displace the path traced out by the spot of light in a direction at right

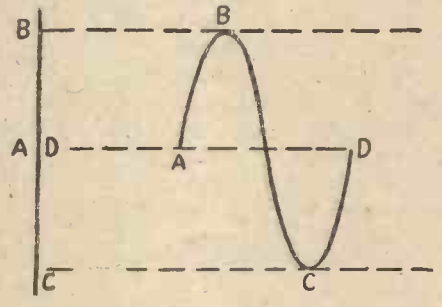


Fig. 2. Path of the light spot

angles to its normal travel as illustrated in Fig. 2.

In Fig. 2 we have a line traced out by an imaginary spot of light which has moved from A to B, from B down to C and then from C back to B again. As the point B coincides with A, the whole appears as a simple straight line. In the curve A B C D, we have caused the spot of light to move slowly from left to right while it is also moving up and down.

Tracing a Wave

This is the principle which must be adopted in tracing out an oscillograph record so that it appears as a wave form. One rather simple way of doing this is to allow a photographic plate to fall past an aperture through which the spot of light is visible. This automatically provides the movement along the time axis as it is called so that the movement of the spot of light will appar as a wave on the photographic plate when it is developed.

Where we are dealing with recurring or steady waves, we can arrange to produce a visible image of the wave form and observe the effect of this of making various alterations to the circuit. This in many cases is useful as, for example, where we wish to know what the wave form actually is like.

To do this we arrange to deflect the spot of light across the screen as just described. We then return it to its starting point again as rapidly as possible during which time we cut off the source of the light from the screen by some suitable means such as the interposition of a shutter. When the light next reappears on the screen, therefore, it is moving across in the same direction as on the previous occasion. We have to do more than this, however. It is necessary to arrange that the path traced out by the light on this second journey shall coincide exactly with that on the previous journey and so on for each succeeding instance.

Provided the wave is regularly recurring we can do this by arranging to synchronize the mechanism which we are using to deflect the spot of light across the screen finish every two or three complete oscillations. It then takes, perhaps, one further oscillation in returning to its starting point during which time the light is cut off, so that it starts on its second travel exactly four oscillations later coinciding with the previous path. The net result is that the successive paths traced out by the spot of light all build up and form a luminous line which is equivalent in shape to the current which is actuating the oscillograph.

If now we alter the value of the current, then the relative motion of the spot of light up and down will become greater or less

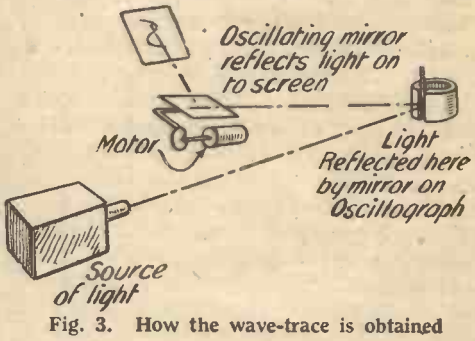


Fig. 3. How the wave-trace is obtained

and the wave form will appear to grow or to diminish. If we do other things to the circuit, we can observe the results in much the same way. We can even, if we like, arrange two oscillographs throwing a spot of light on to the same screen, one of which records the voltage across the circuit and the other the current. Another very popular oscillograph is the cathode ray type. In this a pencil of electrons is produced from a heated filament. I will describe this at length in a further article.

On Your Wavelength!

Proud of an Inventor

IT would be difficult to recall many cases where an inventor has been honoured by any form of memorial until long after he has passed away, so that I think Hastings is really doing something unique by deciding to put up a tablet to Mr. J. L. Baird, the inventor of television. This will be placed on the walls of the house at No. 8 Queen's Arcade, for it was here that Mr. Baird went early in 1921 after a breakdown in health following his activities in a jam factory in Trinidad. The problems of television had occupied his attention for some time prior to this, but the story of his single-handed struggles to reach a satisfactory solution—actually arrived at in October, 1921—make inspiring reading. Naturally, Hastings is justifiably proud of her Scottish adopted son, and when the history of television is written pride of place must undoubtedly be accorded to the town.

A "Talk" Suggestion

I wish I had been listening in the other evening to what must have been an intensely interesting American broadcast. Dr. Lee de Forest and Mr. W. F. Jenkins were "on the air" to discuss recent developments as far as television is concerned. Neither of these two workers needs any introduction to readers, the former achieving most fame for his addition of the grid to the previously existing two-electrode valve, while the latter is known for his contributions to the field of television, particularly in relation to the televising of films. During the course of this microphone discussion it was proved that television is well out of the laboratory experimental stage, with an early promise of a worth-while means of home entertainment. Another item of interest was that dealing with the obstacles overcome in order to increase the size of the image dimensions.

In advertising this broadcast I saw it mentioned that the first home televisor to be made was to be the prize awarded for the best essay on "What Television will do for the Home." The competition was open to boys and girls under eighteen years of age. Wouldn't the youth of this country welcome an opportunity to participate in a similar contest if such could be arranged by the B.B.C.! Sir J. A. Fleming, as the inventor of the valve, and Mr. J. L. Baird, as the inventor of television, would make an ideal combination for a broadcast of this character. Perhaps at some future date the Programme Committee of the B.B.C. could manage to fit this in, for I have no doubt in my own mind as to the talk being particularly popular.

A Gramo Puzzle

I did an amusing thing the other day. I had rather a good record which I wanted to demonstrate to a highbrow-ish friend—a rendering of "Father O'Flynn," by Norman Allin—so I ups and says, "Come and listen to this song, which is rather a good one"; whereupon I started the motor, switched on the amplifier, and placed the pick-up on the record. We were immediately greeted with strains of dance music!

Somewhat bewildered, I switched everything off and examined the record. Everything was O.K., so I switched on again, hoping that my friend had not noticed anything wrong. Exactly the same thing happened! I feverishly wiped my brow and asked my friend if he also heard dance music. "Why, yes," he replied. "I thought it was rather funny myself." Heaving a sigh of relief, I returned to the amplifier to see what was wrong. Of course, you will have spotted by now the reason of the trouble. I had the amplifier switched on to a radio set instead of the gramophone, and had not noticed it: a very simple and perhaps silly sort of mistake, yet it momentarily puzzled me.

British and American Sets

The lines along which wireless reception has developed on the two sides of the Atlantic form an exceedingly interesting study. In this country the most popular set for loud-speaker reproduction of both home and foreign stations is probably the three-valver consisting of one H.F. stage, a rectifier, and one note-mag. In the States the five-valver appears to be almost the smallest set that is widely used, while six- and seven-valvers are very popular. America, we know, is the land of big things, but that is not the reason why so many more valves are used in receiving gear. The fact is that we have gone in rather for few stages of high efficiency, whilst our transatlantic cousins prefer many of only moderate efficiency. We like the screen-grid valve or low-loss neutralised circuits on the H.F. side, whilst they are doing little with the former and low-loss is with them as unpopular as high-loss is with us. On the low-frequency side the pentode appeals to us, though they do not seem to be very much struck by it.

An Interesting Position

At one time reception conditions were very different in the two countries. In the States there was a multiplicity of low-powered stations, anything up to a score being found in one and the same time. Even nowadays the whole of Europe contains fewer stations than there were in America four or five years ago. The American listener, therefore, has always had a pretty useful supply of alternative programmes. To separate them he wanted selectivity; to bring them up to loud-speaker strength he required plenty of amplification. Since then the Federal Radio Commission has greatly reduced the number of broadcasting stations, but there has been a big all-round increase in the power. The listener can thus go farther afield for his alternative programmes, for stations such as WEAF, WLW, WGN, WJZ, WBBM, KDKA, and KMOX are all rated at 25 kilowatts, and they have large service areas. There is also the giant WGY, with 50 kilowatts, and numerous intermediate stations with ratings between 5 and 15 kilowatts. Conditions in America, then, nowadays are not at all unlike our own, for we have two high-powered stations at home and numbers of them within range on the Continent of Europe. In both countries the chief need at present is for sets selective enough to cut out unwanted transmissions and sufficiently powerful to be able to bring in numerous alternatives at loud-speaker strength.

The Prague Plan

The Prague Plan comes into force at the end of this month, and we are all hoping for great things from it. On paper it should be a complete success at the outset, for it has been most carefully thought out, and the re-arrangement of stations is in every way sensible and sound. We are reminded also that it scores over all previous plans in that it definitely has the backing of the various Governments concerned. So far so good, but there is one snag to which I have not seen attention called hitherto. This is that comparatively few stations possess appliances necessary for keeping their transmitters dead on the assigned wavelength. If you care to look up the chart showing the actual doings of stations which is published every month by the Brussels Laboratory you may be surprised to find how very few stations seem able to hold their wavelength accurately for any length of time. By far the best in this respect are our own stations and the Germans, though in other countries Vienna, Lyons PTT, Stockholm, Toulouse, Milan, and Brunn have fairly good records.

Some stations, of course, deliberately "wander" in the hope of finding quiet spots. During April, for example, Marseilles showed the following frequencies on various nights: 951, 955, 957, 954, 962, 968, 961, 939, 923, 915, 940, and 947. This corresponds approximately to wavelength wandering between 310 and 327 metres! Other stations, though, really

On Your Wavelength! (continued)

tried to keep their wavelengths, but could not do so. Berne, for instance, never once succeeded in exactly hitting his proper wavelength during the whole month of April, being generally a little above it and on two occasions somewhat below. Though by no means a bad offender, and keeping on the whole pretty near his assigned wavelength, Prague actually scored a bull's-eye on only seven evenings out of thirty during April. He was quite close to it on other nights, but just wasn't there; and in a scheme which requires such close packing of stations as does the Prague Plan the slightest error in the wavelength will be sufficient to cause trouble. I am looking forward very much to studying the reports of the Brussels Laboratory for July and the succeeding months.

Have We Been Rash?

I am rather wondering, as a matter of fact, whether the European authorities have been a little rash in throwing overboard the Brussels Plan and plunging bald-headed into that of Prague. We must admit that by the end of May there were no great numbers of stations working even approximately on their Brussels wavelengths; but in the four and a half months that have elapsed since the inauguration of the scheme things have shaken down pretty well, and most of the important stations have found positions which enable them to broadcast without interference. Actually it is years since I have been able to receive so many Continental stations free from interference as I could during March, April, and May. It seemed, too, that conditions were improving week by week, and there was quite a possibility that if matters had been left alone the European ether would, so to speak, clear itself. Time alone can show whether the Prague Plan will be a success. Personally, I have no doubt that it will be if—and it is a big "if"—all countries adopt a satisfactory means of abolishing "creeping" in transmitting plants.

Renewals That Pay

There are quite a number of little bits and pieces connected with the aerial-earth system that it pays to renew from time to time if one desires, as most people do, to maintain high efficiency. The cost of replacement is generally very small indeed, and it is well spread out, for renewals become necessary not all at once, but here and there at intervals. Aerial insulators don't last for ever. If yours have been up for four or five years you may be surprised to find, on lowering the wire, that the glazed surface has become badly cracked, or even that in places it has disappeared altogether. So soon as the surface "goes" the insulator becomes less and less able to do its job properly, for cracks or roughened surfaces provide numberless little cavities in which moisture and grime can collect.

I have long since abandoned big insulators on the aerial, using instead three small ones in series at each end. These cost only about a penny apiece, so that the expense of renewing them every year is neither here nor there. Lead-in tubes of ebonite also lose their insulating powers in time, owing to the effects of weather and exposure to light. The few pence spent on renewals at intervals are a good investment. The earthing switch may wear out in time, especially if it is in an exposed position—wobbly contacts here spell poor signal strength and most likely noisiness. Lastly, don't forget the earth plate. It is surprising to find how quickly a biscuit tin or a piece of galvanised iron will become corroded away in certain soils.

Broadcasting Figures

One of the German broadcasting companies has recently totted up the number of hours devoted during the year to various kinds of items by broadcasting stations throughout Europe and incorporated the figures in a report which makes very interesting reading. To those who are fond of saying how much more entertaining are the German programmes than our own, I have previously pointed out that much more talking is done and much less music given from the German stations than from our own. The figures referred to prove this to the hilt. In 1926 no less than 40 per cent. of the German programme time was devoted to talks! This has now dropped to something over 23 per cent., but in our own country it is under 20 per cent. Whilst London last year gave 70 per cent. of its working hours to music the all-in figure for the German stations is only 64 per cent. Actually, Rome, Hilversum, and Radio-Paris headed the list in the matter of musical broadcasting, whilst Rome is the smallest offender in the matter of talks, devoting only 5 per cent. of his time to them. On the whole, I don't think that we have very much to grumble about.

Second-hand "New" Goods

I am glad to see that attention is being called just now to a very bad practice on the part of some retailers. This is to sell as brand new valves which have been used (often pretty extensively) in demonstration sets or have been lent to experimenters so that they might "try them out." The dull-emitter valve of to-day, long lived as it is, is not everlasting. Every hour that it is used before it is sold means an hour of service life lost to the purchaser. And not infrequently it happens that in either the demonstrator's or the experimenter's hands a valve, afterwards sold as new, receives for a longer or shorter period an accidental overload of filament current. It takes very little of this kind of treatment to impair the subsequent performances of a valve and the characteristics may be entirely altered.

In the old days valves used to be sold in sealed boxes from which two contacts protruded so that the filament might be tested. I am sure that many of us would be glad to see a return to this practice. There could then be no tampering with valves before they were sold over the counter. Valves, as a matter of fact, are not the only part of the set which may be really second-hand though sold as new. I have more than once come across a high-tension battery which was offered for sale in a partly run-down condition as the result of its having been employed for demonstration purposes.

Mind Your Eyes!

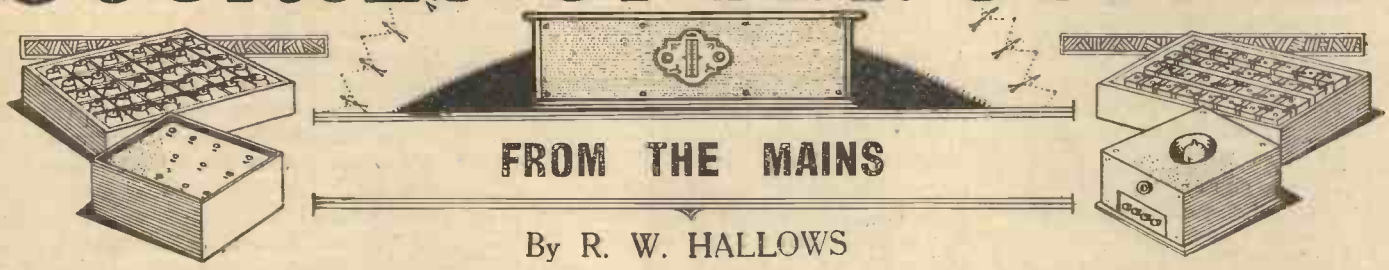
When testing the specific gravity of his accumulators the other day a friend of mine accidentally splashed a spot of acid into one of his eyes. For the moment he was blinded and suffered intense pain. One of the family came along and steered him to the bathroom while somebody else 'phoned the doctor for special instructions. Meanwhile, bathing with boric acid dissolved in warm water seemed to do the eye some good. The doctor's advice followed a few minutes later and completed the cure. His antidote was oil—good oil of any kind, salad, olive, or any kind that happened to be handy. The injured eye was swamped with the oil and then the patient was made to lie down in a darkened room for half an hour or so. The eye was swollen for a day or so, but otherwise no damage was done. Don't go squirting acid in your eye because I've told you an effective antidote!

Acid and Tea!

Talking about acid, a B.B.C. engineer told me about an amusing incident which occurred in the early days of broadcasting. One of the most important events in the day at Savoy Hill was (and still is) the partaking of cups of tea which were brought to each office and workshop. The little room wherein the "Tea Lady" brewed her valued liquor happened to be situated underneath the one and only accumulator charging room, and there were large cracks in the floor and ceiling separating them. One fine day an enthusiastic engineer overstepped his zeal and spilled a large-sized "ship type." Of course, the acid made a bee-line for the crack and dripped steadily on to and into a large tea urn in the room below! Tea was "off" for that afternoon, the worthy lady and sundry engineers being occupied for some time with ammonia and washing soda, neutralising the ravages of the acid on floors and tea utensils. To be truthful, however, it is not often that the engineers make their presence so felt at Savoy Hill!

THERMION.

SOURCES OF H.T. SUPPLY



FROM THE MAINS

By R. W. HALLOWS

THERE is something enormously attractive about working from the mains, either through the medium of a battery eliminator or with a self-contained receiving set designed to operate straight from a wall plug and socket. There are no H.T. batteries, wet or dry, primary or secondary to be recharged or replaced at intervals; running costs are comparatively low and the simple turning over of a switch brings the set at once into action.

Like all good things, however, the battery eliminator has its weak, as well as its strong points and these should be duly considered by anyone who contemplates the installation of such equipment. For the set intended for the reception of the local and other powerful stations, the battery eliminator, provided that it is of suitable type, is ideal, for signal strength will always be sufficient to drown the very tiny amount of ripple that can seldom be entirely eliminated even by elaborate smoothing circuits.

Conditions

For long distance reception of weak signals, though, I personally feel that the H.T. battery in one form or another still holds its own. One of my chief reasons for saying this is that searching has often to be done with the aid of head telephones and that I do not very much like the idea of using headphones with an eliminator, unless very special precautions are taken to prevent short circuits and their unpleasant results.

Again, it is essential when one is trying for weak and distant signals that the set itself should give an absolutely silent background. Since it has frequently to be operated in its most sensitive condition, that is not far below the point of oscillation, the tiniest ripple noises are apt to be brought out with rather annoying results. Even a direct-current eliminator may show traces of ripple since the D.C. delivered by the mains is never perfectly smooth.

I must confess, though, that I am a long-distance enthusiast and probably the majority of wireless folk do not sit up for America or try for the less powerful and more distant European stations. My own scheme, which will probably appeal to readers, whatever their bent may be, is this. Have a "quality" set specially designed for giving the most perfect reproduction possible from very powerful stations and run this and its accompanying moving-coil loud-speaker from the mains through an eliminator. For long-distance work have a special set designed for sensitiveness and selectivity, rather than for pure quality, and work this from a high-tension battery. Any station that can be found and tuned in straight on to the loud-speaker may be regarded as within the province of the eliminator set. Those that demand head-phones and careful searching are better dealt with by the battery-operated receiver.

Good and Bad

The reader should not forget that there are eliminators *and* eliminators. I have seen in my time some terrible contraptions. One of these was home-designed as well as home-made by a man who knew very little about any department of electricity. Plain brass terminals, condensers designed only for low voltages and mains connections made of thin cheap flex rendered this affair a potential death trap, especially as it was housed in a scullery which was damp as often as not. If you want to make an eliminator, follow the designs that have appeared in AMATEUR WIRELESS and use only the best of parts. Should you purchase one complete, see that it is made by a reputable firm. The eliminator is then a perfectly safe piece of apparatus for anyone to use.

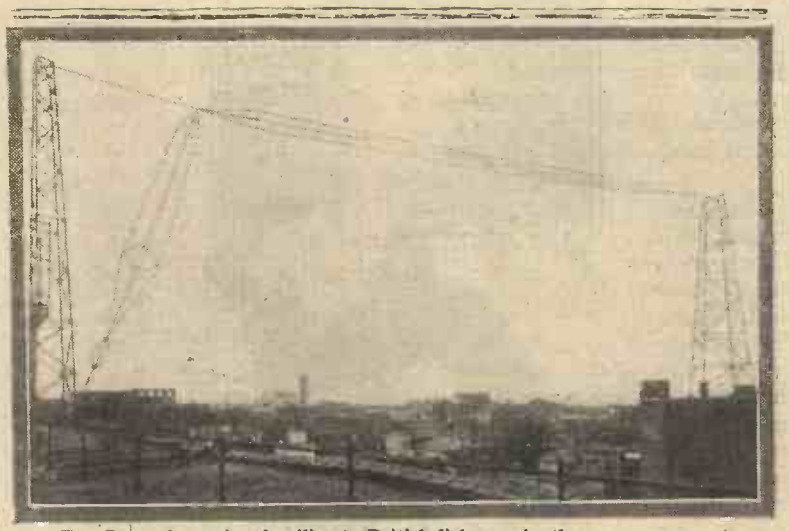
Selection

Before you acquire an eliminator you should most certainly measure the total current consumption of your set and you will be wise if you allow a fairly wide margin, for you may later on decide to fit in the last holder an output valve of lower impedance. Make certain that the eliminator under consideration is capable of supplying the current output that your set needs. What one often sees is an eliminator designed for, say, a 10-milliampere output yoked up to a set that needs a great deal more to operate properly. The result is that the terminal voltage shows a big fall. The output valve is starved in the matter of plate potential and overloading takes place, even with moderate signal volume. So long as the eliminator is up to its work you will get the full voltage from it, but you won't if you try to make it do more than it can.

The next thing to make sure of is that the eliminator is suitable for the mains supply in your own locality. Sometimes the mains current is comparatively steady; sometimes again it is exceedingly rough. It follows that a smoothing circuit which will serve admirably in some places may not be sufficient in others. Make certain, therefore, preferably by obtaining a demonstration in the locality and from the same source of current, that supplies your own house, that there is no undue amount of ripple in the output of the eliminator.

Running costs of an eliminator are very small, for

(*Continued on page 828*)



The Brussels station familiar to British listeners by the announcement, frequently repeated, "Ici Radio Belgique."

For the Newcomer to Wireless: THE ART OF SEARCHING

WHEN Robinson was trying out my set the other night I noticed that he was able to get a great many more stations than I could. Can you explain the secret to me?

Robinson, of course, is an old hand at the game, but there is nothing at all mysterious about it if you'll just remember one or two points that may seem small, though really they are very important. How do you set about making a search?

Well, I start with the condensers either at zero or with the dials at their maximum setting.

Hold on. That brings out point number one.

And what's point number one?

Always search upwards, that is from the lowest dial reading, and never go downwards.

Why?

You will find it a very great deal easier. One of the reasons is that reaction is so much more smooth to handle.

How is that?

If you are going upwards you bring the reaction coupling to a point which makes the set as sensitive as possible though still a good bit short of oscillation. Then without touching the reaction control you can work upwards for several metres with the set still sensitive.

I follow that.

When you find that it is becoming less sensitive a slight increase in the reaction coupling is made and the search is continued upwards.

Suppose one goes downwards?

Again the reaction coupling is adjusted to make the set fully sensitive, but as you descend you keep on finding that the coupling is too tight and quite unintentionally you make the set oscillate.

I see now. Let us take it that I start at the bottom of the scale and work upwards. Just what should I do?

Do your condensers go pretty well in step?

Fairly well, though I find that the one which tunes the grid of the first valve leads slightly on the other at the bottom of the scale and lags a bit behind it at the top.

That doesn't matter a bit so long as you know what the difference between the two should be approximately at any setting. The great point is to keep the two tuned circuits always in resonance, and that's where the expert searcher scores.

How does he do it?

He takes every opportunity of bringing the two exactly together. For example, if he comes across a station badly heterodyned or even a common wavelength, he does not pass straight over either.

What exactly does he do?

He tunes either in as sharply as possible with both circuits, for he then knows that he has his tuned circuits in step for a further move upwards.

And I suppose that one should not search too quickly?

Certainly not. You will get far more stations by covering a comparatively narrow waveband slowly and carefully than by rushing over a wide band. A good rule is to advance your second condenser—that which tunes the detector circuit—slowly and steadily and to make an upward advance with the other with a slightly backwards and forwards movement. Any signal within the range of the receiving set is then picked up and it is only a matter of care to tune it in properly. But always treat the reaction control with respect!

"SOURCES OF H.T. SUPPLY"

(*Continued from page* 827)

the amount drawn from the mains is really trifling. The most expensive item in one's annual accounts is likely to be the renewal of rectifying valves. This, however, does not amount to anything very serious for one should obtain at least a thousand hours of service life from a valve of good make. If the set is used on an average for three hours a day, this means that one rectifying valve should operate the eliminator for a year on the average. If a metal rectifier is used, there are, of course, no valves to give out. The reader must be guided by his own judgment in this matter and he will probably find the experiences of friends of considerable value when it comes to making a choice.

There is one point about eliminators which is not perhaps always realised. It is an excellent scheme if a portable is used to have it so arranged that an eliminator may be used as a general rule for high-tension supply, the batteries being employed only when the set is taken out of doors. The reason is that most portables impose a considerable current drain upon the high-tension battery and it is therefore much more economical to work whenever one can from the mains. This applies particularly to portables using pentode or very low impedance valves for the output.

WIRED WIRELESS IN U.S.A.

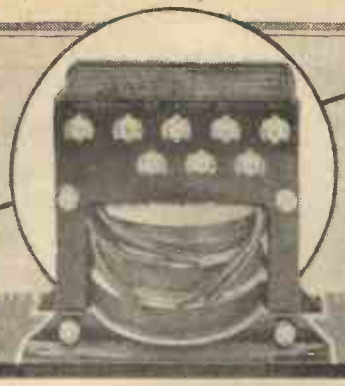
STEPS are now being taken to utilise the ordinary telephone wires for distributing broadcast programmes to American listeners. The problem of ether congestion and overlap is even more pronounced over there than here, whilst static is a decided bugbear, especially in the summer months. By feeding modulated radio-frequency currents into a telephone wire several alternative "programmes" can be distributed simultaneously to all telephone subscribers, with absolute clarity and freedom from all disturbance.

Harold Kimberley, through Roberts' eyes

All that is necessary to select any required programme is to switch over from one filter unit to another at the receiving end. In the new "monophone" system, as it is called, a comparatively inexpensive set consisting of a crystal rectifier followed by one stage of low-frequency amplification, is sufficient to give ample loud-speaker strength. This is due to the fact that "line radio" provides a relatively heavy input current as compared with the energy picked up by the ordinary aerial. The "monophone" does not interfere in any way with the ordinary point-to-point telephone service. B. A. R.

THE STENTORPHONE

IN this type of loud-speaker a stream of air under pressure is allowed to escape through an outlet valve, which is controlled by the speech vibrations. As its name implies, it is particularly suited for public-address systems where a large amplification of the original sound is required. The escaping air gives rise to a slight hissing sound, which is, however, hardly noticeable when the instrument is in full operation. As there is no mechanical diaphragm, distortion due to inherent resonance is avoided. M. A. L.



Facts About POWER TRANSFORMERS

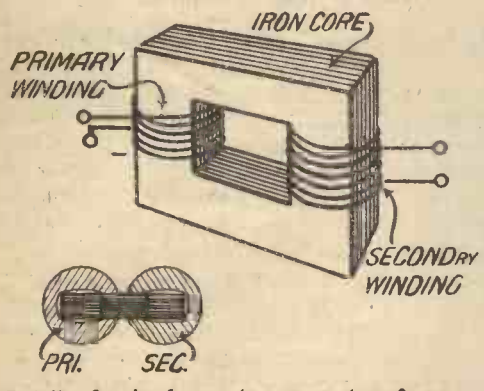
By W. JAMES

If your set takes its H.T. or L.T. from alternating-current mains, then it will include a power transformer. Here are some interesting details of transformers for the purpose

AS more and more houses that are wired for lighting are supplied with alternating-current electricity, the number of users of battery chargers, high-tension mains apparatus and filament power units is bound to increase. In fact, there has been for a considerable time a distinct tendency on the part of those desiring trouble-free reception to discard battery-operated sets, and to employ receivers that derive the whole of their current from the electric-light circuit.

Why Not Mains Drive?

Personally, I look forward to the time when practically all wireless users will have a mains-driven set. A great many of the troubles with which we now have to contend are undoubtedly the direct result of using for power purposes, batteries that vary in their electrical characteristics. As they discharge, their voltage falls off and their resistance increases; consequently, performance is affected.



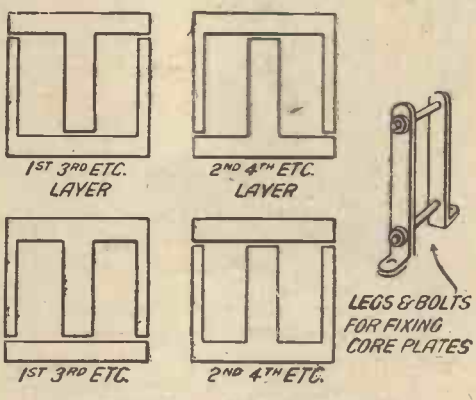
Details of a simple core-type power transformer

Mains units of all descriptions, on the other hand, provide power which is relatively constant. True, the actual voltage of the supply mains usually varies a little throughout the day, but only by a small percentage.

If an examination is made of the various mains units, you will notice that in every one of them a transformer is employed. A transformer must, therefore, be a most important component and actually it does play an important part.

What then is a transformer? It is a component for converting alternating current at one voltage into alternating current at another voltage.

Normally there are two distinct windings fitted over an iron core. One of these windings, termed the primary, is joined to the mains and the other winding, the secondary, is connected to the input terminals of the apparatus included in the mains unit.

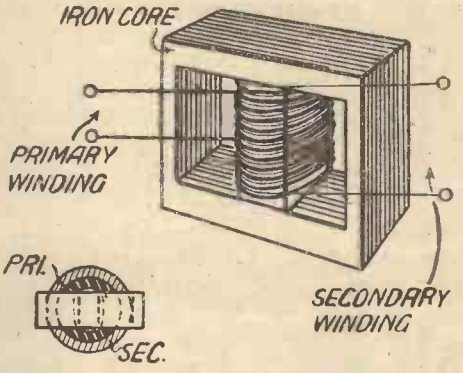


Stampings for shell-type transformer

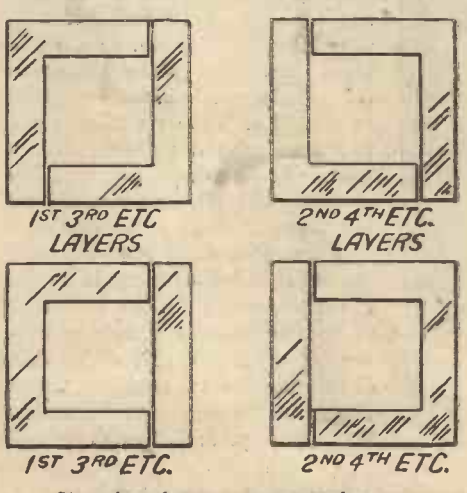
Now, when the mains supply of alternating current is connected to the primary winding, a current will flow through it. This current is, however, best kept small. It is not giving us a current in the secondary circuit.

What factors determine the magnitude of the current? If we take a certain transformer and measure the current which flows for various voltages and frequencies of supply, we shall find the current increases as the voltage is raised or as the frequency is reduced. The primary circuit of the transformer must, therefore, be so arranged that it is suited to the particular voltage and frequency of the supply with which it is to be used.

If now we connect to a given mains supply a winding arranged over an iron core, we shall find the current passed by this winding to fall off as the number of turns of wire are increased, or as the size of the iron core is made larger. The essential points that have to be remembered are, therefore, that the amount of the current is dependent upon the number of turns, the size of the core, and the frequency and voltage of the supply. The magnetic properties of the iron are of course also important.



A shell transformer. See how it differs from the core-type



Stampings for core-type transformer

Small transformers such as used in mains units for wireless purposes often have a core of iron having a cross section of from three-quarters to two square inches and the number of turns on the primary are arranged to suit the voltage and frequency of the mains.

On this page are shown details of cores for small transformers, of the core and shell types. The core dimensions depend largely on the windings, and in a concluding article I will give particulars of suitable primaries and secondaries.

More about The

HINTS ON TI
MAKING THE FRAME A
: : USING A PICK-UP

DID you read last week's article on the "Holiday Portable Three"—a new three-valve portable set produced by the AMATEUR WIRELESS Technical Staff and which fills a very definite niche?

Here is just a summary before continuing the constructional details necessary to complete the receiver. The "Holiday Portable" is a three-valver incorporating frame aerial, batteries and loud-speaker. It covers both wavelength ranges, has provision for a gramophone pick-up, embodies one R.C. and one "super" transformer stage, a volume control, and a choke output circuit. There is provision for using an external aerial and earth, and this converts the "Holiday" receiver into a very up-to-date *poste* for home work. Last week, full constructional details were given for making the receiver section.

It now remains to construct the frame aerial. The wooden former which carries the frame windings is supplied with the cabinet if this is bought ready made. There may be some amateurs, however, who are anxious to make the whole receiver themselves and for the benefit of these, the following dimensions are given.

The sides of the wooden former are of 5-ply wood, the dimensions being 14 $\frac{15}{16}$ by 15$\frac{3}{4}$ in. The ends of the box-like frame-aerial former are finished off with fillets of wood, $\frac{3}{8}$ in. by $\frac{1}{4}$ in. These prevent the frame windings from touching the inside of the cabinet, and also prevent any loose movement of the frame aerial former.

The loud-speaker unit in place in the cabinet

The Frame Windings

So far as the frame windings themselves are concerned, the reaction winding consists of 9 turns of No. 24 s.w.g. enamelled wire. The ends of the windings are finished off simply by threading through small holes. The reaction winding is spaced approximately $\frac{1}{4}$ in. away from the edge of the first aerial section. The long-wave aerial winding consists of 46 turns also of No. 24 s.w.g. enamelled copper wire and the short-wave winding is 11 turns of the same wire. The exact position of the windings is clearly shown in the blueprint No. 188, which can be obtained, price 1s., post free, from the Blueprint Department of AMATEUR WIRELESS, 58-61 Fetter Lane, E.C.4.

When the construction of the frame unit is complete the whole set may be assembled. Slide the frame aerial former into the cabinet, taking care that the supporting fillets for the baseboard are the right way up, that is leaving the larger space at the bottom. The receiver unit may then be slid in inside the frame aerial former from the front and there are two small holes in the panel through which wood screws are passed to make the assembly secure.

Connections

Next, connect up the loud-speaker and frame aerial by means of the flex leads which have been provided. Do not have the frame aerial leads unduly long. The leads need not be more than 6in. long at the most and if they are longer than this, they may foul other components and result in setting up undesired capacity effects. The same applies in a degree of lesser importance to the loud-speaker and battery leads, but it is wise to allow sufficient length of wire for the battery connections in case there shou be any loose movement of the batter

COMPONENT

Ebonite or bakelite panel, 18 in. by 6 in. (Raymond, Bec Ebonart, Paxolin).
.0005-mfd. reaction condenser (J. B., Formo, Lissen, Igranic, Peto-Scott, Burton).
1-meg. volume control (Rotor Electric).
Two push-pull filament switches (Bulgin, Trix, Lissen, Benjamin).
Single-circuit-closed jack (Lotus, No. 2).
Three valve holders (Wearite, Lotus, Benjamin, Lissen, Trix).
.0001-mfd. fixed condenser (Dubilier type 620, Lissen, T.C.C., Mullard).
.0002-mfd. fixed condenser with series clip (Dubilier type 620, Lissen, T.C.C., Mullard).
.005-mfd. fixed condenser (Lissen, Dubilier type 610, T.C.C., Mullard).
3-megohm grid leak (Lissen, Dubilier, T.C.C., Mullard).
High-frequency choke (Peto-Scott, Trix, Igranic, Burndept, Wearite).

HOLIDAY Portable THREE

themselves, which would cause trouble.

The cabinet is capable of accommodating two 60-volt H.T. units, an L.T. accumulator of generous capacity, and a grid-bias battery. This latter is placed at the back of the loud-speaker unit and allows of easy adjustment.

So far as the loud-speaker itself is concerned, it will be seen that in this receiver we have used a proprietory cone chassis with a well-known make of reed movement. The resulting assembly is quite light and compact and very suitable for portable set use.

Very attractive—the complete set in its cabinet

One of the photographs shows the receiver unit contained in the frame aerial former, but the whole assembly without the cabinet. Provided connection is made to the loud-speaker, there is no reason why this "skeleton" should not be used for a preliminary trial, but if all the joints are well soldered and there is no doubt whatever that the connections are correctly made, then time might just as well be saved by making the first test in the cabinet.

The valves should be H.F., L.F and power respectively.

S REQUIRED

150,000-ohm resistance with holder (Varley, Ready Radio, Mullard, Lissen, Dubilier).
Low-frequency transformer (Lissen Super, Ferranti, R.I., Philips, Mullard, Igranic).
Output choke (Ferranti B1, R.I., Igranic)
2-mfd. fixed condenser (Dubilier, Lissen, Mullard, T.C.C.).
1½-volt dry cell (Siemens).
Connecting wire (Glazite).
Three yards of thin flex (Lewcoflex).
Two red and three black wander plugs (Clix). Two spade terminals (Clix).
Cone chassis complete (Squire P.W 77, White Spot).
Loud-speaker unit (Blue Spot, Triotron, Hegra)
Portable cabinet (Lock).
No. 24 enamelled wire (Lewcos).
Two 60-volt H.T. batteries (Ever Ready Popular Portable).
2-volt accumulator (C.A.V. type 2A.N.7, Ever Ready).

So far as H.T. is concerned, two 60-volt units of the type specially designed for portable set use will be found to give satisfactory length of service. This is more than can be said with many multi-valve portables, the designers of which seem to expect midget H.T. cells, almost indefinitely to feed the anodes of a group of hungry tubes. Of course, it should be realised that for home use even the proper portable type batteries which can be enclosed within the cabinet of the "Holiday" set do not give the greatest economy. It is recommended that if this receiver is to be used extensively, both for indoor and outdoor working, then either an H.T. battery of the power type, an accumulator bank or a mains eliminator be employed, the portable type H.T. batteries in the cabinet being used only when the set is taken out of doors.

It is worth remembering that if the set is used continually indoors the accumulator may not be fully up to the mark when it is desired to take the set out for a trip. Therefore, if mains are available, it is a good plan to have a small trickle charger, such as that manufactured by the Regent Radio Supply Co., of 21 Bartlett's Buildings, Holborn Circus, E.C.4, in order to keep the accumulator properly charged so that it will be ready at a moment's notice for outdoor excursions.

Operation

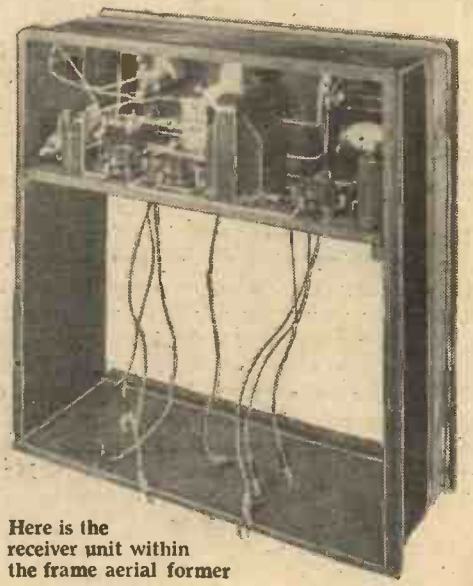
Operation will be found quite simple. Wave-changing is effected simply by the movement of a switch on the panel, and there is not very much that can be said about that! Tuning is remarkably simple, the controls being simply the aerial condenser (centre dial) and the reaction condenser, right-hand dial. The volume control (the knob of which is on the left of the aerial condenser dial) will be found a great advantage, because when working fairly close to a main station, the volume may be expected to be too great for "full throttle" working, and this is bound to be the case when advantage is taken of an external aerial and earth. Moreover when working this receiver with an electric sound-box, some control of volume is almost essential.

There is nothing very much that need be said about the addition of a pick-up. A magnetic movement of almost any type can be used and it should be noted that when the plug attached to the pick-up leads is inserted in the jack a 1½-volt cell is brought into circuit and this impresses a slight negative bias on the grid of the detector valve, which is then, of course, operating as an L.F. amplifier.

Tell us the Results!

When you have made up the "Holiday" set, give it a thorough trial and then let us know the success you obtain with it. The Technical Staff has carried out extensive tests, but with a receiver of this type there is not much object in publishing a station log, for results so obviously depend on locality, operating conditions, operating ability and many other factors.

So tell us of the success you obtain. We want all reports, good, bad or indifferent.



Here is the receiver unit within the frame aerial former

WITHOUT FEAR OR FAVOUR

A Weekly Programme Criticism by Sydney A. Moseley

BERLIN seems to have got a hold on me, for I have flown to London and back in time for the inauguration ceremony of the laying of the foundation stone of the new German broadcasting building. The Under Secretary of State tells me that, strangely enough, they expect the new building to be finished almost at the same time as our own B.B.C. building in London.

An impression of James Kelleher, of the Piccadilly Hotel Dance Band

◆ ◆ ◆

I experienced considerable difficulty in picking up London even with the best five-valve set available. As my readers know, I am not much good at technicalities, but after consulting with some of the leading manufacturers in Germany, I realised that it was neither my fault nor the set, but simply technical difficulties.

◆ ◆ ◆

The political speeches, as it happened, came over extraordinarily well, and some of my German friends were able to follow every word of the speeches. It was a real triumph for British oratory.

◆ ◆ ◆

I am glad that my friend Seiveking has got over well at last. His last kaleidoscopic play was really good. Apart from my own opinion, I "sounded" a few friends as to their ideas about it, and they have borne out my bet with myself that this latest creation of Lance Seiveking will cause more controversy than any other feature. Some said it was silly; some thought it wonderful; others were just amused. Quite a few thought it an object lesson. The general verdict seemed to be that it was "rather clever."

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My opinion is that it was brilliantly conceived and excellently produced. It was a triumph for the men at the control panel. They had to handle three orchestras, singers, choruses, actors, and effects, and it went through without a hitch. *Kaleidoscope* may have been a little obscure in parts, and some scenes were slightly drawn out; one or two of the episodes were a little unpleasant; but taken as a whole it was a treat of the first order for those of us who enjoy something new and unusually clever.

◆ ◆ ◆

Not long ago I had something to say upon the subject of acoustics as applied to certain broadcast organ recitals. I have come across another instance where, as at the Bishopsgate Institute, the effect is none too pleasing. I refer to an organ recital by Gilbert Mills from the Church of the Messiah, Birmingham. Nothing but praise is due to Mr. Mills—I particularly liked his rendering of Norman Coates' "Tuba Tune"—but the echo was a source of annoyance. Surely these details could be gone into more thoroughly by the B.B.C. engineers?

◆ ◆ ◆

Those who like a romantic comedy accompanied by soft, seductive music must have found *Love Magic* from 5GB to their taste. It came rather as a surprise when it ended a quarter of an hour too soon, but the Midland Pianoforte Sextet filled up the spare time in a most capable manner. The selection from *Carmen* which followed was delightfully played by the Gershom Parkington Quintet.

◆ ◆ ◆

My apologies, or perhaps the printer's, are due to Rudy Starita, who was recently referred to on this page as "Ruby"!

◆ ◆ ◆

Cupid and Cutlets, a new burlesque operetta, was of the pleasant type which has nothing much new in it, but helps to pass the time away. Olive Groves, as the Cook General, was easily the best of a good caste. This operetta was preceded by an overture from *The Pirates of Penzance* and was followed by a selection from *The Show Boat*, both of which were played by the Birmingham Studio Orchestra.

◆ ◆ ◆

A delightful Sunday "plum" was the latest concert given by Tom Jones and the Grand Hotel (Eastbourne) Orchestra. Every item was so well selected and played that it is impossible to pick out any one for special comment. I am certain that no one can find fault with a programme including the selection from *Pagliacci*, Tschaikovsky's "Canzonetta," Liszt's "Rhapsody No. 2," and the "Valse Triste" by Sibelius.

The "noise factory" which is heard from WOR, Newark, is a machine driven by nineteen motors and is capable of making more than two hundred different sounds, among which are animal growls, musical notes and the creaking noises of a mediaeval drawbridge. The machine was developed for talking pictures and is said to duplicate noises with exactness.

Mabel Marks, the popular entertainer

VALVES—SOME FURTHER DETAILS OF VALVES FOR ALL PURPOSES

LAST week, on page 806, were given details of two- and four-volt valves of the most prominent manufacturers available. In the table below are particulars of six-volt three-electrode valves for H.F., detection, and low-frequency amplification, while screen-grid valves and pentodes are also shown.

Technical pointers to observe when buying new valves were given last week, and it remains only to be noticed that the rated impedance of pentodes is high as compared with the impedance of ordinary power valves. This does not mean, however, that the loud-speaker should match the impedance of the pentode's anode circuit. An output transformer is always advisable.

It will be seen that some very large power valves, some with impedances so low as 1,600 ohms, are included in the six-volt range of ordinary three-electrode valves and these must match the load.

SIX-VOLT VALVES: Three-electrode Types

Make.	Impedance.	Amp. Factor.	Fil. Current.	Type.
Mazda	90,000	40	.075	RC607
Six-Sixty	74,000	37	.075	6075RC
Cossor	60,000	50	.1	610RC
Marconi	60,000	40	.1	DEH610
Osram	60,000	40	.1	DEH610
Mullard	53,000	40	.075	PM5B
Ediswan	50,000	40	.1	RC610
Marconi	30,000	30	.1	HL610
Osram	30,000	30	.1	HL610
Marconi	25,000	20	.8	LS5B
Osram	25,000	20	.8	LS5B
Ediswan	21,000	25	.1	HF610
Cleartron	20,000	20	.25	CT25b
Cosmos	20,000	9	.09	DE50
Cossor	20,000	20	.1	610HF
Mazda	20,000	20	.075	HF607
Six-Sixty	20,000	20	.075	6075HF
Mullard	14,700	17.5	.075	PM5X
Mazda	12,500	14	.075	GP607
Cleartron	10,000	9	.25	CT25
Ediswan	10,000	15	.1	LF610
Mullard	9,000	18	.1	PM6D
Cossor	7,500	15	.1	610LF
Marconi	7,500	15	.1	DEL610
Osram	7,500	15	.1	DEL610
Marconi	6,000	5	.8	LS5
Osram	6,000	5	.1	LS5
Six-Sixty	6,000	7.2	.1	610P
Mazda	5,300	9	.075	LF607
Mullard	5,200	7.1	.1	PM6
Ediswan	4,200	5	.1	PV610
Cleartron	4,000	5	.5	CT25 X
Six-Sixty	3,600	3.2	.25	625SP
Cosmos	3,500	6	.25	SP55R
Cossor	3,500	8	.1	610P
Marconi	3,500	8	.1	DEP610
Mullard	3,500	3.15	.25	PM256
Osram	3,500	8	.1	DEP610
Ediswan	3,000	3	.25	PV625
Marconi	2,750	2 5	.8	LS5A
Osram	2,750	2.5	.8	LS5A
Mazda	2,600	6	.15	P615
Marconi	2,400	6	.25	P625
Osram	2,400	6	.25	P625
Cossor	2,000	5	.1	610XP
Mullard	2,000	5	.6	DFA9
Mazda	1,750	3.5	.5	PX650
Ediswan	1,600	4	.25	PV625A
Marconi	1,600	3.7	.25	P625A
Osram	1,600	3.7	.25	P625A

FOUR-ELECTRODE VALVES: Screen-grid

Make.	Impedance.	Amp. Factor.	Fil. Volt.	Fil. Current.	Type.
Mullard	230,000	200	2	.15	PM12
Six-Sixty	220,000	190	2	.15	215SG
Cossor		200	2	.2	220SG
Marconi	200,000	170	2	.15	S215
Osram	200,000	170	2	.15	S215
Dario	125,000	25	2	.18	SHF
Ediswan	140,000	140	2	.15	SG215
Mullard	230,000	200	4	.075	PM14
Six-Sixty	220,000	190	4	.075	4075SG
Cossor	200,000	200	4	.1	410SG
Dario	125,000	25	4	.1	SHF
Ediswan	115,000	140	4	.1	SG410
Marconi	175,000	110	6	.25	S625
Osram	175,000	110	6	.25	S625
Ediswan	100,000	140	6	.1	SG610

FIVE-ELECTRODE VALVES: Pentodes

Make.	Impedance.	Amp. Factor.	Fil. Volt.	Fil. Current.	Type.
Ediswan	65,000	80	2	.25	5E225
Six-Sixty	64,000	80	2	.3	230PP
Mullard	62,500	82	2	.3	PM22
Dario	55,000	100	2	.3	Pentode
Marconi	55,000	90	2	.35	PT235
Osram	55,000	90	2	.35	PT235
Cossor	20,000	40	2	.3	230QT
Dario	55,000	100	4	.15	Pentode
Mullard	28,600	62	4	.15	PM24
Six-Sixty	27,000	60	4	.15	415PP
Cossor	20,000	40	4	.15	415QT
Mullard	25,000	50	6	.17	PM26

MAGNETOSTRICTION

THE original Reis "telephon," now more than fifty years old, depends upon the expansion and contraction effects produced in a steel knitting-needle by the passage of voice-frequency currents. The needle is wound with insulated wire and mounted in a wooden box. When voice currents are passed through the wire the resulting vibrations of the needle are communicated to the box, which acts as a sound resonator.

The effect on the knitting-needle is known as magnetostriction. An American inventor, G. W. Pierce, has recently found that magnetic substances will expand and contract in this fashion even when the applied currents are of radio frequency. Magnetostrictive vibrations are, in fact, now being used instead of piezo-electric crystals to standardise the frequency of high-frequency carrier waves such as those used in broadcasting. B. M.

MUTUAL CONDUCTANCE

MUTUAL conductance is the most informative of the various valve characteristics, since it represents the "factor of performance." It varies directly with "mu" (the amplification factor) and inversely as the internal plate resistance. Obviously the greater the amplification factor, the better the response, whilst the higher the internal resistance, the lower the response, other things being equal. When expressed in units, the mutual conductance of a valve measures the change in milliamps in the plate circuit for a change of one volt applied to the grid. In other words, it equates applied grid voltage to current output. B.

MY WIRELESS DEN

By W. JAMES

Weekly Tips, Constructional and Theoretical—

For the Wireless Amateur

A Surprise!

A FEW days ago I had a surprise when I opened a 50,000-ohm wire-wound anode resistance. I did not measure the diameter of the wire, so I cannot tell you its gauge, but No. 47 wire is two thousandths of an inch thick, and is therefore fairly thin. Even this seemed thick in comparison with the wire used in this anode resistance!

The wire was actually wound over thin string, and not very much of it was required for the 50,000 ohms.

The current-carrying capacity of resistance wire is remarkable. No. 47 Eureka will carry 50 milliamperes without becoming too warm. No. 40, which is nearly five thousandths of an inch in diameter, will carry 150 milliamperes when the wire is coiled in air; the temperature will approximate to 100 degrees centigrade.

Claims for Mains Valves

Some of the new mains valves of the shielded type have very large amplification factors and correspondingly high anode impedances. On one or two occasions I have heard the opinion expressed that with these new valves it will be possible to obtain much greater high-frequency amplification, simply because the valves themselves have large magnification factors.

This is, of course, not true. It will not be possible with the new valves to obtain more magnification than with the older *unless* the anode-grid capacity is smaller. At the moment no claims have been made of better shielding.

Compact Condensers

There are I notice now on the market a number of variable condensers having a mixed dielectric. They take the form of the usual sets of plates with sheets of insulating material between them. These condensers are, of course, relatively compact and suitable for portables.

One must remember, however, that these condensers have much greater losses than ordinary types, with the result that tuning will be broad and the signal strength rather less than normal.

There may be circuits in which tuning condensers having mica or other material for a dielectric are perfectly satisfactory, but one should be cautious. Such condensers would, so far as I can see, be entirely satisfactory in reaction circuits and there would be the advantage that the plates could not short-circuit. As a result, there would be no need to employ a protective condenser.

The movement should not be too stiff, or there may be some little difficulty in properly setting it, and the capacity at a given point should remain practically constant, even after the moving plates are moved too and fro about that point.

Is Your Tuning Good?

The worth of a receiver is dependent in no small degree upon its tuning curve. Is it pointed at the top and broad at the bottom, or does it approach a rectangular shape?

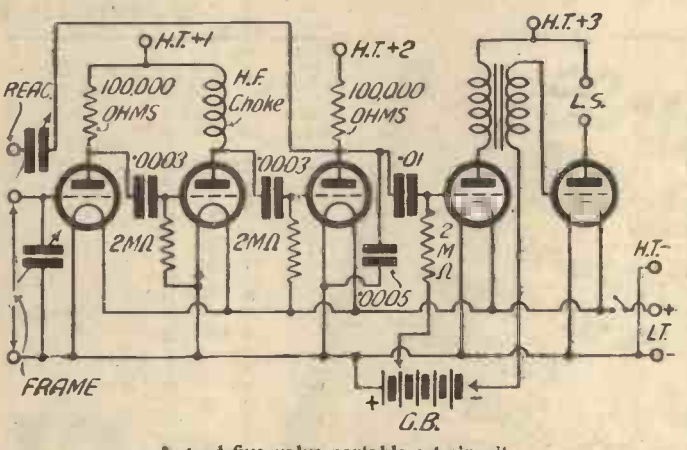
Many receivers, I am afraid, have poor tuners. Perhaps the coils are not very effective, or they may be so connected that the best results are not obtained. In an effort to improve selectivity a fixed condenser of little capacity, such as .0001 microfarad, is often included in the aerial circuit, and sometimes there is an alternative aerial terminal which may be joined directly to the coil or through a larger condenser.

Several tuned circuits have to be used in order to obtain a tuning curve which may approach the rectangular shape, and the inclusion of fixed condensers in the aerial circuit does not help very much towards reaching this ideal. But these condensers are a help and may properly be used in small and inexpensive receivers. Loss of signal strength should not be experienced with a medium condenser value.

Amplification in Portables

It is well known that very little high-frequency magnification is obtained from a resistance-coupled stage when the high-frequency valve is an ordinary one. The magnification is in certain circumstances quite useful, however, and for this reason many of the cheap self-contained receivers include a stage of this type.

A typical circuit of a five-valve set is given herewith and the values of the various components are indicated.



A good five-valve portable-set circuit

I have measured the amplification of a single-stage of resistance-coupled high-frequency at 400 and 2,000 metres, and it amounted to from two to three and from four to five respectively. A well-designed tuned stage will give approximately 40 with stability.

A Mains Indicator

Those who employ A.C. mains supply for filament heating through a suitable step-down transformer may usually, without difficulty, arrange for a small indicating lamp to light when the receiver is connected to the mains supply.

This lamp may be of the 4- or 6-volt pattern, depending upon the voltage of the secondary winding, and if one that takes a fairly heavy current is used, it should have a long life. Mains valves usually have 4-volt filaments, but when only the power valve or valves of a receiver are supplied with alternating current, the voltage is generally 5.5 or 6.

The indicating lamp may be mounted behind a small glass window fitted to the panel. A number of types having windows of various designs are available, and I consider a mains-driven set is hardly finished off unless a visual indicator of this type is fitted.

BROADCAST TELEPHONY

(Broadcasting stations classified by country and in order of wavelengths)

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (6SW)	15.0
243.9	1,230	Newcastle (5NO)	1.0
258.6	1,160.1	*Leeds (2LS)	0.13
288.5	1,040	*Sheffield (6LF)	0.13
288.5	1,040	*Bournemouth (6BM)	1.0
288.5	1,040	*Edinburgh (2EH)	0.35
288.5	1,040	*Hull (6KH)	0.2
288.5	1,040	*Dundee (2DE)	0.13
288.5	1,040	*Liverpool (6LV)	0.13
288.5	1,040	*Stoke-on-Trent (6ST)	0.13
288.5	1,040	*Swansea (5SX)	0.13
288.5	1,040	*Plymouth (5PY)	0.13
294.1	1,020	*Bradford (2LS)	0.13
302.6	991.1	Belfast (2BE)	1.0
311	964	Aberdeen (2BD)	1.0
323	928	Cardiff (5WA)	1.0
358	838	London (2LO)	2.0
378	793	Manchester (2ZY)	1.0
401	748.3	Glasgow (5SC)	1.0
482	622	Daventry Ex. (5GB)	17.0
1,504.3	191.7	†Daventry (5XX)	25.0
AUSTRIA			
250	1,200	Linz	0.5
283	1,060	Innsbruck	0.5
354.2	847	Graz	3.0
456	694	Klagenfurt	0.5
520	577	Vienna	20.0
BELGIUM			
230	1,300	Chatelineau	0.25
249	1,203	Schaerbeek-Brussels	0.5
250	1,200	Ghent	0.5
280	1,070	Liége	0.5
512	586	Brussels	10.0
CZECHO-SLOVAKIA			
265	1,128	Kosice	2.0
277.8	1,080	Periby (testing)	12.0
306	980	Bratislava	4.0
343	873	Prague (Praha)	5.0
432.3	694	Brunn (Brno)	2.4
DENMARK			
339	883	Copenhagen (Kjobenhavn)	1.0
1,158	259	Kalundborg	7.5
ESTHONIA			
408	735	Reval (Tallinn)	1.3
FINLAND			
379	791	Helsingfors (Helsinki)	0.8
1,500	200	Lahti	20.0
FRANCE			
170	1,750	St. Quentin	0.25
212	1,415	Fécamp	0.3
211.3	1,420	Beziers	0.1
238	1,260	Bordeaux (Radio Sud-Ouest)	2.0
240	1,250	Radio Nimes	1.0
244	1,219	Lille (PTT)	0.3
250	1,196	Juan-les-Pins	0.4
254	1,180	Rennes (PTT)	1.0
255	1,175	Toulouse (PTT)	1.0
268	1,118	Strasbourg	0.3
274	1,092	Limoges (PTT)	0.5
285	1,050	Montpellier	1.5
292	1,028	Radio Lyons	1.5
300	996	Bordeaux (PTT)	0.6
305	982	Agen	0.3
309	970	Vitus (Paris)	2.0
318	943	Marseilles (PTT)	0.5
336	892	Petit Parisien	0.5
352	850	Algiers (PTT)	2.0
368	815	Radio LL, Paris	1.0
382	785	Toulouse (Radio)	9.0
413	725	Radio Maroc (Rabat)	2.0
429	699	Grenoble (PTT)	1.5
436	687	Radio Flandre Lille	0.5
446	672	Paris (Ecole Sup., PTT)	0.7
468.8	640	Lyons (PTT)	5.0
1,350	222	Tunis (testing)	
1,470.2	204	Eiffel Tower	8.0
1,749	171	Radio Paris	8.0
1,825	164	Radio Carthage (Tunis)	5.0
GERMANY			
219	1,370	Flensburg	1.5
240	1,250	Nurnberg	4.0
250	1,200	Kiel	0.7
250	1,200	Cassel	0.7
263.2	1,140	Cologne	4.0
267.8	1,120	Muenster	1.5
272.4	1,101	Kaiserslautern	1.5
280.4	1,070	Königsberg	4.0
283.1	1,058	Berlin (E)	0.7
283.1	1,058	Stettin	0.7
283.1	1,058	Magdeburg	0.7
317.5	945	Dresden	0.75
320	937	Breslau	4.0
326.4	919	Gleiwitz	6.0
329	910	Bremen	0.75
361.9	829	Leipzig	4.0
374.1	802	Stuttgart	4.0
391.6	766	Hamburg	4.0
421.3	712	Frankfurt	4.0
455.9	654	Danzig	0.75
456	651	Aachen	0.75
462.2	649	Langenberg	25.0
476	630	Berlin	4.0
538	558	Munich	4.0
563	532.8	Augsburg	0.5
566	530	Hanover	0.7
577	520	Freiburg	0.7
1,651	181.7	Zeesen	20.0
1,651	181.7	Norddeich	10.0
GRAND DUCHY OF LUXEMBOURG			
1,220	245	Radio Luxembourg	2.0
HOLLAND			
31.4	9,554	Eindhoven (PCJ)	25.0
326.3	891.5	Huizen (until 5.40 p.m. B.S.T.)	5.0
1,076	278	Hilversum (ANRO)	5.0
1,846	162.5	Huizen (after 5.40 p.m. and on Sundays	5.0
1,846	162.5	Scheveningen-haven	5.0
HUNGARY			
548	548	Budapest	15.0
ICELAND			
333.3	900	Reykjavik	1.0
IRISH FREE STATE			
222.2	1,350	Cork (5CK)	1.5
411	730	Dublin (2RN)	1.5
ITALY			
278	1,078	Turin	7.0
333	900	Naples (Napoli)	1.5
387	775	Genoa (IGE)	3.0
442	677	Rome (Roma)	3.0
450	666	Bolzano	0.3
503.5	596	Milan	7.0
JUGO-SLAVIA			
308.3	973	Zagreb (Agram)	1.25
450	668	Belgrade	4.0
582	515	Ljubljana	5.0
LATVIA			
529	567	Riga	2.0
LITHUANIA			
1 935	155	Kovno	15.0
NORWAY			
242	1,240	Rjukan	1.0
297	1,010	Notodden	0.7
365	820	Bergen	1.0
387	774	Fredriksstad	1.0
456	657	Tromso	1.0
456	657	Aalesund	1.0
456	657	Porsgrund	1.0
496	604	Oslo	1.5
577	519.9	Hamar	0.7
POLAND			
314	955	Cracow	1.5
337	890	Posen	1.5
415.5	722	Kattowitz	10.0
456	658	Wilno	1.5
1,397	214	Warsaw	10.0
PORTUGAL			
317.5	945	Lisbon CTIAA (Wed' and Sat.: 10—midnight)	
ROUMANIA			
395	757	Bucharest	4.0
RUSSIA			
492	609	Kharkov (NKO)	5.0
825	363.6	Moscow (PTT)	25.0
925	323	Homel	2.5
1,000	299	Leningrad	20.0
1,440	208	Moscow	30.0
1,684	178	Kharkov	15.0
SPAIN			
263	1,141	Barcelona (EAJ13)	10.0
314	956	Oviedo (EAJ19)	0.5
324	926	Almeria (EAJ18)	1.0
346.8	865	Barcelona (EAJ1)	10.0
369	811	Seville (EAJ5)	0.5
400	750	Radio España	1.0
405	740	San Sebastian (EAJ8)	0.5
425.7	703	Madrid (EAJ7)	3.0
456	658	Salamanca (EAJ22)	0.55
SWEDEN			
261	1,150	Horby	10.0
265	1,130	Trollhattan	0.4
333	900	Falun	0.5
350	858	Goteborg	6.0
437	686	Stockholm	1.5
550	546	Sundsvall	1.0
770	390	Ostersund	2.0
1,200	250	Boden	2.0
1,345	223	Motala	30.0
SWITZERLAND			
406	739	Berne	1.0
496	604	Zurich	0.6
680	441	Lausanne	0.6
760	395	Geneva	0.5
1,010	297	Basle	0.25
TURKEY			
1,200	250	Stamboul	5.0
1,809	164	Angora	5.0

* Relay stations. †Relays 2LO.

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

June 17 Vaudeville programme.
" 18 The Aldershot Tattoo.
" 19 Covent Garden relay.
" 20 A band concert.
" 21 Spanish symphony concert.
" 22 "The Diary of a Nobody."

DAVENTRY EXPERIMENTAL (5GB)

June 16 Military band concert.
" 17 An orchestral and vocal programme.
" 20 *The Importance of Being Earnest.*
" 21 Vaudeville programme.
" 22 Symphony concert.

CARDIFF

June 16 An orchestral and choral concert
" 18 A Welsh programme.
" 20 *Many Happy Returns.*
" 22 *Les Vivandiers.*

MANCHESTER

June 16 Orchestral programme.
" 19 A band concert from Southport.
" 21 *Such is Life.*
" 22 Brass band concert.

NEWCASTLE

June 19 Orchestral concert from Whitby.
" 20 Recital on the New Zealand War Memorial carillon.
" 21 Sunderland programme.

GLASGOW

June 16 Military band concert.
" 19 Concert of Welsh music.
" 22 *Radiotics.*

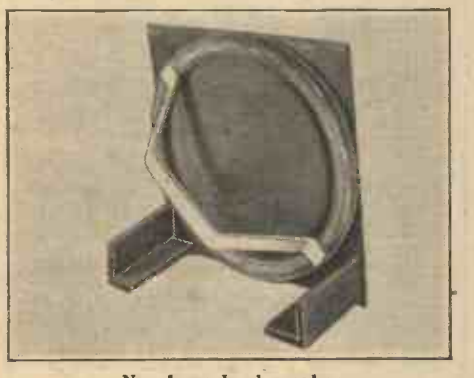
All Italian studios have received definite instructions to close down their transmissions by playing the Fascist hymn (*Giovinezza*), followed by the Royal anthem.

"A.W." TESTS OF APPARATUS

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

Neophone Loud-speaker

THE Neophone Engineering Co., 9 Little St. Andrew Street, St. Martin's Lane, London, W.C.2., have recently introduced a cone unit comprising an 11-in. diaphragm clamped securely to a massive wood frame fitted at the back with a metal support for holding an electro-



Neophone loud-speaker

magnetic unit. This assembly is primarily intended for mounting inside a cabinet, or alternatively a suitable baffle may be employed.

One of the interesting parts of the assembly is the diaphragm, which is made of an exceedingly rigid material and appears to be heavier than the normal cone speaker diaphragm. Although not attached to any leather or other supple substance at the periphery, it is fully floating and bears against a ring of felt.

Having attached a well-known balanced armature unit, we tested the speaker on a special power amplifier, capable of giving a large volume if required. During previous experiments we have found that the normal cone is liable to chatter if subjected to undue volume, but in this particular speaker, a large power output could be obtained without any sign of this trouble.

It is interesting to note that a perpetual guarantee is given with each loud-speaker.

Sinquers—for Testing Accumulators

IN order to obtain long life from accumulators it is essential to look after them. In brief, one must maintain specific gravity of the acid at the correct value, filling up with distilled water at frequent intervals, and never allow the voltage to fall below a certain value. Even the naturally careful individual will fail on occasions to observe these precautions, therefore, it is hardly surprising that accumulators do not always give the life with which they are accredited.

We have just tested a substance known as Sinquers, manufacturerd by Fiddian Bawtree & Co., of Gem Works, Oakhill Road, Sutton, Surrey. These are marketed as a number of red and blue cakes which can be rolled up into balls and inserted through the vent hole of the accumulator. When both the blue and the red ball are floating the accumulator is fully charged; when the blue ball sinks, it is only half charged, whereas when the red ball also sinks, the cell is right "down" and must be charged immediately.

Actually, during our tests, the red and blue floated at specific gravities of about 1220. At 1215, the blue ball had sunk, which is the condition of approximately half charge and at 1100 the red ball had sunk. This last value is somewhat below the recommended minimum for an accumulator and indicates that the cell requires immediate attention.

Bulgin Plug and Jack

THE plug and jack is by no means a newcomer to wireless or electrical engineering, yet its use in radio sets is not as great as one might expect. This may be due to the fact that during the past two or three years, sets have been constructed in which adjustments were limited to switching on and off and simple tuning.

We have recently tested a particularly neat plug and jack manufactured by Messrs. Bulgin, of 9-11 Cursitor Street, E.C.4, who have previously had considerable experience in components of this type. The jack itself occupies only one inch behind the panel and is one-hole fixed. Two terminals are supplied, one to fix to the metal framework and another to the spring clip which bears on the knob of the plug.

The plug, too, is different from the usual type, and is so arranged that even when stiff phone tags are attached to it, the plug does not occupy more than $\frac{7}{8}$ in. outside the panel, thus allowing sets fitted with doors to be closed up in the normal manner.

Hammarlund Short-wave Coils

THERE is never any waning in short-wave interest, for during these months, the long-distance stations are more often heard with greater clarity than is general in the winter months, whilst in addition, the hours of optimum reception do not always coincide with the hours of daylight.

This week we are reporting on Hammarlund short-wave coils manufactured by the Hammarlund Manufacturing Co., of New York City and marketed by the Rothermel Corporation, Ltd., 24-26 Maddox Street, W.1.

One would be liable at first glance to imagine that these coils were wound without any former; indeed, it has been the aim of the manufacturers to utilise the minimum amount of supporting material and in consequence to cut down dielectric losses. Actually, the coils are wound on a 3 in. diameter celluloid former with each turn spaced, which makes them extraordinarily robust and able to withstand rough treatment without any tendency to collapse.

The complete assembly includes a small socket holder and a six-turn aerial coupling coil mounted on a narrow piece of ebonite with tag connections. The sockets are spaced to a desirable extent in order to minimise losses and the aerial coil swivels on a horizontal axis for the purpose of altering the coupling and, therefore, removing any dead spots.

The three sets of coils which plug into the holder comprise a grid winding and reaction winding, both wound on the same former. Due to the special design of the coil pin, plugging in and out of the sockets can be accomplished without any force; at the same time, excellent electrical contact is ensured—an important point in short-wave reception.

On a standard aerial, the ranges obtained on the three coils are as follows:—

19 metres to 49 metres for the smallest
31 " " 89 " " " medium
54 " " 160 " " " largest

These coils are undoubtedly well designed and may be recommended to readers.

Hammarlund short-wave coil

According to the latest Polish statistics, in the first quarter of 1929 the number of registered licences increased from 189,481 to 202,561, but it is generally considered that a "roping in" of wireless pirates would contribute over 50,000 to this figure!

LETTERS TO THE EDITOR

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

The "Clarion S.G. Three"

SIR,—I am writing to thank you for such a successful circuit as the "Clarion Screen-grid Three." I think it would be a very good idea to publish it again in the winter, with a four-valver on the same lines, for those people who are unfortunate as regards reception. I made the set about a fortnight after it came out, and on one night I pulled in thirty-two stations at varying strengths on the loud-speaker and logged most of them. The medium waves have "gone off" now, but the long waves can be brought in at any time in the day.

L. J. R.

"Avoiding Saturation in Chokes"

SIR,—We have noted with interest the article under the above heading in AMATEUR WIRELESS No. 363, but there is one point with which we wish to take exception—namely, the statement that chokes having air gaps in their cores have not yet been in general use—and would therefore draw your attention to the fact that all Ferranti chokes, with the exception of the B3 type, in which the advantages of an air gap are relatively small, have been provided with air gaps ever since they were marketed about two years ago.

We do not consider that there is any particular merit in making a choke for this purpose having an absolutely flat curve, as to do so as a rule inevitably means a reduction of inductance at the lower plate currents, which is undesirable, seeing that small currents usually occur in circuits where the greatest smoothing, and therefore the greatest inductance, is necessary.

Another very important point with regard to the inductance of smoothing chokes to which attention, we think, ought to be drawn is that the inductance varies with the signal ripple, and under the conditions that are sometimes used for measuring this inductance—for example, when employing thermal instruments—the ripple voltage must be considerable, and therefore the inductance indicated is greater than the effective inductance under working conditions.

FERRANTI, LTD.

Two output valves of WTAM, Cleveland, to be installed in its new 50-kilowatt station, will be 5 ft. high. The power rating of the two will be 200 kilowatts, or four times the wattage of the station.

The Ohio School of the Air, broadcast for the State department of education by WLW, Cincinnati, has received the support of the state legislature. It recently appropriated £8,000 for two years operation of the school.

BURNING THE CANDLE AT BOTH ENDS!

Jottings from my Log

By JAY COOTE

DURING the bright and sunny days, if you hope for a good reception of the more distant foreign stations, you must try for them early in the morning or late at night; and the radio fan who wishes to test out a new receiver must needs burn the candle at both ends.

If advantage is not taken of the most favourable periods of the twenty-four hours, the daily log will show a considerable falling-off in the number of transmissions heard. To-day, with nearly close on two hundred different stations simultaneously on the air in Europe, much difficulty may be encountered if a weaker broadcast is to be picked out of the multitude, and it is fortunate for us that some of the most troublesome transmissions in this respect may be captured at a time when the ether is less congested.

Such an opportunity, for instance, is given on Sunday mornings, when it is possible to hear a concert from Berlin direct, its relays or from Königswusterhausen, as an alternative, at 6.30 a.m.; later, at 7 a.m. Prague and its associates take an orchestral programme from the Karlsbad Kursaal Gardens. At 7.30 a.m. Leipzig—an exceptionally tricky transmission to receive in London when 2LO is working—comes on the air with an organ recital, and fifteen minutes later Cologne and the Rhineland stations broadcast a course of jujitsu self-defence.

Realising also that during the warmer months many listeners abandon their wireless receivers for outdoor sports, the Germans have extended their concerts at the latter end of the day, and each in turn gives one night concert in June, July, August, and possibly September. As these transmissions are timed to start at 12.30 a.m., you are given an excellent opportunity of securing clear reception of any and all of them, for at that hour there is but little interference in the ether.

Believe me, you will find no difficulty in burning the candle at both ends!

LISTENERS to 2LO and 5XX on June 24 will be taken over to the Hippodrome Theatre for a relay of an excerpt from *The Five O'Clock Girl*, a musical revue in which the cast includes George Grossmith, Ernest Truex, Hermione Baddeley, Ursula Jeans, and Jean Colin.

Arrangements for the musical portion of the Canterbury Festival, to be held from August 19 to 24, and for which the B.B.C. is providing the orchestra, have now been completed. Listeners will be given a relay of a concert directed by Mr. Gustav Holst on August 21, in which the composer will conduct his own work "The Planets."

Up the Stairs, a thriller by J. Jefferson Farjeon, will be sandwiched between the two sections of the Aldershot Command Searchlight Tattoo to be relayed from the Rushmoor Arena on June 18.

Cardiff on June 28 will broadcast a concert given by the Band of the 2nd Somersets at Priory Park, Taunton. This is the first occasion on which an O.B. has been carried out from that town.

The Devil Among the Skins, a play from the pen of Ernest Goodwin and which recently gained the cup at the National Festival of Community Drama in London, is down for transmission from the Manchester studio on June 22. It will be performed by the members of the Liverpool Players' Club.

On June 29 Scottish, English, and Northern Ireland stations will relay a concert from the Atholl Palace Hotel, Pitlochry. The programme of vocal and orchestral music will conclude with a short play performed by the Scottish National Players. There will also be pipe music played on the terrace outside the hotel by the Vale of Atholl Pipe Band.

A new company, under the title of Radio Fer, has been formed in Paris for the installation of wireless receiving apparatus on the French railway systems.

At the annual general assembly of the International Broadcasting Union recently held at Lausanne arrangements were made to provide for the management and finance of the wavelength checking centre at Brussels, which now becomes the official centre for Europe.

The French Posts and Telegraphs, through its high-power station at Ste. Assise, experiments daily on a wavelength of 24 metres between midday and 2 p.m. B.S.T. with a relay of the Ecole Superieure (Paris) luncheon gramophone transmission. On recent occasions these broadcasts have been picked up in Algeria and Morocco, and fed to the local transmitters. Should the tests prove that a regular service is possible, it is hoped to effect an interchange of radio programmes between Radio Alger and Radio Maroc (Rabat) with the French official studios.

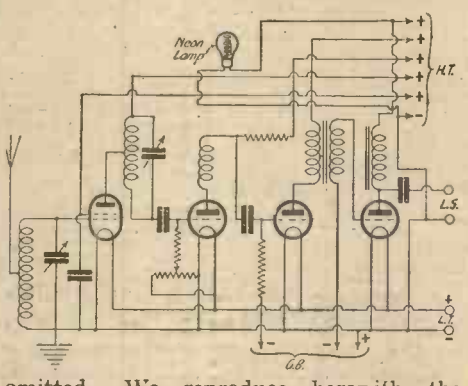
By means of the Fultograph system, Radio Barcelona proposes to establish a regular picture transmission service during the period of the Barcelona International Exhibition. It is possible that pictures broadcast from that city will be relayed to all the Union Radio transmitters.

According to a report from the United States, American engineers have arrived at Rome with a view to the proposed erection of a high-power broadcasting station to be controlled by the Vatican.

Radio Luxembourg, having increased its power to 2 kilowatts, now carries out tests on 1,220 metres every Sunday between 12.30 and 4.30 p.m. and transmits a musical concert every Tuesday and Friday between 9.20 and 11.20 p.m. B.S.T.

In the last two years Saturday afternoon relays of concert-party performances from Glasgow parks have proved so popular with listeners to the local station that it has been decided to make them available this year for the Edinburgh and Dundee stations also.

"An Inexpensive Distortion Detector."—In AMATEUR WIRELESS No. 364, page 764, there appeared under the above heading some notes on the use of a neon tube as a distortion tester. Owing to the block becoming broken during printing, some of the circuit connections were



omitted. We reproduce herewith the diagram showing the complete connections. The neon lamp should be connected directly across the H.T. positive terminal to the last valve and H.T. negative, as shown in the accompanying diagram.

VARLEY COMPONENTS LISTED

VARLEY components, manufactured by the Oliver Pell Control Ltd., are catalogued in an interim list, a copy of which has been received. The catalogue describes and illustrates the range of Varley components, including gramophone pick-ups, bi-duplex wire-wound R.C. couplers, anti-mobo units, anode resistances, power resistances, H.F. chokes, rheostats, potentiometers, and so on. Some interesting technical details are given, and readers may obtain a copy on application to the Oliver Pell Control Ltd., 103 Kingsway, W.C.2, and mention of AMATEUR WIRELESS.

The new Graz (Austria) transmitter is to be officially opened on June 15. As its power is some six times that of the original, the transmissions should be heard at good strength in the United Kingdom. An interesting part of the broadcast will be the carrying out of experiments with radio apparatus made by Dr. Alois Nussbaumer, in Salzburg, twenty-five years ago. The opening ceremony and the ensuing programme will be relayed from 6.30 p.m. onwards to the Vienna Rosenhuegel high-power station.

BRITAIN'S FAV. 2

A.W., 25th May, 1929

COMPONENTS

Ormond .0005, 6/-; .00025, 5/6; 7 ohm Ormond, 2/-; 2 W.B. V.H., 2/6; 6 pin Base, 2/-; .0003 and Series Clip, 1/6; 2 meg. leak, 1/-; H.F. Choke, 5/6; L.F. Transformer, Lissen, 3/6; Push Pull, 1/3; Tunewell Dual Range Coil, 7/9.

PLEASE ADD POSTAGE

OR READY TO USE including DUAL RANGE COIL, POWER & DET. VALVES in Handsome CABINET. All parts enclosed on Baseboard. £3.12.6

(SET IN WINDOW).

UP-TO-DATE.

If your order for Fav. 2 parts exceeds 32/- you can buy

for 1/- extra

14x7 Ebonite Panel, Pair Panel Brackets, Baseboard, Battery Clips, Engraved Terminals, Wire, Flex, Plugs.

Deduct 10/- if Cabinet not required

MULLARD S.G.P. 3

SEE OUR EXCHANGE OFFER

(Applies to this Set ONLY).

KIT OF PARTS (IN STOCK)

1 Aluminium Panel (ready drilled to carry tuning condensers, switch, reaction condenser, rheostat, and panel brackets) Colvern, 5/6; Juno Piano-board, 2/-; Bebe .0003, 8/-; 2 J.B. Log, left and right, 10/-; Sovereign 50 ohms, 2/6; 2 Drum Dials, pr. 21/-; 2 Six-pin Bases, 4/-; Benjamin Switch, 1/3; 2 H.V. Valve Holders, 3/6 pr.; B.B.C. Aerial Coil, B.B.C. Anode Coil, 9/6 pr.; 1 W.B. Valve Holder, 1/3; 2 Junit Mounts for 1/5; 4 B. Lee Terminals 2/-; Climax H.F. Choke, 7/6; G.B. Clip, 5d.; Mullard Permacore, 25/-; Metal Screen, 10/6; Panel Brackets, 2/6; 25 T.C.C., 2/3; Mullard .01, 3/-; 7 Plugs, 1/2; 2 Spades, 6d.; Flex and Screws, 1/9; Set of Links, 1/3; Exact to Mullard specification. Long-wave Coils, 10/6 pr. EXTRA.

Total £6 : 16 : 7 POST 1/6

VERY IMPORTANT NOTICE. In order to popularize the above set, I am willing to ACCEPT EXCHANGE, in RADIO, GRAMOPHONE or PHOTOGRAPHIC GOODS (provided Kit of Parts as above are purchased). Such exchange in value not to exceed one-sixth of total. Send your cheque less amount you value your goods at. Post your old parts separately with name and address.

Mullard S.G. 22/6. D. 10/6. Pentone 25/- 2- and 4-volt. Mullard Speaker Unit 38/6. All H.T. Units, H.T. Batteries and L.T. Batteries stocked. Table Cabinet, 18 in. x 7 in., oak, hinged lid, 16/11, (post 2/-) for 2/6 with order exceeding £10 : 0 : 0 retail. Above Special Offer for CASH ONLY.

HANDSOME POLISHED OAK SPEAKER CABINETS

13 x 13 x 6

The Lot Carr. Paid U.K.

12/11 Post 1/3

BLUE SPOT 66K (101) **25/-**

GENUINE ADJUSTABLE 4 POLE BAL. ARMATURE

OR CABINET BLUESPOT 12" CONE **35/-**

With Triotron Unit 27/6

Tunewell Dual

250/2000 6-pin Base, 1/6 **7/9**

PANEL MOUNTING PUSH PULL **10/6**

TUNEWELL COILS for MULLARD S.G.P.3 Aerial or Anode, BBC or Long-wave, **7/10** pair.

DUAL C. TAPPED with reaction AERIAL ANODE **10/6** each.

FOR CLARION (post extra)

WEST END DEPOT for TUNEWELL COILS

TRADE SUPPLIED

EXIDE

H.T. and L.T. TRICKLE CHARGER **£5**

Illustrated Catalogue (144 pages). 1/- refunded on first 10/- order.

ULTRA SHORT-WAVE COILS

FOR COSSOR

Per pair. **7/6** Post 4-min. 6d.

GRAWOR UNIT

with CONE for Talisman Portable **16/6**

Post 1/-

BLUE SPOT

Metal Chassis With fitted Cone **12/6**

Philips' Type 3002. High-Tension Supply Unit for A.C. Mains, £7. Type 3003. High-Tension Supply Unit, with Grid Bias, for A.C. Mains, £8 15s. Type 3005. High-Tension Supply Unit for D.C. Mains, £3 17s. 6d. Type 450. Low-Tension Battery Charger for A.C. Mains, £3 10s.

Philips' 2-Valve All-electric Receiver for A.C. Mains. Price complete, £12 10s.

Philips' Loud-speaker (Type 2026 or 2016), price £2 10s.

Ferranti Anode Resistances, 3,000 ohms, 5/-; 20,000, 4/-; 40,000, 4/- each; 50,000 5/-. Complete with Holder, 2 Mfd. Mansbridge, 3/6.

AF3L.F. Transformer, 25/-. AF4, 17/6. Post 3d. each.

SPECIAL "A.W."

CASH VOUCHER

This Voucher is worth (retail)

On £2 Order (and over) 2/- Cash

On £5 " " " 5/- Cash

On £10 " " " 20/- Cash

This Voucher CANNOT be used at same time as Coupon—and is only available at Raymonds. (H.P. excluded).

CLARION 3 SCREENED GRID

A.W. 9/3/29

KIT OF PARTS

Any other Condenser, H.F. Choke, or L.F. Transformer, supplied by adding balance.

2 Polar .0005, No. 3 at 5/9. .0001 Reaction 4/-. 2 Dual range C.T. Coils, with Reaction (Tunewell), Anode 10/6; Aerial, 10/6. 3 Lotus or W.B. V.H. at 1/3. Formodenser, "J," 2/-. Dubilier .1 mfd., 2/6. .01 Fixed, T.C.C., 1/9. 3-meg. Lissen or Edison Bell, 1/-. S.G. H.F. Choke, Peto-Scott, 5/-. H.F. Choke, Lissen, 5/6. L.F. Transformer, R.I. and Varley, 15/-. Ebonite Strips.

14x7 Ebonite Panel. Screen, 8½x3. 3 Engraved Terminals. Push-pull Switch, Flex, Plugs, 16-g. Wire, 2 S.M. Dials.

THE LOT **70/-**

POST FREE U.K.

.0002 Fixed and Series Clips 1/6 extra. 1/6 EXTRA C.O.D.

VALVES for CLARION 3

Screened Grid, Marconi, Mullard, Six-Sixty, 22/6 each Detector, 10/6. Power, 12/6.

CLEARTRON

S.G., 2-v., 12/6. C.T.15, L.F. or H.F., 4/-. C.T.15X., P. 6/-

DEFINITELY CUTS OUT 2LO AT 1 MILE and obtains 5GB, 5XX and Continental Stations with 2LO working. This actual test has been made by the designer of set at our premises.

14 x 7 x 9 American Type CABINET, hinged lid, Oak finished with Baseboard,

12/6 15/- 17/11

PORTABLE CABINETS for "ROADSIDE" FOUR

in real Rexine, made to Mr. Percy W. Harris's specification. Post 1/- U.K. **39/6**

OR with AERIAL WOUND and SWITCH FITTED ... 12/6 extra

SIMILAR DESIGN IN LEATHERETTE FOR

TALISMAN **25/-**

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WORLD RECEPTION

On Your Set

.00015 Short-wave Condenser with S.M. movement or Dial, 12/- (Ormond or Polar); Reaction, Polar, 5/6; 7-ohm Panel Rheo, 2/6; 6-pin Base, 2/-; Spring V. Holder, 1/3; .0001 fixed, 5-meg. Leak and Holder, 2/6; Valve Holder, Plug Clip, 2/-. Total, including Short-wave Choke, Connecting Wire, A. and E. Terminals, Flex, Screws, Baseboard, and Panel.

The Lot **30/-**

Post free U.K. (1/3 C.O.D.).

Lewcos AMS4, AMS9, for above, 7/6 each.

VALVES

10/6 each.

Cossor 210RC, HF, LF. Mullard PM1A, HF, LF. Six-Sixty RC, HF, LF. Marconi DEH210, HL, DEL. Osram DEH210, HL, DEL. Ediswan RC, HF, LF.

12/6 each.

Cossor 220P. Mullard PM2. Six-Sixty 215P. Marconi DEP215 (Osram same). Ediswan PV215.

15/- each.

Cossor 230P. Mullard 252. Six-Sixty 230SP. Marconi 240 (Osram same). Ediswan PV225.

Screened Grid, 22/6. Pentodes, 25/-

VALVES

DARIO RADIO-MICRO

2-v. or 4-v. G.P. 5/6

Super Power 7/6

Super H.F., 2-v. or 4-v. .. 7/6

Post 3d. (3 Post Free).

TRIOTRON

H.F., Det., R.C., 5/2 each; Power 6/9. 2-v. or 4-v. Post 4d. & post free.

CLEARTRON

SCREEN GRID

2-volt, 12/6; usual types, 4/-. R.C. or Power, 6/-. Post 3d.

LEWCOS

Lewcos C.A.C.5, 10/6; C.A.C.20, 12/6; C.S.P.5, 10/6; C.S.P.20, 12/6; P4 to 14, 3/- each; P16 to 22, 4/- each. Touchstone Coils, 30/- pair. CT. Coils, 3/6, 5/3. Q Coils: Q.A., 15/-; Q.S.P., 21/-; Q.A.R., 21/-; Q.A.A., 15/-; Q.S.G., 21/-. All Lewcos Products.

WATES' Three in One Radio TEST METER

Readings :—0-150 volts. 0-30 milliamps. 0-6 volts. Res., 5,000 ohms. **8/6**

ORMOND

Midget Log all brass, .0005, 8/-. .00025, 7/6. .00013 Shortwave, 7/-, complete with Dial. Also with S.M. (friction) 5/- extra.

Send direct to us for ALL ORMOND GOODS. Wholesale and Retail.

Be sure to mention A.W.

RAYMOND'S for WIRELESS

27 & 28a, LISLE ST., LONDON, W.C.2

Come to LEICESTER SQUARE TUBE.

This address is at the back of Daly's Theatre. Phones: Gerrard 4637 and 2821

WE ARE OPEN

ALL DAY SATURDAY

ALL DAY THURSDAY

ALL DAY EVERY DAY

Hours 9 a.m. to 8p.m

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Sunday morning 11-1

QUOTATIONS for SETS OF PARTS

SPECIAL PRICES on LISTS of 25/- and over

CALLERS or POST.

Oak American Type, Hinged Lid,

BEST QUALITY. Panel and Dial NOT included.

14x7, 14/11 16x7, 16/11 18x7, 18/11 21x7, 21/-

Post 1/6. (C.O.D. Extra). Advt. May 11, error in prices.

Cabinet to specification, £2 9s. 6d. (30/- with parts). Carriage extra.

HOLIDAY PORTABLE

SPECIFIED PARTS

.0005, 6/6; 1 meg. vol. control, 6/6; 2 P.P. switches, 3/-; S.C.C. Jack, 3/6; 3 Lotus V.H., 3/9; .0001, 1/10; .0002, S/P 2/4; .005, 1/6; 3 meg. 2/-; Peto-Scott H.F. choke, 5/-; 150,000 ohm anode and holder, 6/6; Lissen Super L.F., 19/-; Output choke, Igranic, 15/-; (Add balance any other) 2 mfd. Mansbridge 3/6. Ebonite Panel, Screws, all Wire, Plugs, Spades, Flex, and Kit of Parts, 82/-.

SQUIRE 77 PORTABLE CHASSIS AND CONE, 18/6.

For this set all batteries in stock.

PORTABLES

SHOP SOILED ONLY

£15 ORMOND, One only **£11.11.0** 5-v.

£15 NATIONAL, One only **£12.0.0** 5-v.

Complete ready to use.

Personal Shoppers Only.

ORMOND

S.M. Drum Dial, 5/-; Rheostats, 6, 15, 30 ohm, 2/-; Midget .0001 max., 4/-; Log .0003 and 4 in. Dial, 6/-; Log .0003 and 4 in. Dial, 5/9. S.L.F. No. 3 same price. We always stock all ORMOND PARTS.

ALL STANDARD COMPONENTS, wholesale and retail.

SQUIRE CRADLES

P.77. The Squire Universal model complete with latest type vellum cone and cradle, suitable for taking Blue Spot, Triotron and other units. 2½ in. deep 18/6

No. 97. For general use (9½ in. cone), standard fitting for Blue Spot, Triotron units, complete with latest vellum cone, 15/-.

Baffle board, 12 in. fitted.

DR. NESPER TRICKLE CHARGER

200/240 v. for 2 or 4 volts **29/6**

TALISMAN PORTABLE

A.W. 11-5-29

LIST OF COMPONENTS

2 Ormond Log Midget	16/-
.0002 Variable	5/6
4 Lotus V. Holders, 1/3	5/-
2 Screens, pair	6/-
Dual Range Coil (W.W.)	7/6
15-ohm Rheostat	2/-
Dubilier, 2 mfd.	3/6
2 do., 1 mfd.	5/-
T.C.C. .0003 S/P	2/4
McMichael H.F. Choke	4/6
30,000-ohm Anode & Holder	3/6
2 Igranic "J" L.F. (17/6)	35/-
2 H.F. Stoppers, 5/6	11/-
"Grawor" L.S. Unit (as specified)	16/6
Tuning Chart	2/-

Valves—S.G., 22/6; H.F., 10/6; L.F., 10/6; S.P., 15/-. Please add Carriage (over 15 Free U.K.).

IF YOUR ORDER for TALISMAN PARTS EXCEEDS £3

for 2/- extra

YOU CAN BUY

All necessary Plugs, Spades, Screws, 100 ft. Frame Aerial Wire, Switch, L.T. do., Terminals, Connecting Wire, Ebonite Panel (14x6, drilled) (Any other size at extra charge). 2 Slow-motion Dials, Red and Black Flex, 32 d.s.c. Copper Wire, 2 Grid Bias, 9 volt, Plug and Socket

A.W. SPECIAL COUPON (80)

FOR EVERY 30/- you spend retail

YOU CAN buy ONE of the following for

3d. each extra (on this Coupon)

H.F. Choke, Silk Loud-speaker Cord, 9-volt Grid Bias, Pair Panel Brackets, .0001 Reaction, 2 mfd. Mansbridge, 100 ft. Insulated Aerial, 4- or 5-way Battery Leads, 30 ft. Coloured Connecting Wire, S.M. Dial, 12 yds. Lead-in, Fuse and Holder, 12 Nickel Terminals, 60X Coil, Permanent Detector, Battery Switch, .0003 and 2-meg. Leak, 6-pin Coil Base, 12 yds. Twin Flex, 100 ft. Indoor Aerial, .0005 Variable, Set of 12 Plugs and Sockets (red or black), Set of 3 Coil Plugs with Terminals, Wave Change Switch, .01 Fixed Condenser, 1 mfd.

R.E.P.T.A. Members allowed discount, except where already reduced.

MORE RADIOGRAMS

In the desire for nothing less than the "real thing" in its atmosphere, the Glasgow station has arranged for a programme entitled "Sea Ways" to be presented by an ex-naval officer, who has also had considerable experience in producing shows on board ship.

Sir James Barrie has given his consent for the broadcast of *The Old Lady Shows Her Medals* by the Ardrossan and Saltcoats Players from the 5SC studio as a special play broadcast to schools. This item is regarded as the most interesting and attractive to have been put on solely for the benefit of schools listeners since the introduction of separate broadcasts for Scottish schools.

About one call a day was made to Europe on the transatlantic phone from Washington last year. Some calls originated at the State Department, but a good percentage was put in by Embassies and Legations.

A new £9,000 transmitting plant is being erected for WGR at Amherst, New York. The installation is expected to be ready for operation in June.

The Belmont Dramatic Society, one of Aberdeen's most successful amateur dramatic organisations, has come under the lure of the microphone and is to broadcast a J. J. Bell comedy from 2BD. This and similar broadcasts provide interesting opportunities for comparing the work of outside dramatic organisations before the "mike" with that of the Radio Players, who are accustomed to studio conditions.

The Dayton Westminster Choir, heard so frequently in the United States, has dropped the "Westminster" in its present tour of England. It is known here as the Dayton Choir of the United States.

Our Information Bureau.—We regret that pressure upon our space has compelled us to hold over this week a selection of readers' queries published under the above heading.

"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

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.

In view of the increased power of the two Barcelona (Spain) broadcasting stations, namely, EAJ1 and EAJ13, the studios have decided not to transmit simultaneously, in order that Spanish listeners may be given a better service. Radio Barcelona will work from 1.30 to 2.45, from 5.30 to 6.30, and from 9 to 11.30 p.m. daily, whilst Radio Catalana (EAJ13) will only be on the air from 6.30 to 9.30 p.m. B.S.T.

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