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Practical Wireless

3D.

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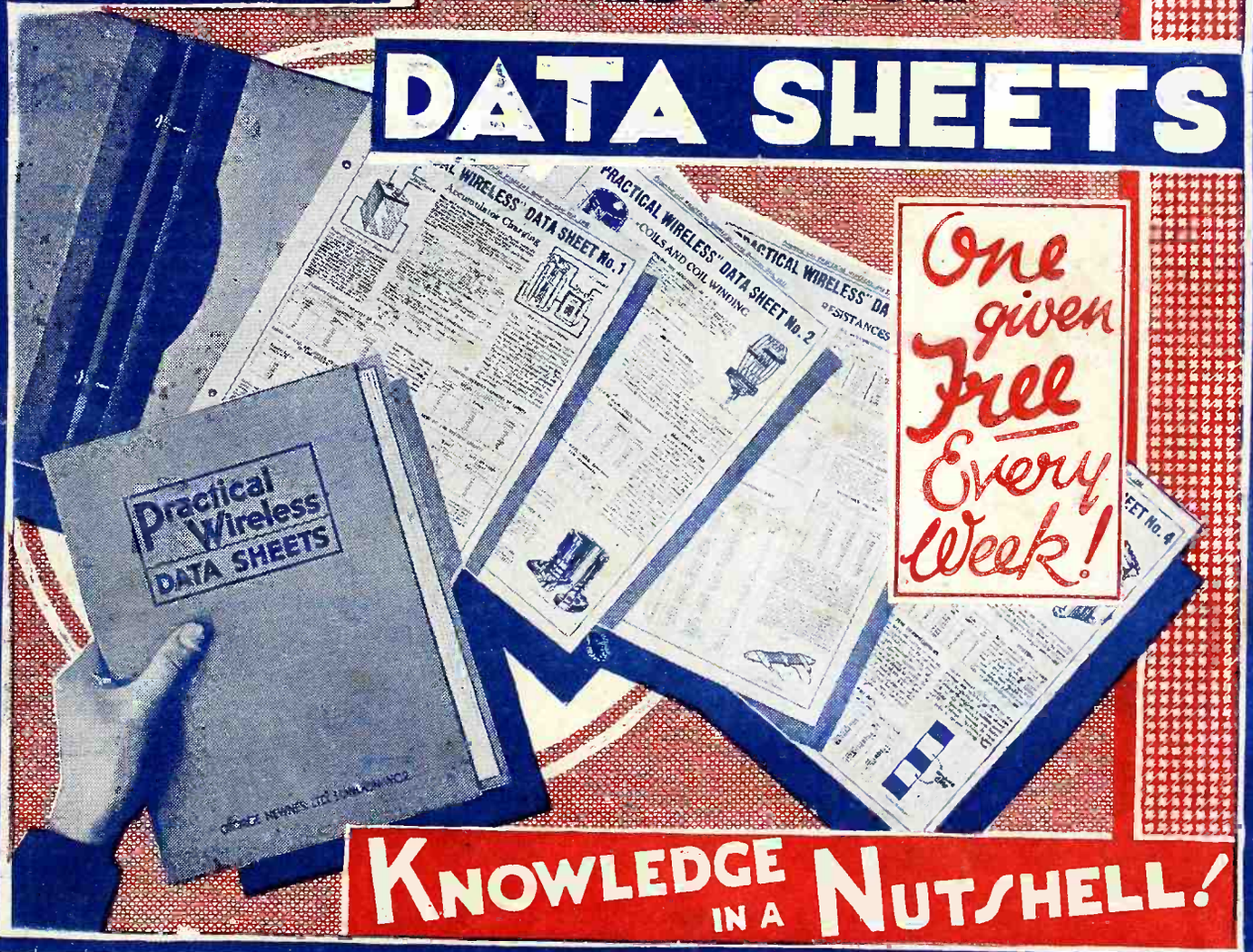

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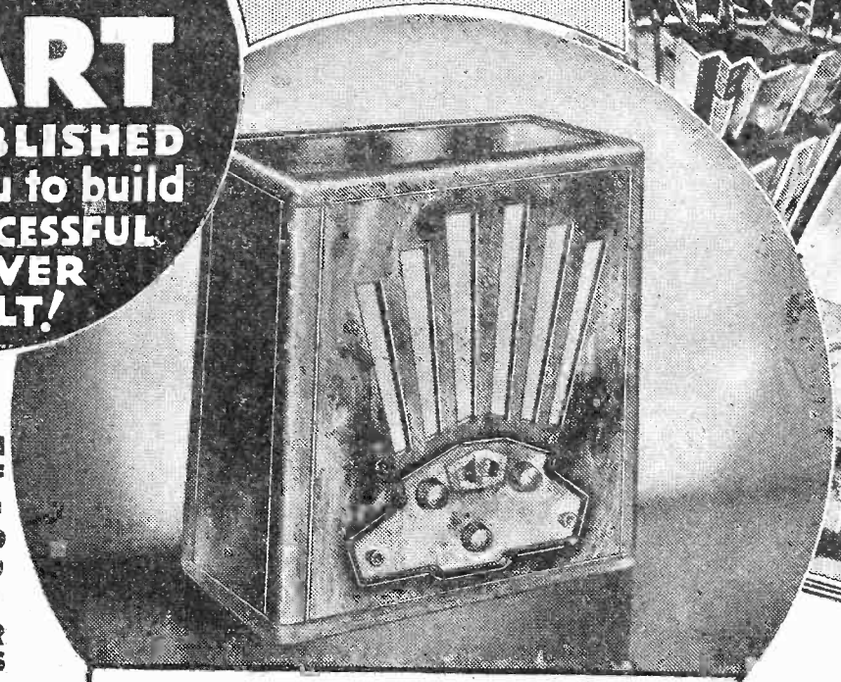

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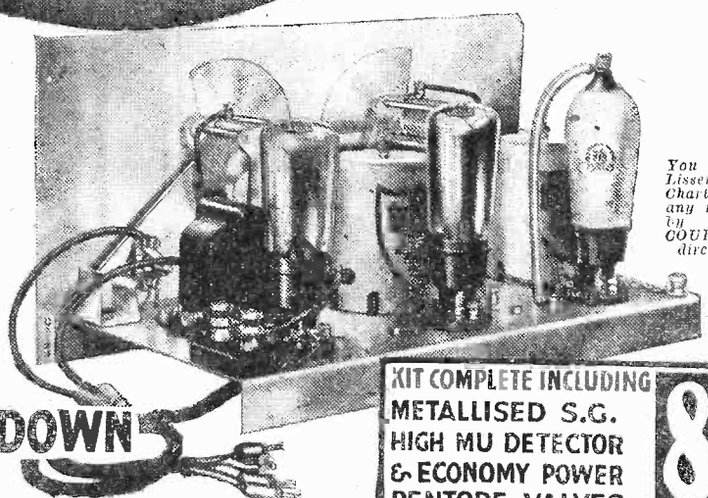

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Are You Collecting Our DATA SHEETS? See pages 692 & 693

ROUND *the* WORLD *of* WIRELESS

Listen to New York at Lunch Time

WITH even a modest short-wave receiver it is now possible to hear at 1.0 p.m. daily W3XAL, Bound Brook, N.J., on 16.878 m. (17,780 kc/s), as this station comes on the air at 8.0 a.m. Eastern Standard Time. With a cheery "Good morning, ladies and gentlemen," the announcer takes you over to the New York studios for light music or short sketches. At the end of each broadcast, the call of the National Broadcasting Company of America is given, preceded by three notes (on oscillating valves) generally adopted as an interval signal.

International Christmas Peace Programme

THE UNION INTERNATIONALE DE RADIODIFFUSION at Geneva is endeavouring to arrange a special international broadcast during the Christmas Holidays. Steps are to be taken to induce all European stations to transmit this Christmas Peace programme.

Austria Broadcasts on Short Waves

UOR2, the Vienna experimental transmitter on 49.4 metres (6,072 kilocycles) may now be heard working every Tuesday and Thursday from 1.30-6.0 p.m. and again from 7.0-9.0 p.m. G.M.T. when it relays the Vienna programmes.

The B.B.C. Nigger Minstrels

BROADCASTING HOUSE proposes to revive the Nigger Minstrel entertainment by organising a troupe of its own, the Kentucky Minstrels, and the first transmission will be heard by Regional listeners on January 6th. Such a combination will form a good background for the introduction of popular negro spiritual songs and short sketches. The company will include the traditional Bones, Cornermen, Stump Orators, etc.

A Batch of Plays

AMONGST a number of works to be broadcast during December and January the B.B.C. has selected *The Forest* (John Galsworthy); *The Green Goddess* (William Archer); Flecker's *Hassan* and Sheridan's *The School for Scandal*. A new microphone version of Charlotte Brontë's best-known work, *Jane Eyre*, will be given on January 2nd.

Have You Heard Porto Rico?

IN addition to a number of American transmissions heard after midnight, listeners now report good reception of WKAQ, San Juan, Porto Rico, on 236.1 m. (1,270 kilocycles) between 2.0 and 3.0 a.m. G.M.T. All announcements are made in English and Spanish.

New Hungarian Relay Station

ACCORDING to a report the Nyirehaza 6-kilowatt relay station has started its tests on 261 metres; in common with Magyarovar (210 m.) it re-broadcasts the Budapest programmes.

To Facilitate the Identification of Stations

COMPLAINTS have been received by the U.I.R. at Geneva, that European transmitters do not give out their calls sufficiently often, and a request has been made to the studios to broadcast the name of the station at the beginning and at the end of all transmissions, and whenever opportunity occurs in the course of the programme. The method adopted by the U.S.A. stations of calling at regular intervals is a good one.

The Result of the Madrid Conference

ALTHOUGH the International Conference at Madrid is almost at an end, it is expected that the broadcasting world will reap but little advantage from the decisions taken by the delegates. At the utmost some six or seven channels may be added to the band allocated to telephony transmitters. No alterations are likely to take place before the next meeting of the International Union of Broadcasters at Prague in 1933.

Held Over

OWING to great pressure on space, we have been compelled to hold over the continuation of Mr. Barton Chapple's second article on "Thinking in Terms of Frequency."

NEXT WEEK'S DATA SHEET
will be entitled
"RESISTANCES"

ROUND *the* WORLD *of* WIRELESS *(Continued)*

The Christmas Radio Pantomime

THE most suitable period of the evening, 8 o'clock, has been chosen for the broadcast of Ernest Longstaffe's pantomime, *Jack and the Beanstalk*, on December 26th (National) and December 27th (Regional). The cast includes Leonard Henry who, we are told, will not impersonate the beanstalk!

A Play Without Words

WORKING DAY is the title of one of the shortest plays on record; it will run for less than fifteen minutes, and will consist of sound effects only. The novel programme has been specially written for the microphone by Dallas Bower, the well-known film personality. Without words he will endeavour to give an impression of the passing hours.

Call of the North Italian Stations

WHEN a simultaneous broadcast is carried out by Milan, Turin, Trieste, and Genoa, you will not necessarily hear any of these names mentioned. The interval signal used will be that of Turin, the trill of the nightingale, and the call put out by the woman announcer: *Eh Yah* (E.I.A.R.) *Radio All'Italia* (Upper Italy).

The Father of 5,000 Children

PAPA STEFANE is the pet-name given to the director of the Katowice (Poland) station, Dr. Tyminiecki, who some four years ago founded the International Radio Club, calling itself the Katowicards. Every Wednesday and Friday, from 10.0 p.m. G.M.T., Papa Stefane replies to letters received from his unseen children, some five thousand members of this vast association. The languages used in these broadcasts are French, English, Italian, German, and any other which may be found necessary.

These Tri-lingual Difficulties

SIMILARLY to Switzerland, Belgium in its population has subjects using three different languages—namely, French, Flemish and, since the Great War, German. For this reason the two Velthem Louvain transmitters which broadcast the Brussels programmes respectively transmit in French and Flemish. To cover the country efficiently, however, and to satisfy all classes of the community, it is now proposed to erect a smaller station in the east of Belgium to broadcast German entertainments.

More Than the Usual Excerpt

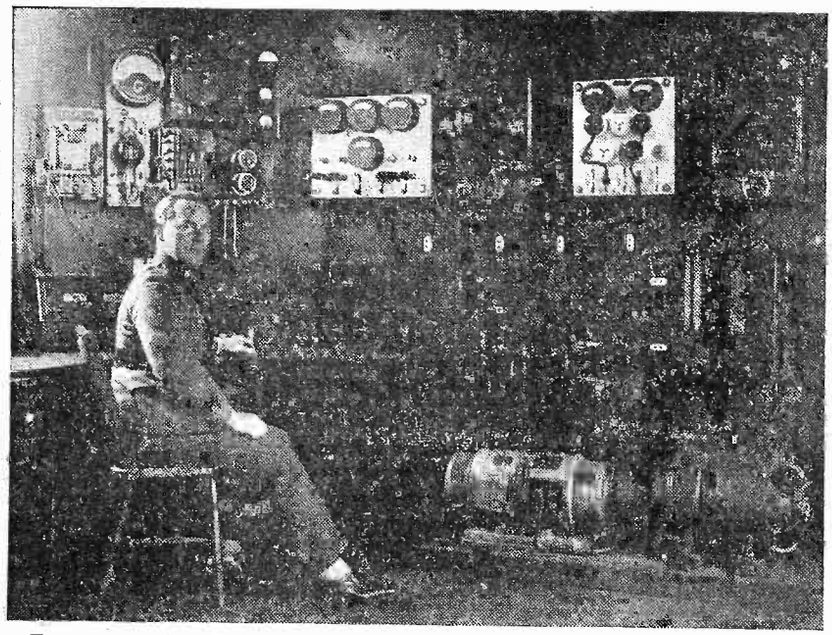
FOR the first time in the history of British broadcasting listeners are to hear, on December 24th, the relay of an entire Gilbert and Sullivan opera, namely *The Yeomen of the Guard*, as performed at the Savoy Theatre. It will be transmitted by the National stations.

INTERESTING and TOPICAL PARAGRAPHS

A Genuine Russian Cabaret

LA CHAUVE SOURIS (The Bat Theatre of Moscow), consisting of twelve artists, is back in London from a world tour. Arrangements have been concluded to broadcast a performance through the Regional wavelength on December 24th. The entertainment includes Russian and Tzigane folk songs as well as a number of original sketches.

TELEPHONE TALKS TO AEROPLANE



Two-way communication, both by telephone and telegraph wireless, during tests at the BALDONNELL AERODROME, was established with perfect results.

Clearing Up a Puzzle

WIRELESS listeners have been somewhat mystified by the result of a prosecution in which a fine was imposed by a magistrate on a man who was using two radio receivers at the same address. As stated by the daily Press the facts of the case were not made perfectly clear to the public, as the wireless sets in the house were owned by two different people, and one licence only had been taken out. The listening licence issued by the Postmaster-General covers the installation of a receiving station, *i.e.*, the operation of a wireless receiver. Such a licence permits the use, if desired, of a separate set for the domestic staff, and the holder of the licence may also possess a portable set. The use of the receivers is also granted to members of the licensee's family. In the case, of course, of an apartment house or of a house sub-let into flats, a separate licence is required by each tenant.

The Danish Interval Signal

BETWEEN items in the Copenhagen programme, you may hear a special musical signal which consists of a phrase taken from a Danish folk song dating back to the early fourteenth century. It is reproduced by an instrument resembling an electrical musical box, and has been adopted as the Copenhagen signature tune.

SOLVE THIS!

Problem No. 14

Johnson's wireless set was installed in the dining-room, as this faced the garden and permitted of easy connection to the aerial. However, for the Christmas holidays he decided that the set would be more convenient in the drawing-room in the front of the house, and accordingly carried out the following arrangement. The set was taken into the new room and a length of ordinary twin flex was run round the picture rail from one room to the other. The aerial and earth leads were joined to the ends of the flex in the dining-room and the opposite ends were joined to the receiver. Johnson could not get any signals from this arrangement. Why? Three books will be awarded for the first three correct solutions opened. Mark envelopes Problem No. 14, and send to the Editor, PRACTICAL WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2, to reach us not later than December 26.

SOLUTION TO PROBLEM No. 13

A short-wave converter will only work with a receiver employing H.F. stages, as it converts the existing receiver into a super-heterodyne set. Jenkins' receiver did not employ H.F. stages, and he should therefore have obtained an adaptor instead of a converter.

The following three readers received books in connection with Problem No. 12:—

Mr. F. Speight, 1000, Manchester Road, Bradford, Yorks; Mr. G. W. Darby, 12, Wood Lane, Hemel Hempstead, Herts; Mr. M. A. Price, 37, Malmesbury Road, Morden, Surrey.

German Night Listeners

GERMANY is the country for statistics, and during the past year considerable investigation has been carried out by the authorities in matters relating to the broadcasting stations. According to a recent census, ninety per cent. of German listeners use their wireless receivers between 7.30 and 11.30 p.m., and fifty per cent. are still searching the ether for programmes at 2.0 a.m.; one hour later some twenty per cent. are still up. The early morning broadcasts of physical exercises at 5.15 and 5.45 a.m., and the concert which follows them are enjoyed by sixty-five per cent. of the total number of licence-holders!

Tired of Politics

FOR some few weeks as a special feature the Madrid (EAJ7) studio relayed, for the benefit of its listeners, debates at the Cortes or Spanish Parliament; later, speeches from the sittings of the Municipal Council were also transmitted. Following a series of noisy meetings, in which the speeches of Cabinet Ministers were shouted down, the Government has withdrawn from the studio the permission to broadcast the Cortes at work—much to the satisfaction of listeners who are asking for less exciting and more peaceful musical entertainments.—JACE.

Simple Points Concerning Detection and Amplification

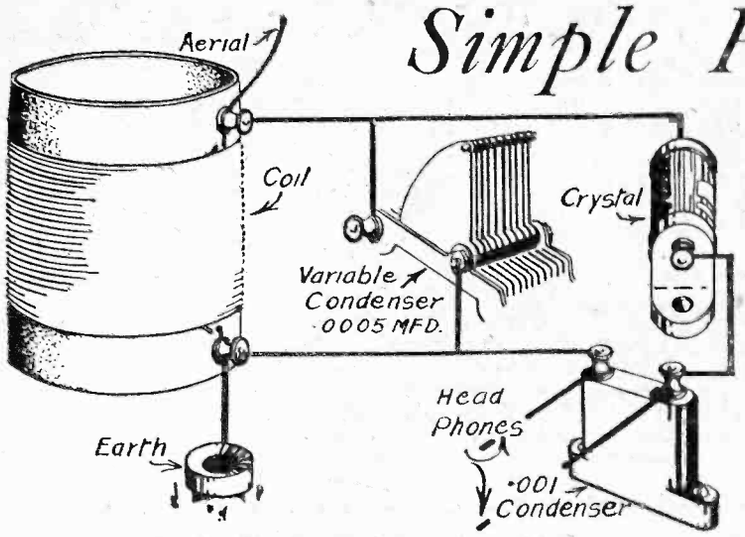


Fig. 1.—Simple crystal set in pictorial form.

An Interesting Article on Simple Points Concerning Crystal Detectors Compared with Valve Detectors. Amplification Before and After Detection, etc.

By GILBERT E. TWINING

WIRELESS waves which are transmitted from a broadcasting station radiate in all directions at the speed of light, that is to say 186,000 miles per second. They are made up of the carrier wave, high-frequency currents of some 1,000,000 cycles per second, and microphone currents, low-frequency of speech and music; these lower frequencies are modulated or mixed into the carrier wave at the transmitting station.

Detection

The detector's work in a set is to separate the low-frequencies of sound from the high-frequencies of the carrier wave. Now a wireless wave keeps changing its direction, becoming alternately positive and negative. The effect of every surge of current in one direction is instantly obliterated by the following surge in the opposite direction; therefore, before the current can be utilised it must be rectified, which means that one half of the oscillating current, together with the high-frequency current of the carrier wave, must be eliminated, and this is rendered possible by either a valve or a crystal detector.

The Crystal Set

The crystal, in the case of crystal receivers, does the work of getting rid of the unwanted half of the modulated carrier wave and leaves a series of high-frequency pulsations varying in amplitude. The crystal does not eliminate the high-frequency currents, however, as does the valve detector, but passes them on to the headphones, which have a very high resistance caused by the great number of turns of fine wire with which the electro-magnet coils are wound, for this is done to obtain as much inductance as possible. As the high inductance of the 'phones offers a considerable impedance, the high-frequency rectified current is caused to be by-passed, that is to say, an easier course is offered through either a small fixed condenser of .001 capacity or the leads of the headphones are utilised, if they have sufficient capacity, to by-pass the high-frequency current to earth. In Fig. 2 is shown a diagram for a simple crystal set, and in Fig. 1 the same circuit in pictorial form. The great disadvantage of the crystal is that it cannot amplify. It will not hand out more power than it receives from the aerial; it is for this reason that the valve is so popular, for not only is it far more sensitive to the incoming signals than a crystal detector, but its magnifying powers are simply enormous, deriving its extra power or energy, as is well known, from batteries.

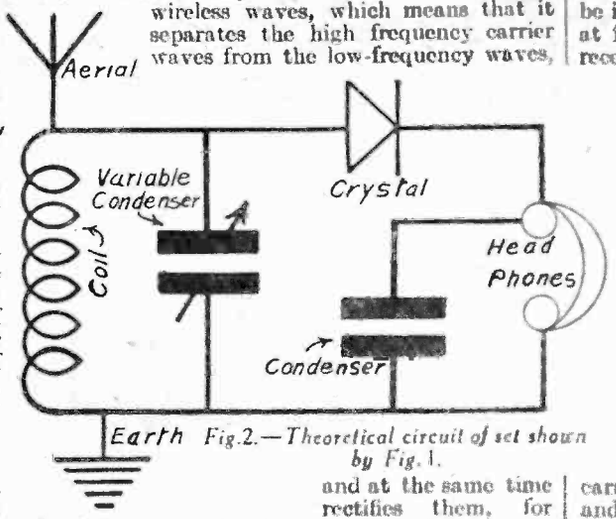


Fig. 2.—Theoretical circuit of set shown by Fig. 1.

The Valve as Detector

The detector valve, as mentioned before, has the ability to demodulate the incoming wireless waves, which means that it separates the high frequency carrier waves from the low-frequency waves, and at the same time rectifies them, for the valve only allows current to flow through it in one direction. The valve will give much stronger signals than the crystal detector on account of the batteries employed, but by altering the circuit slightly it is possible to get a still further increase in signal strength.

Reaction

Reaction is the means whereby the incoming signals may be strengthened, and stations received which would otherwise be unheard. The reaction takes the form of a coil coupled to the aerial winding, enabling it to feed back some of the energy of the plate circuit into the grid circuit again, and this has the effect of greatly increasing sensitivity. The nearer the reaction coil is brought to the aerial inductance, or alternatively, the more turns of wire there are on the coil the more energy will be fed back and therefore stronger will be the results. There is, however, a limit to the amount that can be fed back, for if too many turns are made, the set will be in continual oscillation and not working at its best, besides interfering with other receiving sets in the neighbourhood. If more amplification is needed, then the only way is to add another valve.

Amplification

The wireless waves picked up by an aerial are not strong enough after detection alone to actuate a loud-speaker, therefore, amplification has to be undertaken. Two methods of amplifying are resorted to at the present time; these are high-frequency before detection and low-frequency which comes after detection.

Amplification Before Detection

It has been explained at the commencement that the signals which are tuned in by the aerial system are high-frequency oscillations, being the carrier wave with its waves of speech and music modulated into it. Now this can be amplified—made stronger—by the H.F. side of the set before detection, that is to say a valve can be incorporated to amplify the signals, but not change them in any way whatsoever before the detector has demodulated them. This will mean another tuned circuit for improving the selectivity of the set and, as most people are aware, in a modern three-valve set this is the section taken up

(Continued at foot of page 678.)

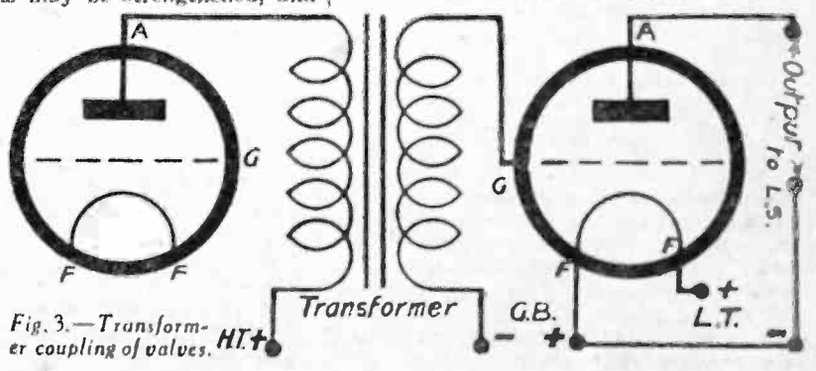


Fig. 3.—Transformer coupling of valves.

Simple Experimental Makeshifts—2

Described by FRANK PRESTON, F.R.A.

Temporary Measures to Try Out Before Fitting New Components; and Other Useful Hints.

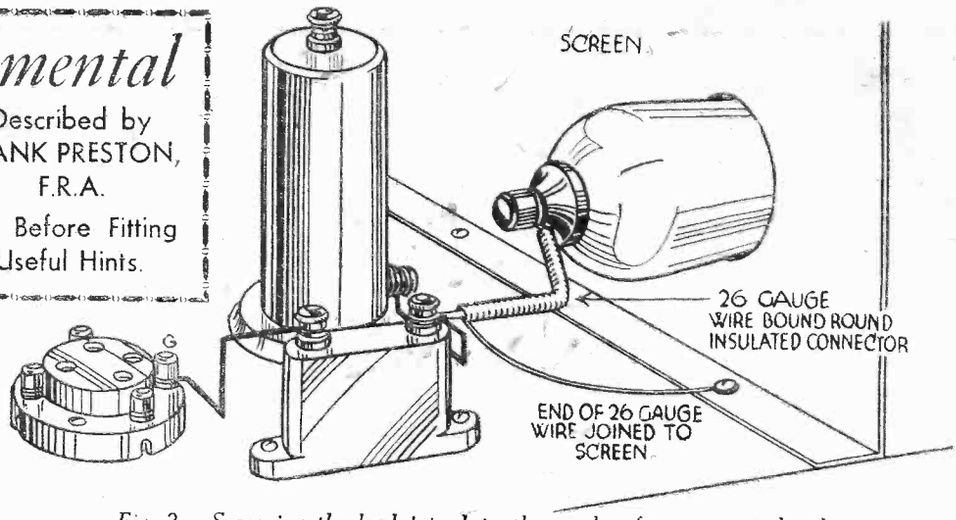


Fig. 2.—Screening the lead joined to the anode of a screen grid valve.

Station Calibration

A good number of commercial sets on the market have their tuning dials marked off to show the names of stations instead of degrees of revolution. The station-calibrated set is very convenient for family use, and an ordinary receiver can be converted quite easily by gluing a paper scale on top of the ordinary condenser dial. If the condensers are of the type with a revolving dial, an annular piece of paper should be cut to the shape shown in Fig. 1 (a) and glued to the edge of the dial. With a condenser having a celluloid disc dial, a circular piece of paper can be glued over the figured scale. In either case the set is calibrated by tuning in the various stations and marking them on the new scale as shown in Fig. 1 (a). If the names are put on in small letters there might be sufficient space to add a few details in regard to the times of transmissions, etc., of some of the foreign stations.

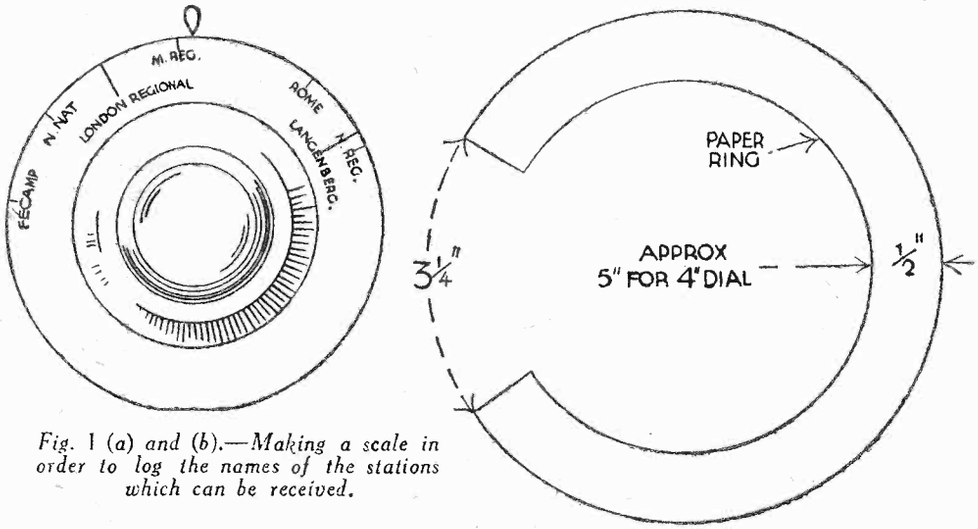


Fig. 1 (a) and (b).—Making a scale in order to log the names of the stations which can be received.

Home-made Wander Plugs

It sometimes happens that a few extra wander plugs are required when trying out a new set, or it might even be found that standard plugs do not make proper contact with the sockets of a particular high-tension battery.

In either case quite good and useful plugs can be made from split pins of the kind used for locking nuts, etc. If the bared end of the flex is bound tightly round the loop and the contact covered with insulation tape, quite a good job will result.

"Feeling" Voltage

Can you verify the presence of H.T. voltage in various parts of a set without the use of a meter? It is quite easy to do so after a little practice. Try it in this way. Moisten the tip of the second finger of each hand, hold one finger on the negative H.T. battery socket and touch the 30 volt socket with the other. You might or might not feel a little "tingle" run up the fingers. In any case, try going to higher voltages up to about 100. If you cannot feel anything at a 100 volts, try wetting the fingers a little more or go through the same process with the little fingers. If you get too much of a "kick" at full voltages, try the test with the fingers dry. You will soon be able to recognise the presence of a voltage, and this will be found very useful in ascertaining whether the H.T. supply is reaching the speaker, valve holders, etc. The method is to hold one finger on the H.T. negative terminal, and with the other touch the anode terminal of the valve holder or the loud-speaker terminal. Any normal person can apply these tests with perfect safety so long as the high tension voltage does not exceed 100 or so—most people can go to much higher voltages if the fingers are kept dry.

Screened Wire

In a set where most of the components are screened it is often advantageous to screen some of the wires; in particular, that from the anode terminal of the S.G. valve and the one connecting the anode of the detector valve to the reaction condenser. Screened wire *can* be obtained, but only in comparatively long lengths, so as only a small amount is required it might not be considered worth while to buy a quantity. Ordinary insulated connecting wire, or even flex, can be screened very efficiently by winding a length of copper wire, about 26's gauge, round it in the manner shown in Fig. 2. Of course, the wire used for screening must be connected to earth or H.T. —; this can generally be done most conveniently by joining it to a nearby screen.

SIMPLE POINTS CONCERNING DETECTION AND AMPLIFICATION

(*Continued from page 677.*)

by the screened-grid valve. To explain it as simply as possible, the reason for amplification before detection is accounted for by the fact that the voltages picked up by the aerial, and fed to the detector, are too weak to actuate the valve efficiently.

L.F. Amplification After Detection

When the Detector Valve has dispersed the carrier waves, all that should be left are the necessary waves of sound which originate from the broadcasting studio of the station to which the set is tuned. These are passed on as complete signals through the necessary components to a power-valve which is the low-frequency amplification side of the set actuating the loud-speaker.

The output from the detector valve is not connected directly to the input of the L.F. valve, for the simple reason that the anode current of the detector circuit through the valve would be applied to the grid of the amplifying valve, which obviously would be wrong. It is necessary to connect between the two circuits a L.F. transformer, see Fig. 3. This will only allow the low-frequency signals to flow from the detector through the primary windings to the secondary windings of the transformer. The transformer not only separates the anode current from the preceding valve, dividing the circuits, but it also amplifies the low-frequency signals which are applied to its primary windings. When the secondary windings on a transformer have more turns of wire than the primary, an increase in the signal voltage at the output or secondary windings is obtained. It will be understood that by altering the number of turns on the secondary in relation to the primary, the voltage, or rather the ratio of the transformer, is altered. The makers quote these ratios on the cases in terms of 3 to 1 or 5 to 1, etc., as the case may be.

PUSH-PULL AMPLIFICATION

What this Form of Amplification does, and some of its Advantages—Explained by E. G. ROWE, B.Sc. (Eng.), A.C.G.I.

PUSH-PULL is generally considered as a luxury, and as only practicable when a very large output is required, but this idea is wrong because it is often very true economy to use it. The input required to obtain lifelike reproduction from the modern loud-speaker is large and, to get this from the last stage of their equipment, experimenters used to employ high anode voltages in order to handle the large grid swings on the input side of this stage. This necessitated special and larger valves of the LS5 type.

Now push-pull amplification will handle the same grid swing using ordinary voltages and ordinary super-power valves. This is one of its advantages—it is possible to operate the loud-speaker on half the H.T. volts required when not using this system, or, to put it more technically, the push-pull amplifier doubles the permissible grid swing in the output stage, for a given H.T. voltage.

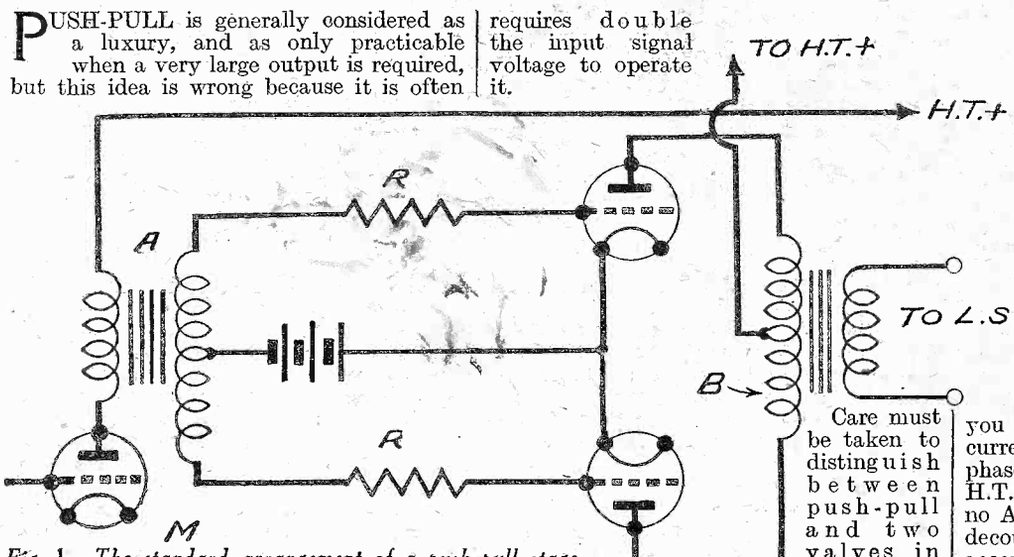


Fig. 1.—The standard arrangement of a push-pull stage.

When To Use Push-pull

Push-pull is only capable of giving greater volume when one output valve of similar size is overloaded; that is, there must be sufficient amplification in the stages before the push-pull stage to cause a grid swing too great for one output valve to handle without distortion. This is so because push-pull by its arrangement requires double the input signal voltage to operate it.

Care must be taken to distinguish between push-pull and two valves in parallel. If two valves are in parallel their filament connections are in common, and the grids and plates respectively of the two valves are joined together. Thus the A.C. resistance is halved and the plate current consumption is doubled, but the amplification and grid swing remain unaltered. Thus the parallel connection only means the sharing of the grid swing between two valves.

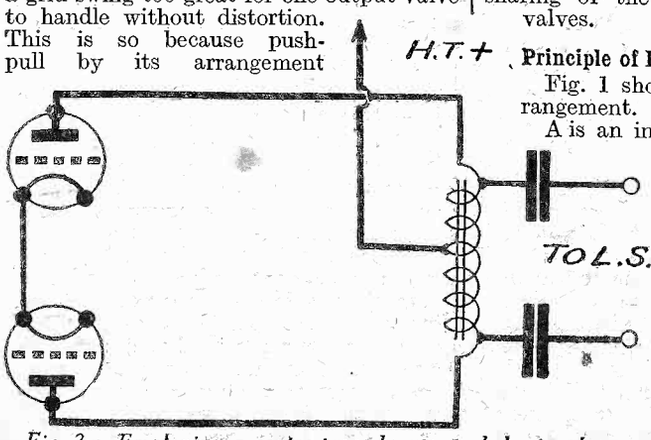


Fig. 3.—Employing a centre-tapped output choke in place of the normal output transformer.

Principle of Push-pull and Its Differences

Fig. 1 shows the usual push-pull arrangement.

A is an intervalve transformer with a centre-tapped secondary; B is an output transformer with a centre-tapped primary. One half of the total voltage from the valve M goes to the grid of each push-pull valve, but they are 180° out of phase; that is, when a signal causes the grid of one valve to swing positive the grid of the other swings negative by an equal amount. Thus, if the valves are similar the anode currents will be equal but opposite in phase, and must be recombined by means of an output transformer.

The output of two valves in parallel might, at first sight, appear to be the same as that of two valves in push-pull, but this is not so, because the limiting factor with ordinary valves, second harmonic distortion, is practically cancelled out in push-pull stages. One can expect on this account something like a 20 per cent. gain in undistorted output, but this is by no means the most important advantage in push-pull. Because of the cancelled second harmonics a better quality can be expected. Again, you will notice that the alternating currents in the two valves are opposite in phase. Therefore they balance out in the H.T. supply leads, and thus, with little or no A.C. ripple there is little feedback and decoupling may be much reduced on this account.

Hum is similarly lessened because any fluctuations in the A.C. supply affect both valves equally and as the supply to each valve is opposite in phase to the other they balance out. This makes push-pull particularly useful to those having A.C. mains receivers, and trouble from ensuing hum. The one drawback to this system is a tendency to parasitic oscillations, which can be overcome, if necessary, by putting resistances of the value of 10,000 to 100,000 ohms in the grid leads to the valves, as shown in Fig. 1. Matched valves are generally used in push-pull, and these can be kept matched indefinitely by supplying them independently with grid bias. Fig. 2 illustrates this method.

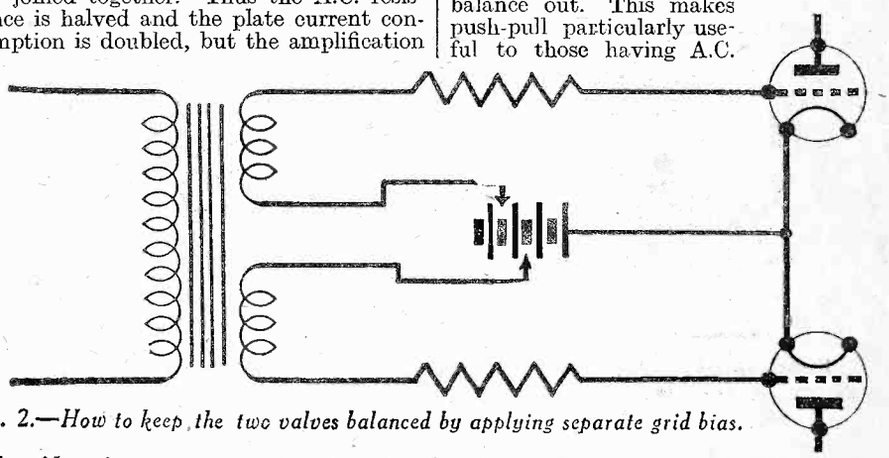


Fig. 2.—How to keep the two valves balanced by applying separate grid bias.

In the place of the tapped transformers it is possible to use two transformers in series. A tapped choke may also be used and may be connected as in Fig. 3. Thus, in conclusion, we may summarise the advantages of push-pull as—the better handling of power output with improved quality, the reduction of harmonic distortion, reduced hum and feedback with consequent simplified decoupling arrangements, and, finally, we may describe it as an excellent means of handling a big grid swing with a modest anode voltage.

Simplifying Soldering

Some Hints on the Correct Method of Soldering, and Instructions for Making a Useful Soldering Stand.

By H. BEAT HEAVYCHURCH.

I WONDER why it is that such a very large percentage of wireless amateurs and home constructors fight shy of that very simple job of soldering. How often we see a set boomed, and one of its advantages set out in bold type—"No Soldering Required." Frankly, I find it difficult to understand the attitude of a man who will point proudly to work he has undertaken with infinite care and patience and yet refuses to try his hand at the simple task of soldering. When properly carried out, the joints in a set, in my opinion, are far better when soldered than when attempting to hold two or more pieces of wire under a terminal screw. All commercial sets are soldered, and this is carried out, in the main by *girls*, so come along, you menfolk, take a little lesson in the art, commit to memory the one or two rules that ensure a satisfactory job, and never look on the task with horror again.

The remarks which follow are general in character and apply to other soldering work besides wiring up the set. Soft soldering, or sweating, as it is sometimes termed, is probably one of the commonest known methods of uniting separate metal parts. It has no equal for simplicity and is entirely satisfactory for small work. The solder used usually is an alloy of tin, lead and bismuth, all of which have a low melting point and will run freely when brought in contact with the heated copper bit or soldering iron. It is very economical when considered from the heat point of view.

Hard soldering or brazing is a method very similar in actual practice except that the medium used is usually spelter, silver solder or brass wire. These require a greater heat to run them and, therefore, a good blow-lamp or gas blow-pipe, with foot bellows, would have to be used. It would also be necessary to build a brazing pan. This is usually a shallow iron pan in which coke or broken brick is heaped or banked up, so that the work to be operated on will not lose the heat.

Fluxes Used

In both methods a flux has to be employed. The purpose of this is twofold—to prevent oxidisation, and to keep the work clean. For hard soldering, the only flux required is borax. This may be used dry, but a more convenient form is to mix with water to form a milky fluid. This will penetrate into joins or seams, providing a clean surface to the metal, and ensuring a free flow of the spelter or whatever other medium is employed.

An excellent flux for soft soldering may be prepared by mixing the following:—

Spirits of salts (killed) ..	1 part
Vaseline	½ part
Resin	2 parts

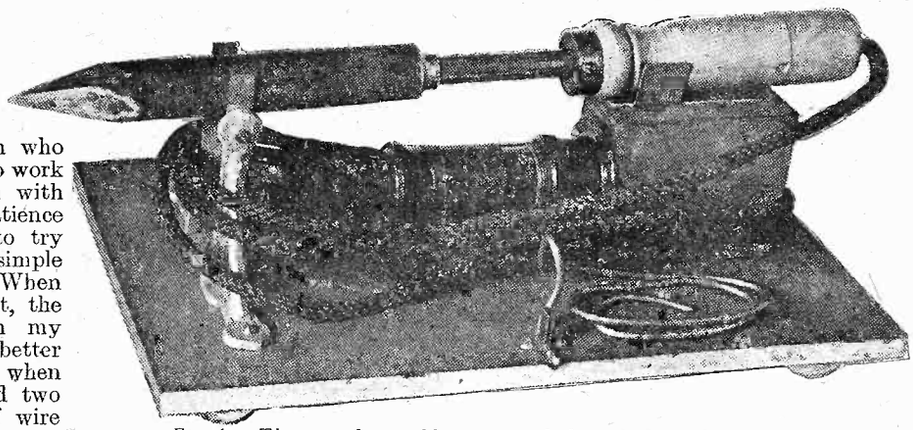


Fig. 1.—The complete soldering stand described in this article.

Killed spirits of salts may be prepared by first obtaining an earthenware bowl or jar into which a quantity of spirits should be poured. Next add clean cuttings of sheet zinc. This will immediately cause the spirit to "live" or effervesce. The operation should be done in the open air, as the fumes given off are objectionable.

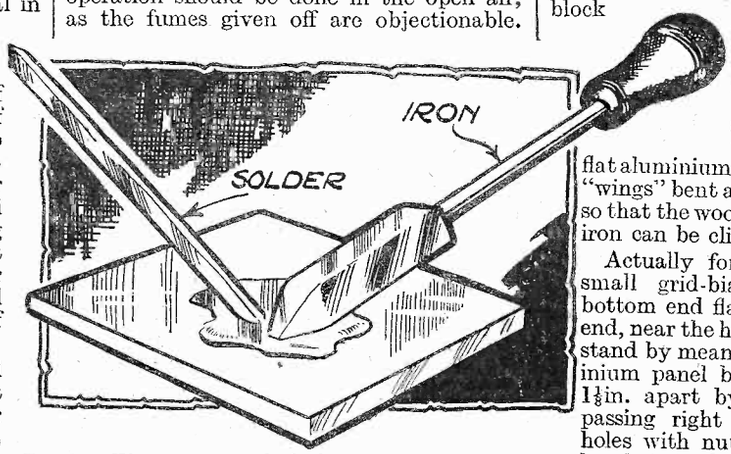


Fig. 2.—The correct method of tinning a soldering iron.

Continue to add zinc cuttings until the effervescence ceases; the spirit is now killed and should be strained off and bottled. The flux paste mixed in the proportions given will be found suitable for general purposes, but if a flux is required specially for wiring purposes, use only resin and vaseline. This is non-corrosive, an essential feature in that class of work. It will be necessary to melt the resin in order to mix with the vaseline, so first of all crush to a powder, then place in a tin and melt slowly, taking care not to overheat. It should then be poured into the vaseline and stirred. An iron suitable for small soldering work may be purchased for a few pence, and it will probably need tinning, that is, coating with solder, a very simple process.

Heating the Iron

Heat the iron until it assumes a dull red shade, *not red hot*, then quickly file over each of the tapering faces towards the tip. Follow this operation by working the iron over a piece of brass or copper which has previously been prepared with a liberal smearing of flux, at the same time bringing the stick of solder in contact with the iron (See Fig. 2). Care should be taken not to overheat the iron, as this tends to amalgamate the lead and copper, producing a very hard skin which must be filed away. Retinning is then necessary before using again.

Electric Soldering Iron

Personally I discarded the gas iron or ordinary copper bit a long time ago for one of the more modern electric soldering irons. These have very many advantages, amongst which can be mentioned the maintenance of a steady heat without the rapid cooling associated with the ordinary iron, cleanliness, saving of time when several soldered joints have to be made and the extra convenience. The accompanying illustration (Fig. 1) shows the simple stand I made up for everyday use, and in case other readers may care to follow a similar plan, let me briefly describe it. The iron shown is a standard one marketed by most good electrical stores, and it has proved a very good servant.

First of all cut out a wooden base about 12in. by 7in. by ⅝in. and fix on the centre line about 1in. from one end a wooden block 3in. by 2in. by 2½in. high as shown. This can be held in place by a pair of wood screws passing through the baseboard from the underside into the block. Screw to the top of this a piece of flat aluminium about ¾in. wide having two "wings" bent at right angles near one end so that the wooden handle of the soldering iron can be clipped into this and not fall.

Actually for this purpose I used a small grid-bias battery clip with the bottom end flattened out. At the other end, near the hot copper bit, make a little stand by means of a pair of stout aluminium panel brackets. These are held 1⅜in. apart by a 6 B.A. brass screw passing right through the top screw holes with nuts on either side of each bracket to hold the screw rigid. Incidentally include two strips of brass 1in. by ⅝in. by 1-32in.—held by the nuts against the bracket sides—as these will allow the bit to remain on the screw without any fear of it rolling off and burning the table.

Last of all, if your electric soldering iron lead does not terminate in a dual adaptor—two pin and lamp holder fitting combined—fit one on and then purchase a batten lamp holder and screw this to the inside of the wooden block. When not in use the lead can be wound round the block and brackets, as shown, and the adaptor inserted in the batten lamp holder to ensure that the lead does not get twisted or damaged. As a further addition I hold my stick of solder on the baseboard by a small clip. This is very convenient when "running" a little bead of solder on to the heated iron before

(*Continued at foot of page 688.*)

Make Your Own Smoothing Chokes

In this Article all the Data Necessary for Construction of Three Different Chokes is given

By FRANK PRESTON, F.R.A.

SINCE the recent publication of two articles dealing with the construction of mains transformers I have been extremely pleased to find that a large number of readers are interested in the making of their own mains equipment. This is indeed a welcome sign, showing as it does that the readers of PRACTICAL WIRELESS are really practical people who wish to make the very best of their hobby by getting out of the common rut so amply filled by those whose idea of wireless does not go beyond the mere mechanical assembly of component parts. After all there is no better way of learning than by doing, and I sincerely hope that all readers will cultivate that pioneering spirit which has made radio what it is to-day. But I am digressing from my point; what I ought to say is that, in view of the popularity of the two articles referred to, I feel that I can offer some details required for the construction of smoothing chokes without any apology being necessary.

Simple Construction

The construction of a smoothing choke is even simpler than that of a transformer, for, although it follows the same general lines, the choke only requires a single winding.

Inductance and Current

Before making a smoothing choke we must decide just what kind of an instrument is required. The first consideration is the inductance needed, and in nearly every case a choke of about 30 henries will give all the smoothing that is necessary. Next in order of importance is the current that the choke must carry; this depends entirely on the output of the rectifier and high-tension current consumption of the set. The larger this current, the larger must the choke be to cope with it, because, as you are probably aware, if a heavy current is passed through a small choke the inductance of the latter is reduced and there is a danger of its core becoming saturated. In addition, heavier gauge windings are required to carry a larger amount of current.

D.C. Resistance

Lastly we must take into account the permissible voltage drop across the choke windings. For example, if the output from the rectifier (or the voltage from the D.C. supply) is only 230 volts and the voltage required by the set is 200, only 30 volts can be spared. If the choke had a high D.C. resistance it would "drop" considerably more than 30 volts, and in consequence the voltage actually applied to the set would be less than it should be.

Practical Data

The calculations employed in finding the volume of iron core, number of turns, and gauge of wire required to produce a choke of given inductance when carrying a specified current are somewhat involved, and thus instead of presenting the numerous formulæ I have prepared the table given on next page in the hope that this will be much more useful.

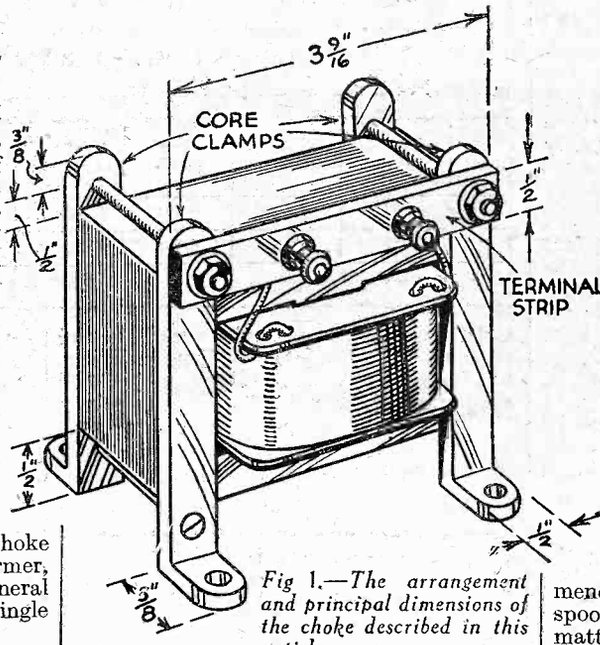


Fig 1.—The arrangement and principal dimensions of the choke described in this article.

The table gives all the necessary data for the construction of three different smoothing chokes, each of which is suitable for a particular value of high-tension current. It should be explained that each choke has an inductance of approximately 30 henries when carrying the maximum current specified. The inductance in every case would be correspondingly higher if the current were reduced below the maximum figure, and any choke can be used with complete satisfaction on currents below the maximum, but, even though an ample factor of safety has been allowed, the current should never be allowed to exceed the figure stated.

From what has been said it will be clear that the choice of chokes 1, 2 or 3 will now depend not only upon the current-carrying capacity but also upon the permissible resistance. For example, suppose a choke were required for an eliminator working from 220 volts D.C. mains and that the set consumed 30 milliamps at 200 volts. So far as current is concerned, choke 1 would be satisfactory, but by applying Ohm's Law (voltage drop equals current multiplied by resistance) we find that this choke will drop 30/1,000 x 1,100, or just over 30 volts, and so the voltage applied to the set would be only 190. In most cases the 10 volts deficiency would be of no account, but if it was it would be necessary to choose choke 2, which would cause a smaller voltage drop due to its lower D.C. resistance.

Making the Choke

Having decided on the choke required, the construction can be commenced. First we must make a winding spool like that shown in Fig. 2. No matter which of the three chokes is to be made the fibre end cheeks will be the same size, because each core has a cross section of 15-16in. by 1 1/16in. The length of the spool, however, will vary with the core size, so the appropriate lengths are given in the table. The method of making the spool was described on page 229 of PRACTICAL WIRELESS No. 5, so there is no need to repeat that information here. In this case only two fibre end cheeks are required, and they should be of the size shown in Fig. 2. See that the cheeks are a good fit on the square tube, and that the whole spool is quite rigid.

The Winding

Next obtain the necessary wire, of which the gauge and weight are given in the table. Solder a 12in. length of flex to the end of the wire, and cover the joint with a small strip of insulation tape. Anchor the end of the flex by passing it through the two holes in the end cheek, leaving about 2ins. projecting from the spool for making subsequent terminal connections. Take the flex round the spool, and then continue to wind on the thinner wire. There is no need to count the turns, because the exact number is not critical, and if you use the weight of wire stated no difficulty can occur. Keep the turns as even as possible, and after putting on half the total number cover with empire tape or oiled silk. Let this come well up against the end cheeks, so that there will be no danger of subsequent turns slipping past it. When the total number of

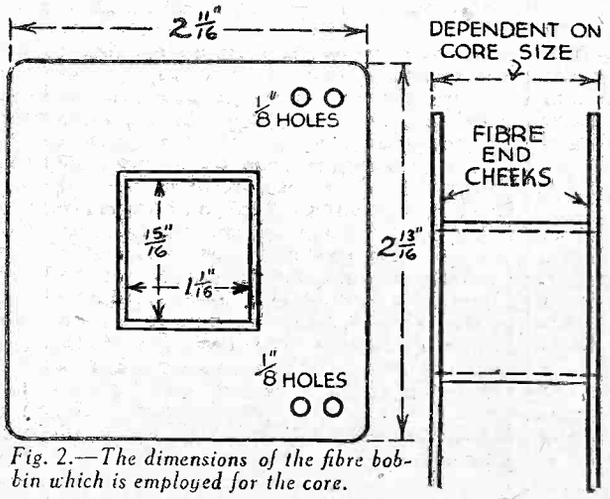


Fig. 2.—The dimensions of the fibre bobbin which is employed for the core.

turns have been wound solder another 12in. length of flex to the end of the winding. Take this once round the spool and anchor it by passing it through the other pair of holes in the end cheek. Finally, cover the whole winding with empire tape and apply a coat of varnish shellac.

The Core

The next part of the work is to assemble the core stampings. They are inserted into the spool from alternate sides, putting in a "T" and a "U" from one side and then a "T" and "U" from the opposite side. So that each stamping is insulated from its neighbours the insulated (white) sides of all stampings should face in the same direction. The specified number of stampings will just fit into the spool, and to make them quite tight the last few might have to be lightly tapped into position.

Core Clamps

The core must now be fitted with four mild steel clamps like those shown in the sketch of Fig. 1. These are made from lengths of ½in. by ⅛in. metal, and are attached by means of four 3-16in. by 1¾in. bolts. The actual lengths of the clamps will depend upon the choke being made, but those dimensions given in Fig. 1 will enable you to determine the lengths applicable to your own case.

A terminal strip of ebonite is fitted underneath the heads of the two top clamping bolts, as shown, and the two flexible leads are finally soldered to the terminals.

The Cost

As some readers will wish to have an idea of the price of the materials used the following figures are given:—

	s.	d.
6 doz. No. 30A Stalloy stampings ..	2	11
6 doz. No. 30 Stalloy stampings ..	3	0
6 doz. No. 4A Stalloy stampings ..	3	6
8ozs. 38 s.w.g. Enamelled Wire ..	1	10
12ozs. 36 s.w.g. Enamelled Wire ..	2	6
1lb. 2ozs. 34 s.w.g. Enamelled Wire..	3	3

The cost of the iron clamps, bolts, terminal strip, terminals and sundries will depend upon facilities available for their purchase, but in any case one and sixpence will easily cover them. From this it will be seen that the prices of the chokes will vary from about six shillings for the smallest to about eight shillings for the largest.

Using Ready-made Parts

If there are any readers who do not possess the few tools required for making the chokes described, or who cannot spare very much time, they will be pleased to know that suitable winding spools, core clamps and terminal strips can be obtained ready-made. These are supplied by the Lumen Electricity Company, 9, Scarisbrick Avenue, Litherland, Liverpool, who also specialise in Stalloy stampings and instrument wires. The spools are made in bakelite, and one Size No. 4 spool just fits the size 30A stampings. Two size No. 30 spools will be required for size 30 stampings and two size No. 4 spools for the size 4A stampings. When two spools are used, half the required amount of wire should be put in each and the two windings connected in series, taking care that the turns in each case go in the same direction. As the spools will only take five dozen pairs of stampings, the numbers of turns (and hence weights of wire) given in the table should be increased by about 20 per cent. to maintain the same inductance.

	Size of Core Stampings	Length of Spool	No. of turns.	Gauge of Enamelled Wire.	Weight of Wire.	Approx. Inductance.	Max. Current.	Approx. D.C. Resistance.
1	30A	13-16in.	8,000	38 s.w.g.	8ozs.	30 henries	30 m.a.	1,100 ohms
2	30	1¼in.	8,000	36 s.w.g.	12ozs.	30 henries	50 m.a.	720 ohms
3	4A	1½in.	8,000	34 s.w.g.	1lb. 2ozs.	30 henries	100 m.a.	500 ohms

Christmas is Here!

HERE we are with Christmas on the top of us and, no doubt, like myself, you are wondering what good things Christmas will bring forth. If you are seriously interested in radio, don't feel yourself too old for the stocking trick, try a pillow-case: the former will not hold a new set or component of reasonable size, though I have known many big enough for a loud-speaker. It is time for you to put on your thinking-cap and make out that list of "what I want." Have a good look round the radio stores, and I am sure you will find something which will improve your installation and give delight, not only to yourself, but to the rest of the household if it is chosen with a view of improving reception. The ether contains many good things at all hours of the day, and if you are not taking advantage of them—well, you are not getting full value out of that licence fee.

Speakerless Speech Mystery

What is quite a common experience is to hear music and speech emanating from a wireless set even when the loud-speaker is not connected to the output terminals. It is a phenomenon which has troubled many of those who have observed it in their receivers. The worry is to know whether it is a defect in the receiver, and if so, how can it be corrected. It may be taken for granted the general cause of the noise, for it is a noise, even though the music or speech is distinguishable, can be found almost immediately. There is sure to be something loose in the receiver, which vibrates when the receiver is in operation in just the same way as the diaphragm moves in some types of loud-speakers. There are two forces which may cause the trouble, namely, magnetic and electric. Magnetic forces are the most common. Very often the loose part is the iron covering of a low-frequency transformer, or even the power transformer when A.C. mains are used for the power drive, being situated within the leakage field of a low-frequency transformer. The magnetic lines of force act on the transformer case and set up a vibration. Sometimes it may be traced to a part of the lamina, or core of the transformer. It will always be noticed that the vibrations are louder when the loose member is iron or other magnetic material. It must not be thought, however, that loose iron members are alone subject to vibration. Any loose metal when subjected to strong electric alternating or varying forces, vibrates, and it is found more severe the higher the varying voltage may be. So, as a loose piece of iron may be subject to the influence of both magnetic and electric forces, the loose member vibrates in the same way as the diaphragm of a speaker. The hum which is often heard from an eliminator is due to the same trouble, but in this case it is usually the power transformer which is the cause. It has often been traced to a loose casing, which vibrates because of the leakage flux from the transformer itself. This being the cause of speech and music heard from a set to which a speaker is not attached, the remedy will be quite obvious. The loose and vibrating member must be traced. Sometimes this can be accomplished by tightening up the clamping of the core, or spreading over it a little rubber solution. The easiest way to trace the offender is by pressing the vibrating part with the finger.

A RADIO COMMENTARY

By "Grid Leak"

Inaudible Frequencies

Some time ago, a correspondent told me of a converter which he had invented, and permitted of his speaking into a microphone to send commands to a dog several miles away. These sound waves were converted by means of the instrument into high-frequency currents, inaudible to the human ear, but heard and acted upon by the dog. It is well known that many animals can hear sounds which are inaudible to the human ear, just as others can see that which is invisible to most. That letter whetted the appetite of my brain in its search for knowledge. I took a long journey to a good address in Cornwall, and you can imagine my surprise on arrival finding the correspondent was an inmate of a mental home.

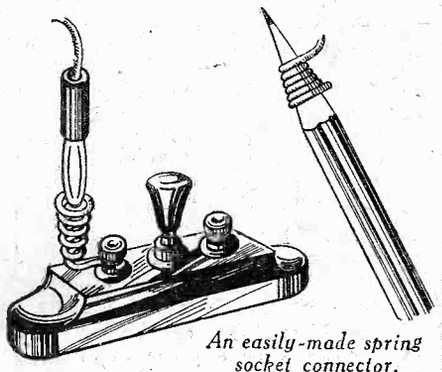
The Leak Leaks

Another case was a lady, much perturbed during the period of spring cleaning. She was dusting the radio receiver and noticed the accumulator, used for filament heating, was only half full of acid. A few days previously she had read one of my articles on the importance of keeping the acid level ¼in. above the plates. She appealed for advice, asking what might be wrong with the set, seeing she had examined the wiring and interior of the set very carefully, and had been unable to find any trace of water or dampness inside the cabinet. She feared the grid leak was not leaking correctly. Evidently, like most women not being technically minded, she was under the impression the acid flowed through the wiring of the set to and from the battery, with the grid leak as a kind of safety valve. Yes! I understand your smiles, but do you realize if she had not asked the question, and received the subsequent explanation, she would still have been in ignorance. That is where I come to my point: if you are in doubt do not be afraid of asking, and do not be disturbed if your question raises a supercilious smile from the one whose knowledge on radio matters you had considered worthy of inquiry, but may be little better than your own.

THE HALF-GUINEA PAGE — Radio Wrinkles FROM READERS

A Handy Spring Socket Connector

IN the hunt for selectivity, it is quite usual to connect a "pre-set" or other small variable condenser temporarily in circuit with the aerial. Often, however,

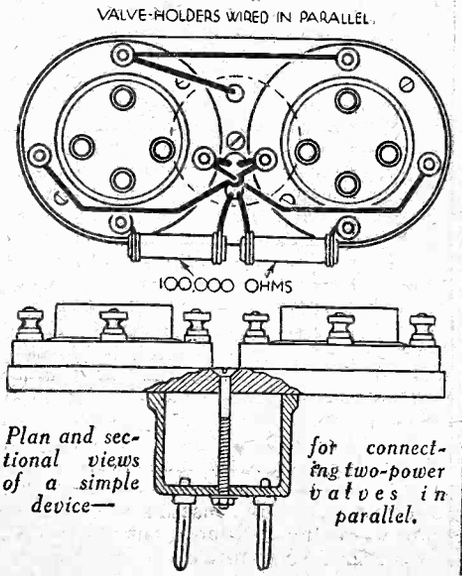


An easily-made spring socket connector.

the aerial connection is of the plug and socket type, and, of course, the terminals on the additional condenser are not suitable for the plug. By winding a little coil of No. 20 copper wire on the taper of a lead pencil, a handy spring socket can be made, as shown in the sketch. When this is fitted to the condenser terminal, the aerial can be easily plugged in where required. Similar spring sockets of a smaller type are useful for telephone or other temporary connections.—H. A. STEWART (Glasgow).

Power Valves in Parallel

HERE is a simple method of connecting two power valves in parallel when there is not enough space on the baseboard for the extra valve-holder. As shown in the accompanying drawing, the two valve-holders are mounted on a piece of ply-wood with their corresponding terminals connected together, and then fixed to an old valve base (by a screw through the centre). Thin rubber covered flex soldered to the pins is then connected to the terminals of the valve-holders. The valve base I used was rather long, but



Plan and sectional views of a simple device—

for connecting two-power valves in parallel.

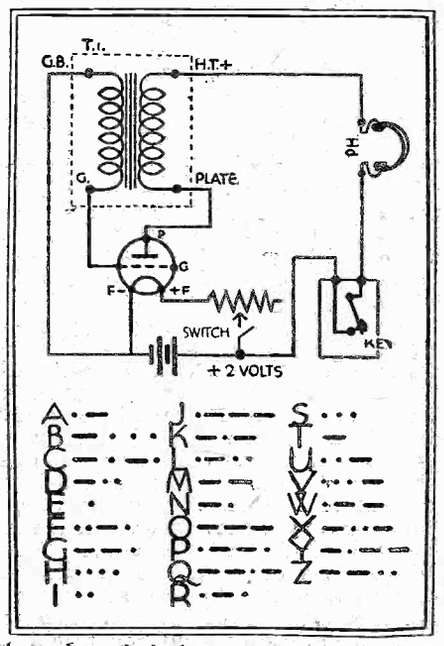
THAT DODGE OF YOURS!

Every reader of "PRACTICAL WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? For every item published on this page we will pay half a guinea. The latest batch is published below. Turn that idea of yours to account by sending it in to us, addressed to the Editor, "PRACTICAL WIRELESS," George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be *original*. Mark envelopes "Radio Wrinkles."

I cut this shorter so as the whole thing should not be too high when plugged into the valve-holder of the set. I afterwards de-coupled them by connecting a 100,000 ohms resistance in each grid lead, and found it a great improvement. —W. J. PALMER (Southsea).

Morse Code Practice Set.

THIS hook-up will enable anyone to master the code quickly, with a few minutes' practice daily. The signals

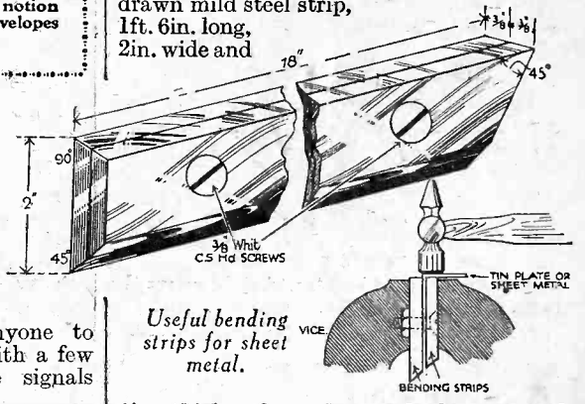


A simple method of practising the morse code.

sound exactly like those heard in ordinary radio transmissions, the 60-ohm rheostat R. 1 regulating their tune. The accompanying diagram shows how the various components are connected up. Almost any valve will do. If the set does not work at first, after checking over the diagram, reverse the leads to G and Plate on the transformer. Any L.F. transformer with a ratio of 3½ to 1 will answer the purpose, while the tapping key is a standard pattern.—R. MCKINNON (Glasgow).

Bending Strips for Sheet Metal

NO home wireless workshop can be complete (particularly with the modern chassis constructions) without a pair of bending strips. These strips are quite easily made from two pieces of bright drawn mild steel strip,
1ft. 6in. long,
2in. wide and

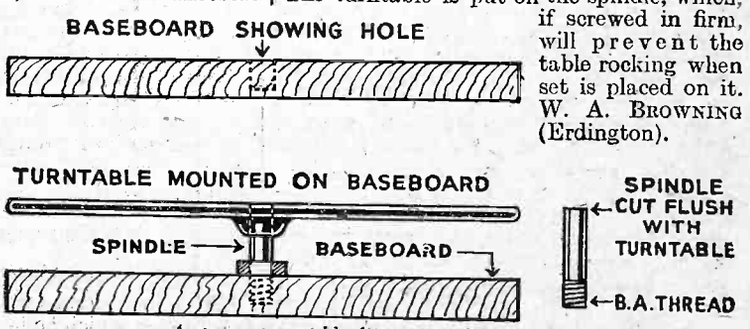


Useful bending strips for sheet metal.

⅛in. thick. One edge, and also one end, should be drawfiled perfectly level and square. The opposite edge should be filed to an angle of 45 degrees, and the opposite end to 45 degrees; and the two strips fixed together with two ⅜in. Whitworth C.S. head screws, about one inch long. The strips are then complete, as shown in illustration. The metal to be bent is screwed firmly between the strips, and the whole held between the jaws of a vice, as shown. After bending the metal over with the hands, it is finished off with a light hammer. The result is a first-class sharp edged bend.—C. CROWLEY (Birmingham).

A Turntable for Portable Sets

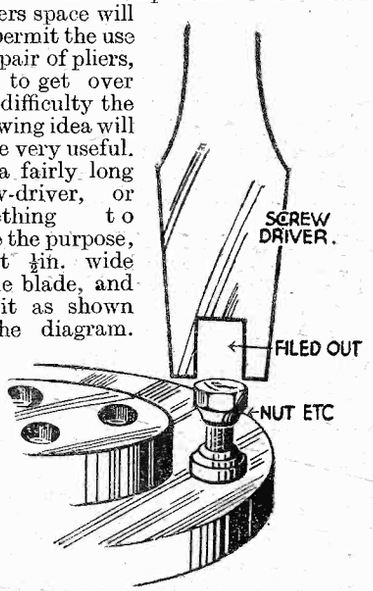
MANY portables, especially those of the attache case type, are not fitted with a turntable, and it is no light task to keep turning one round for best aerial direction. To make the turntable shown in the accompanying sketch, all you require is a 10in. or 12in. gramophone turntable, the spindle from same, and a wooden baseboard about 12ins. square and ⅞in. thick. The spindle is cut down to about 3in., and if possible a BA screw thread put on one end. At the baseboard centre, drill a hole (but not right through) and screw spindle into it. It can be secured with lock-nuts. The turntable is put on the spindle, which, if screwed in firm, will prevent the table rocking when set is placed on it. W. A. BROWNING (Erdington).



A strong turntable for a portable receiver.

Tightening Nuts in Awkward Corners

WHEN wiring a set, trouble is often experienced when screwing up the nuts of the components. In awkward corners space will not permit the use of a pair of pliers, and to get over this difficulty the following idea will prove very useful. Get a fairly long screw-driver, or something to serve the purpose, about ½in. wide at the blade, and file it as shown in the diagram.

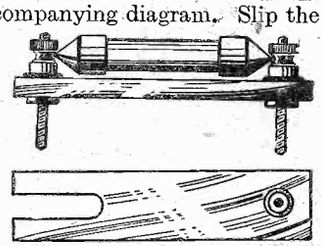


A useful dodge for tightening nuts in awkward places.

It is then an easy matter to tighten up the nuts, using the tool as you would an ordinary screwdriver.—E. G. WHITE (Southampton).

Adjustable Grid-leak Holder

ALL you require to make this holder is a small strip of ebonite and two telephone terminals. First bore a hole near one end of the ebonite strip and cut a slot in the other end as shown in the accompanying diagram. Slip the terminals in place and the holder is finished. The slot in one end allows the holder to be adjusted to fit any grid leak.—FRANK TURNER (Everton).



A novel adjustable grid-leak holder.

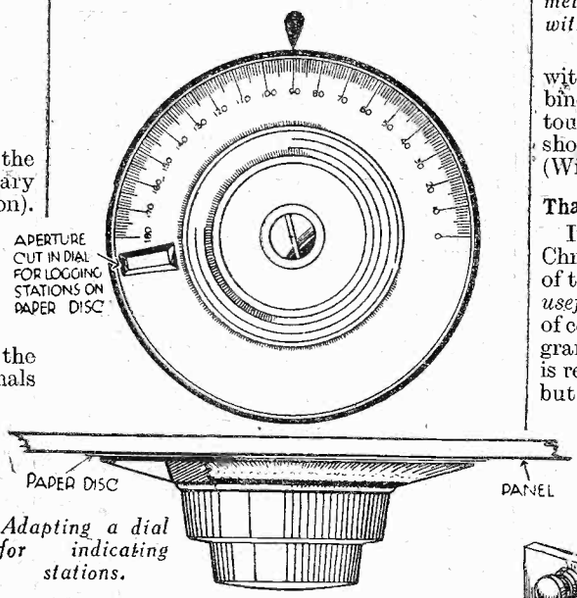
Economising in H.T. Current

A GOOD way to reduce the H.T. current in battery sets is to put a three-pole double-throw switch on the panel to enable one to use a power or super-power valve at will. I use the power valve when listening to a talk, or the News Bulletin. Also, when listening to foreign stations which require much reaction, or suffer from fading. Dance music sounds much more natural and has more body to it when the last valve is using 2 2/5 watts instead of 1 1/5 watts, as would be the case when using a small power valve.

Judging from the few friends of mine whose hobby is radio-set building, etc., a number of readers may already have a small power valve by them which is not in use.—STANLEY CARTER (Lepton).

Locating Stations

A USEFUL dial indicating device can be made as follows:—Remove dial and cut slot ⅛in. by ¾in. and taper back as shown. Cut a white paper disc the same diameter as the dial and paste same on panel before replacing the dial. Once the station is found and marked in the slot of dial, there is no need to trouble about the wavelength or degrees on the dial.—GEO. S. ROME (Shandon).

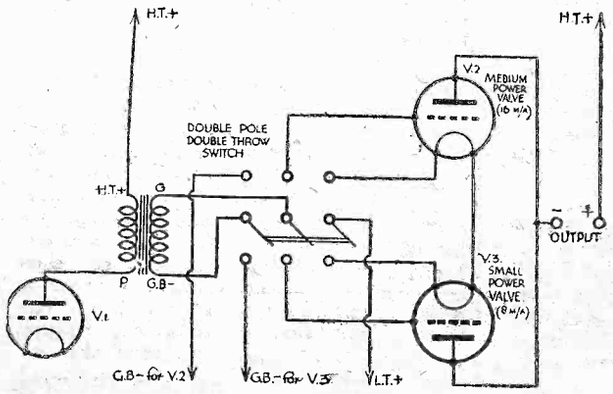


Adapting a dial for indicating stations.

An Auto-coupling Unit

IT is well known that the characteristics of the low-frequency transformer are much improved if the anode current is prevented from flowing through the primary winding. One way of doing this is to employ the new well-known method of filter-feed. Another way is the auto-coupling method, which is really a development of the above system. It is, therefore, thought that the auto-coupling unit, shown in the accompanying sketches, will be of interest. The unit is made up from an old L.F. transformer, a fixed condenser and a 30,000 ohm resistance. A small wooden base should be made for these components, because it is then much easier to put them into the set. The base is provided with terminal strips, as shown, and when all is in place, connect up as follows:—

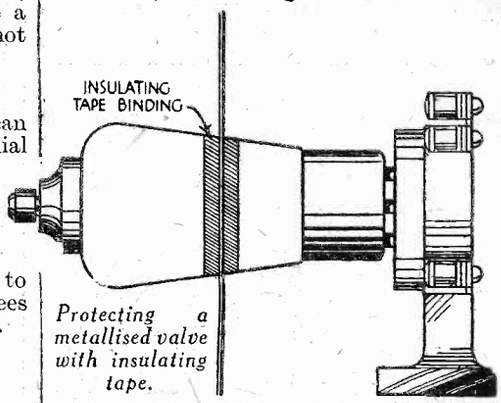
Transformer, P to G.B.; H.T. to G.B. on terminal strips, and G to G on strip. A wire is also taken from transformer P to fixed condenser. One side of resistance is connected to terminal strip H.T.+, and the other side to P. and one side of condenser. The connections to the set are the same as in the case of an L.F. transformer.—A. S. RICHARDS (Bargoed).



A switching arrangement for power valves.

Protecting a Metallised Valve

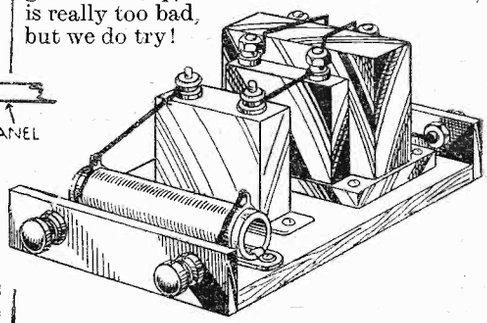
WHERE a metallised S.G. mains valve is mounted through a screen, there is danger of the valve coming in contact with the screen, thus short-circuiting the bias resistance, and causing the valve to be run without bias. This can be obviated by binding the portion of the valve likely to touch the screen with insulating tape, as shown in the sketch.—R. SHARMAN (Wickford.)



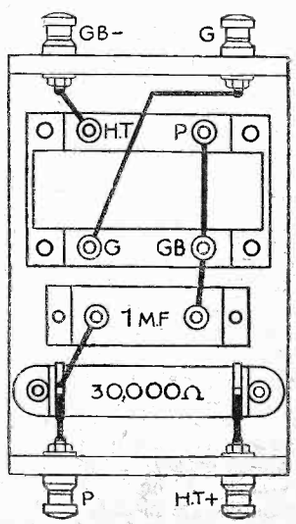
Protecting a metallised valve with insulating tape.

That 12-volt Dry Cell!

In our Dec. 10th issue, on page XII of the Christmas Supplement, an inscription to one of the diagrams reads: *A 12-volt dry cell is a useful stand-by.*" "A single 2-volt cell was, of course, intended, as was shown in the diagram. The slip, which of course was obvious, is really too bad, but we do try!



Perspective view of the complete auto-coupling unit.



Plan view of the auto-coupling unit.

Another Experimental Baseboard

FOR the constructor who delights in carrying out tests of various circuits, one cannot do better than to use an experimental baseboard, such as the one here described.

With its aid numerous circuits can be wired up and tried out with such rapidity as to enable him to explore fully into the fields of this fascinating hobby. Taking a glance at Fig. 1, it will be seen that this consists of a wooden tray into which a number of square blocks fit, producing a baseboard divided up into equal squares. The number of blocks can be such as will cover the constructor's requirements, but for general utility the writer has found that a board 27in. by 12ins. by ½in. thick, having thirty-six blocks, 3ins. square, is large enough to cover a wide range of circuits ranging from one to four valves. Actually several more blocks are needed, on which to mount other components that may be on hand. The construction of this board is simplicity itself, the illustrations being self-explanatory.

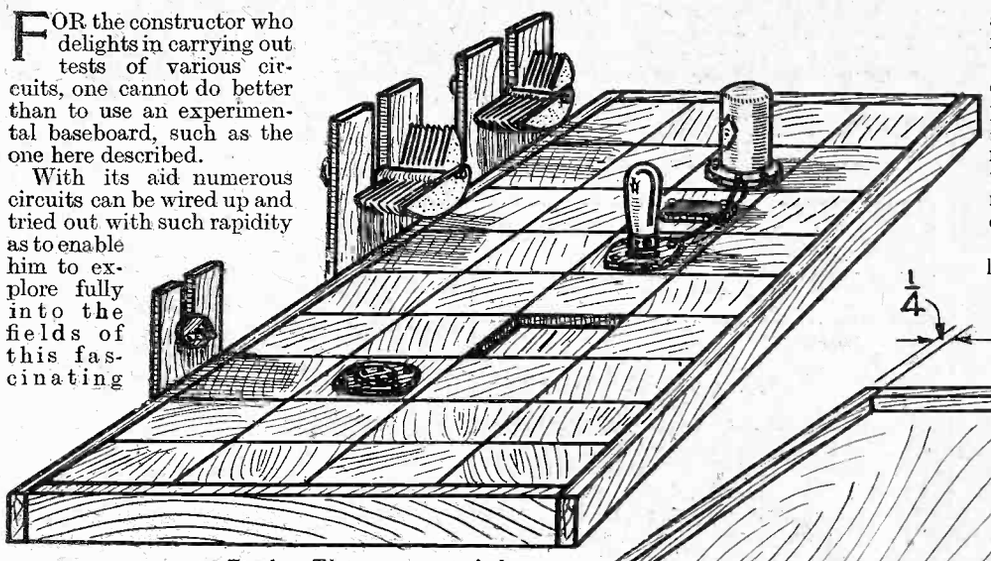
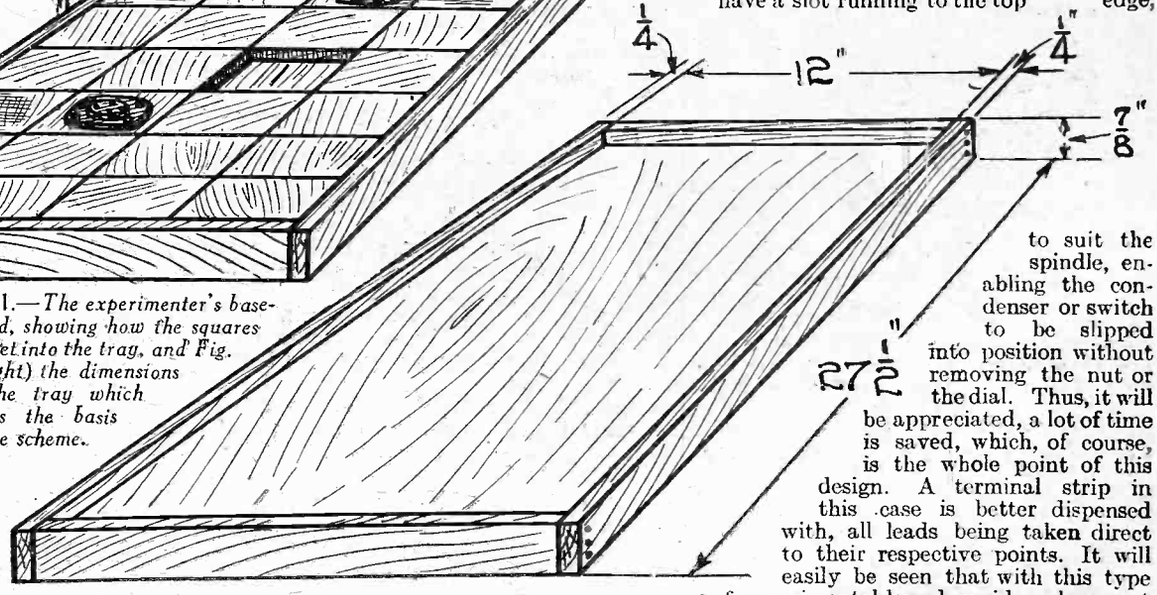


Fig. 1.—The experimenter's baseboard, showing how the squares are let into the tray, and Fig. 2 (right) the dimensions of the tray which forms the basis of the scheme.



Details of Construction

First of all take the bottom board and around this screw on the sides, so as to form the tray as shown in Fig. 2.

Next you will require a sufficient number of blocks, Fig. 3, for mounting each component. Lastly, for the "panel," some ¼in. thick ply-wood will be required for mounting variable condensers, volume control, switches, etc. (Fig. 4). The size and number of these will depend upon the constructor's individual requirements.

It will be noted that the mountings have a slot running to the top edge, to suit the spindle, enabling the condenser or switch to be slipped into position without removing the nut or the dial. Thus, it will be appreciated, a lot of time is saved, which, of course, is the whole point of this design. A terminal strip in this case is better dispensed with, all leads being taken direct to their respective points. It will easily be seen that with this type of experimental board rapid replacement and disposition of components is conveniently effected by disconnecting their leads and lifting out the components complete with their mounting blocks. Also, in the case of a circuit using two L.F. transformer stages, one of the transformers can be turned round so as to bring the windings into opposition. Finally, each component can be extracted or replaced without interfering in any way with the wiring of the remainder of the circuit.

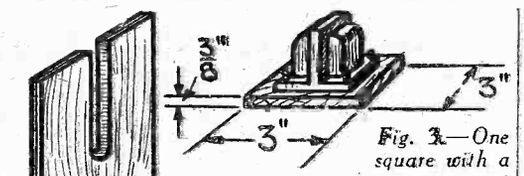
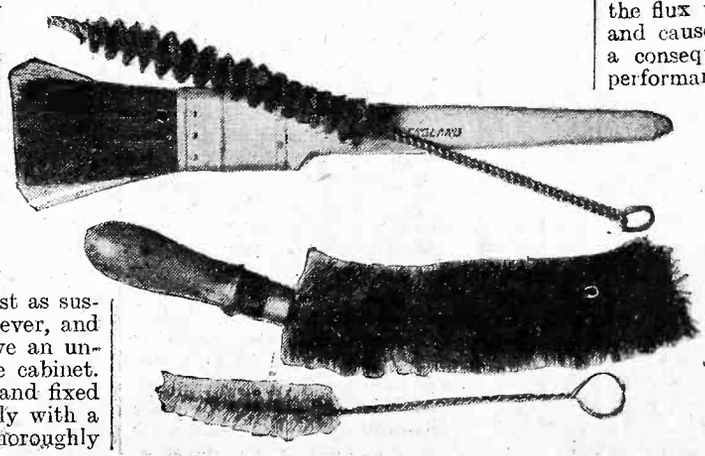


Fig. 3.—One square with a component mounted on it.

Fig. 4.—The small vertical panels used for tuning controls, etc.

AWAY WITH THAT DUST!

THE evil effects of dust evidence themselves in a variety of ways. Poor signal strength, fading, crackling noises, etc., so often attributed to causes outside the control of the user of the wireless receiver will, in many cases, be found to emanate from an accumulation of dust which has perhaps been lying hidden for some time. With the old-fashioned types of sets using horizontal panels, on which were mounted nearly all the components, the effects of dust were most marked, but since the dust was plainly visible to the eye, generally it was removed before making itself very troublesome. The modern type of set, frequently all enclosed, is just as susceptible to the evils of dust, however, and it is surprising how particles have an uncanny knack of getting inside the cabinet. The spaces between the variable and fixed condenser plates are cleaned easily with a feather or pipe-cleaner, but for thoroughly cleaning the set interior generally, special types of brushes are desirable. When soldering, the flux should be used sparingly, and any superfluous flux wiped away as soon as the electrical joint is made. If not, the flux will collect dust particles readily, and cause a leakage between joints, with a consequent upsetting of the receiver's performance.



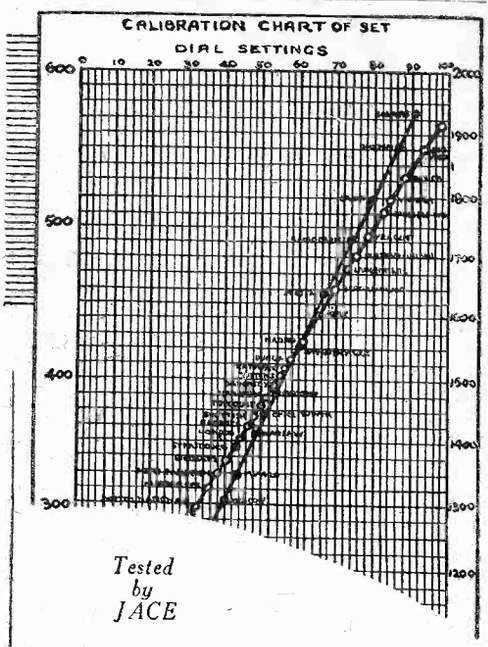
Some Useful Brushes

To carry out the "spring cleaning" one requires a good camel hair brush about 1in. wide across the end. Then, in addition, there is marketed a very good soft brush, appropriately designated a "wireless brush." The hairs are held in a spiral of wire, and thus give a cylindrical formation about 1¼in. to 1½in. in diameter. The hairs close up to a very narrow thickness, however, and this enables one to get into awkward places.

Receivers and their Records

We shall be glad to advise readers regarding purchase of complete sets

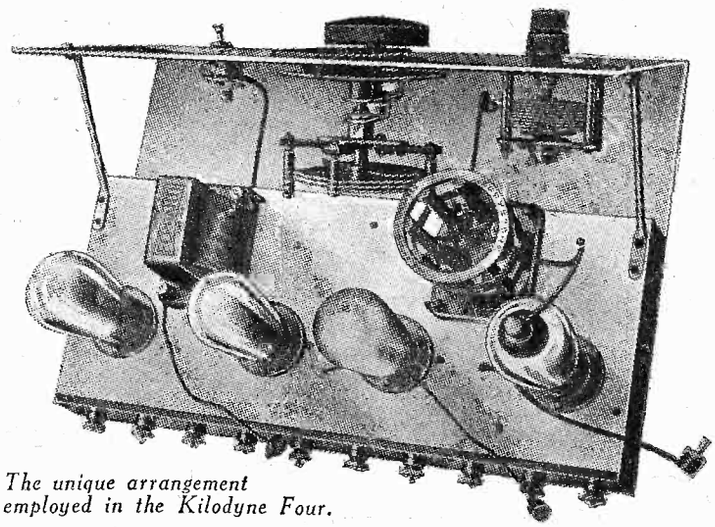
EDDYSTONE KILODYNE FOUR



Tested by JACE

IN reality, this powerful short-wave receiver comes to you as a kit of components, but it is so easy to build that it is possible to construct it in the course of an evening or so. For the purpose of the test, a ready assembled receiver was sent to us, but from a study of the circuit, and the clear instructions and blue print given with it, there is no doubt that even a beginner can put it together without difficulty, and make it work efficiently.

The "Kilodyne" is a well-thought-out four-valver specially made for the reception of all wavelengths between 12.5 and 85 metres, but also possesses the advantage of being adaptable by the use of extra coils for tuning in stations in any waveband up to 1,800 metres. The construction of the receiver has been greatly simplified by the use of a perfectly straight circuit. The aperiodic aerial stage consists of a high-frequency choke between the grid of the screen-grid valve and earth; this valve is coupled to the detector by means of a high-frequency transformer, of which only the secondary is tuned with a .00016 low-loss variable condenser. (It is thus possible to adopt an untuned aerial circuit with success, and to reduce the tuning controls to a bare minimum of *one*.) With such an efficient form of coupling, selectivity is very good, as there is only a light damping due to the load of the secondary winding on the detector-valve. To obtain reaction, a winding is fed from the detector plate to the high-frequency transformer by the Reinartz method. Leaky grid detection has been employed. The metallized detector is followed by one low-frequency (resistance-coupled) stage, using a valve of high amplification type and a Ferranti AF8 transformer feeding a pentode output valve. From this description you will see that the "Eddystone Kilodyne Four" represents a powerful receiver, capable in many instances of giving loud-speaker reception of the most important short-wave broadcasts.



The unique arrangement employed in the Kilodyne Four.

Maximum Efficiency

The set has been designed for maximum efficiency around the valves which are specified by the makers, and it is important to adhere to their choice; in particular, it was found that for the satisfactory operation of the circuit the use of a Mazda HL210 metallized in the detector stage was highly important. There are four special Eddystone 6-pin coils supplied with the kit, and each one is marked with a different colour spot to facilitate recognition; they cover 12.5 to 28 m.; 24 to 50 m.; 40 to 85 m., and 260 to 550 metres, thus allowing the user to tune in transmissions on the broadcast band. Although, in the last case, the coil may be found useful, selectivity, in the neighbourhood of a powerful station is not of a high order, and very careful tuning is necessary if the local broadcast is to be cut out. The "Kilodyne" is essentially a receiver for short waves, and under test proved its great value in this particular sphere. In appearance the receiver is simplicity itself; open metal chassis, with sloping front, its single tuning-control flanked on each side by the reaction knob, and the "on" and "off" switch looks business-like. The dial behind the escutcheon is clearly marked in degrees; the control knob is of generous proportions and, as it works on a friction drive tuning is an easy matter. For the capture of broadcasts on short waves, slow motion is a necessity; it is so easy to pass over a carrier wave, and it is essential that tuning should be direct and precise, also that reaction should be smooth. In these matters the "Kilodyne Four" excelled and, moreover, the set did not suffer from body capacity effects. It was found possible to capture a signal, and to hold it for long periods, without any further adjustment of the controls. The "Kilodyne Four" has been essentially designed for high-tension battery feed; notwithstanding its four valves, its H.T. consumption did not exceed 15 milliamperes; low-tension current taken from a 2-volt accumulator was 0.6 amp.

If good results are to be obtained, it is a *sine qua non* condition that the valves should get their right amount of H.T. current, and *reliable* high-tension batteries should be used. If loud-speaker reproduction is desired at good strength, up to 150 volts (with a grid bias of 15 volts) may be fed to the pentode valve, and 110 or 120 volts to the first L.F. stage. Experiments proved that, where stations were weak and distant, a low voltage was preferable to the screen-grid valve; the makers recommend 70-80 volts, but under test more broadcasts were logged when voltage, in this stage, was reduced to 30-40 volts. This is a question of experiment; the main object is to choose voltages on the screen-grid and detector valves which will secure perfectly smooth reaction, and which will allow you to use reaction easily just under oscillation point, and thus keep the receiver stable. In the long run, it is more economical to use double- or triple-capacity high-tension batteries; for these tests both Drydex and Pertrix ultra capacity units gave excellent results.

There is a knack in tuning a short-wave receiver which the beginner must first acquire. If signals are to be heard the set must not be allowed to oscillate; it must be kept just below that point. Start by putting the reaction control at its lowest point, then, whilst tuning slowly, gradually increase by turning the vernier knob very slowly clockwise. At a certain setting the receiver will begin to oscillate; you will notice this by hearing a peculiar "rushing" noise. Continue to turn the tuning dial slowly, increasing the reaction gently keep the set in this condition. If you come to a carrier wave, you will hear a slight "squeal" or "cheep." Possibly it may only be a morse transmission, but this will give you the necessary intimation. A broadcast telephony carrier-wave provides the same kind of noise, but before you can *hear* telephony the dial must be gently turned until, as it were, you get into the trough of the wave. Ease off reaction, and again re-adjust dial, when the speech or music should be audible. It simplifies the operation to keep it in a condition of oscillation, but bear in mind that telephony

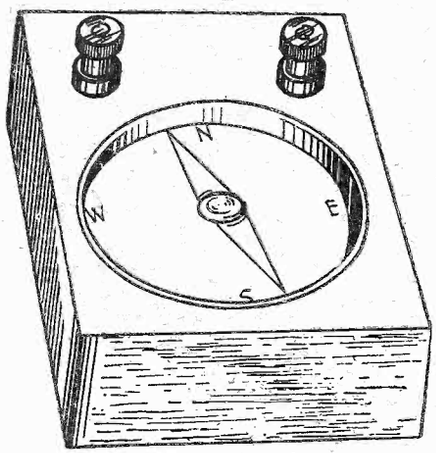
(*Continued on page 710.*)

A SIMPLE GALVANOMETER FOR TESTING

By A. E. OAKLEY

ONE of the handiest testing instruments is the galvanometer. The best form is, of course, the standard "linesman's galvo," which is in regular use by telephone linesmen, mains engineers, etc. A perfectly good and practical galvanometer can be made, however, on the simple plan here explained, and it is quite certain that, once made, it will be in continual requisition.

The basis of the instrument is a cheap compass. Many readers will have one of



The complete Galvanometer.

these on hand; if not, one may be purchased at electrical stores, toy shops or junk stalls. The diameter may be from 1in. to 1¼in. Assuming we have located one of, say 1¼in. diameter, we shall require, for the base, a square of hardwood 2¼in. by sufficient thickness to accommodate the compass, coil and magnet as shown in the illustrations. The compass should be a push fit. The coil is wound on a strip of fibre (or cardboard dipped in wax) ⅝in. wide. The most useful all-round winding will be to fill the strip with about eight or nine layers of No. 40 swg. silk covered. Actually, any wire from 36 gauge upwards will make a delicate instrument, but a high resistance is a great advantage, for it enables the galvanometer to be used universally on L.T. or H.T. circuits. So if you have wire available from an old transformer or choke (usually about 47 gauge), by all means use it. 40 swg. will give a resistance of 150 ohms or more; 47 swg., 800 to 1,000 ohms. Dip the coil in wax after winding. The base is notched out at the back to receive the coil (which is a little longer than the compass diameter) and also the magnet, which is put in last at right angles to the coil. This latter is made from any odd steel strip, such as a piece of clock spring, two or three pieces of watch spring, or a piece of the round silver steel used for drills. If the latter is used, it may be of $\frac{3}{16}$in. diameter, with a flat filed on opposite sides so that it does not occupy too much depth in the base. After filing it should be hardened by heating to bright red and quenching in water. Clock spring or similar material is already "dead hard." The steel is magnetised by drawing one pole of any permanent magnet along its length several times, or by placing it inside a coil through which a current is passing. Tapping the steel occasionally while being magnetised assists the operation.

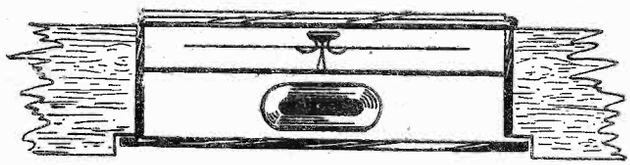
The coil ends are connected to two terminals, and the under side of base covered by pinning or gluing on a piece of cardboard. The latter may be faced with a piece of cloth to give a suitable finish. A touch of varnish or french polish completes the job.

Using the Galvo

When using any electrical instrument, its resistance and current-carrying capacity must always be considered, for to connect a low-resistance winding to, say, a 150 volt accumulator may result in damage not only to the instrument itself, but to other apparatus in the circuit. The present instrument, if wound to the fairly high resistance suggested, may be used pretty freely. It will never, of course, be permanently connected to the current, but a momentary contact made. It is not a precise measuring instrument, but has this advantage over flash lamps, 'phones, etc. It is exceedingly delicate, responding to a very small voltage or current; and yet robust, for it may be "flicked" on the H.T. without damage, and will not hurt one's eardrums as 'phones often do when testing. Its principal use is for continuity tests, and it can be placed in filament or anode circuits to check that a current is flowing, and its direction. Used with an accumulator or flash lamp battery, transformers, chokes, etc., may be tested for continuity, and, using a higher voltage, suspected condensers or other components for insulation breakdown or "shorts."

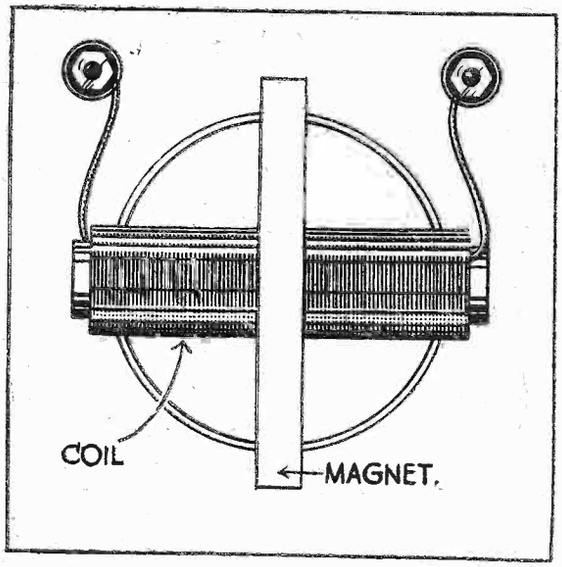
A Polarity Indicator

The compass needle is normally held at zero by the magnet, and the terminals are mounted on the base in such a position that the needle points midway between



Section showing positions of compass, coil and magnet.

them. When a voltage is applied to the terminals the needle will, therefore move left or right according to the direction of the current. It is most convenient to arrange the coil so that the needle will always point towards the positive terminal. This is determined before fixing the base cover by connecting an accumulator. If the needle moves in the wrong direction, simply reverse either the coil or the connections to the terminals.



The underside of base, showing connections to terminals.

Simplifying Soldering

(*Continued from page 680.*)

actually soldering the joint, and furthermore saves the solder from getting lost. A little extra refinement, but one well worth while, is the addition of four small soft rubber feet on the underside of the baseboard—one at each corner.

For the actual work of soldering the joint only a few words are necessary. Say it is part of the wiring on your set. First of all "tin" the iron as described earlier and then tin the soldering tag or tags where the wire has to be connected. This is done by smearing a *little* flux on the tag and touching it with the heated copper bit until the solder "runs" on the tag end. Now add a *little* flux to the end of the wire, place it on the tag and then hold the heated copper bit on the two until the solder runs round the wire and tag. Remove the iron, and when the solder has cooled (this is quite a rapid process), the wire will be found to be held rigidly in place. Now clean away any superfluous flux and the job is done. Actually it takes longer to describe than to carry out.

The golden rules for soldering may be summed up quite simply. First of all use a non-corrosive flux and be very sparing in its use at the joints (its function was described earlier in this article). Secondly, do not overheat the iron, or constant tinning will be necessary, and thirdly, see that the surfaces to be soldered are scrupulously clean—rub up with a file or glasspaper if necessary. Having studied these few hints go straight away and try your hand at soldering and you will be surprised how simple it is and how workmanlike your finished work becomes.

A SHORT-WAVE SUPERHETERODYNE CONVERTER

FRANK PRESTON, F.R.A., Here Gives Complete Details of a Simple Instrument with which You Can Convert Your Set for Use on the Short Waves.

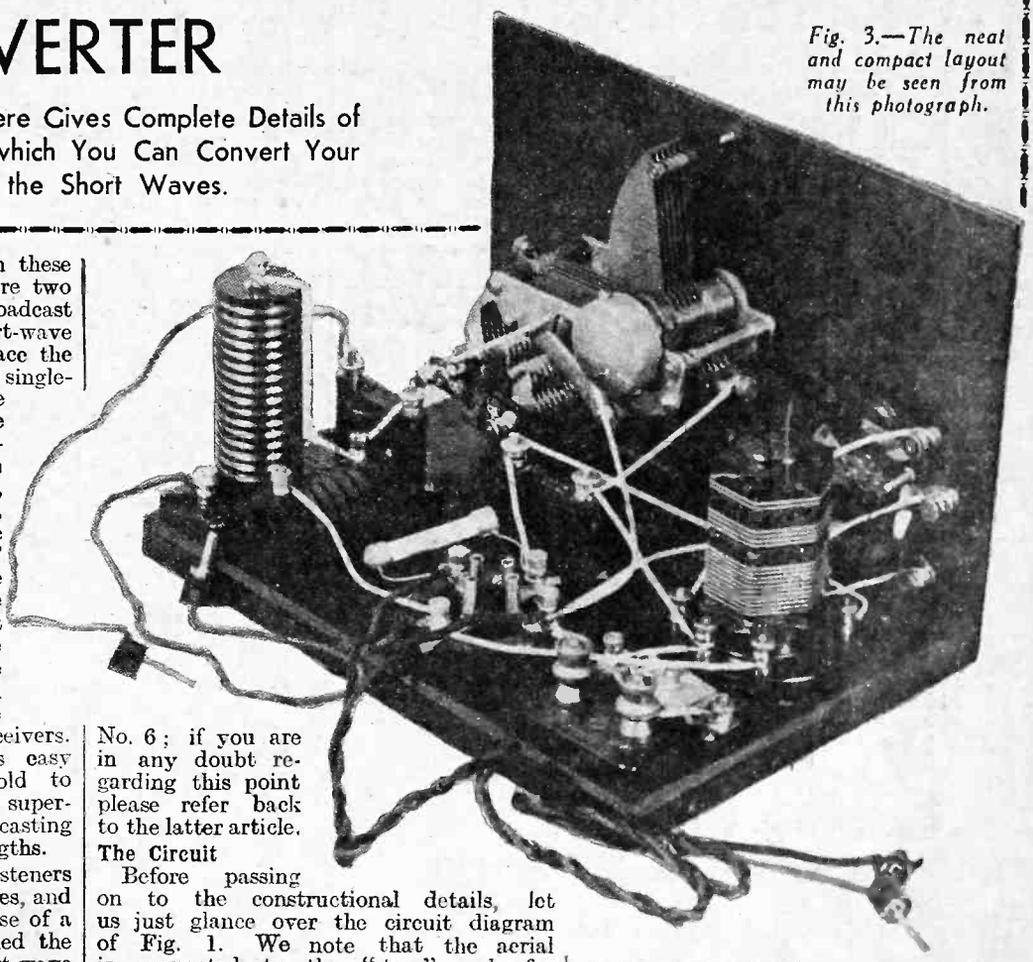


Fig. 3.—The neat and compact layout may be seen from this photograph.

IN a previous article published in these pages I explained that there are two ways of using a normal broadcast receiver for the reception of short-wave stations. One of these is to replace the detector and tuning circuits by a single-valve short-wave set made in the form of a plug-in adaptor. The other is to employ a combined detector-oscillator valve in conjunction with the complete set. This latter, generally referred to as a converter, makes the receiver into a short-wave superheterodyne. The "converter" method provides the more sensitive arrangement and is ideal when the set has one or more S.G. stages. It also gives easier control, because the reaction condenser does not require to be operated in conjunction with the tuning condenser, as is the case with most kinds of S.W. receivers. As a matter of fact, it is just as easy for any member of the household to operate the complete short-wave superheterodyne as to tune in broadcasting programmes on the higher wavelengths.

Realizing that more and more listeners desire to make use of the short waves, and yet do not wish to go to the expense of a completely new set, I have designed the simple, and extremely efficient, short-wave superheterodyne converter, illustrated on this page. In addition to its normal function, the unit can, if desired, be employed as a self-contained single valve short-wave receiver. It can be used with any S.G. receiver which is operated by batteries or an H.T. eliminator, and it can also be modified to work in conjunction with an all-A.C. set when necessary.

I do not propose to describe the theory of the converter, for that was dealt with on page 299 of PRACTICAL WIRELESS, No. 6; if you are in any doubt regarding this point please refer back to the latter article.

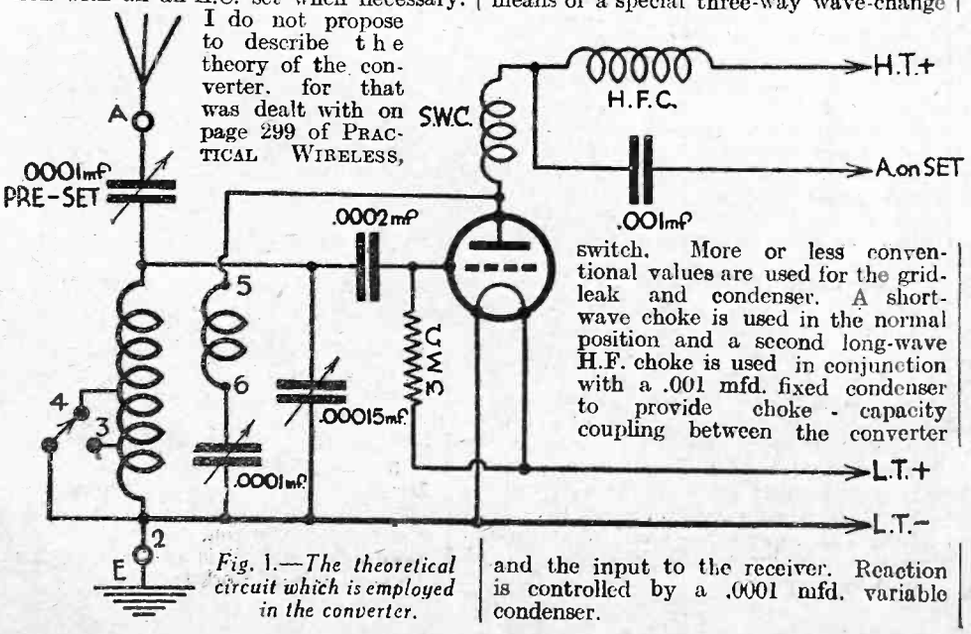


Fig. 1.—The theoretical circuit which is employed in the converter.

The Circuit

Before passing on to the constructional details, let us just glance over the circuit diagram of Fig. 1. We note that the aerial is connected to the "top" end of a three-range tuner through a .0001 mfd. pre-set condenser. The tuner, being tapped in two places, provides a total tuning range of from about 15 to 80 metres when tuned by the .00015 mfd. variable condenser. This range is divided up into three of 15-25, 25-45, and 45-80 metres respectively, the different ranges being obtained by means of a special three-way wave-change switch. More or less conventional values are used for the grid-leak and condenser. A short-wave choke is used in the normal position and a second long-wave H.F. choke is used in conjunction with a .001 mfd. fixed condenser to provide choke - capacity coupling between the converter and the input to the receiver. Reaction is controlled by a .0001 mfd. variable condenser.

Choice of Components

A list of components required is given elsewhere. It is absolutely essential to keep to the parts specified, but in case you have a few parts on hand I will point out where alternatives are permissible. Obviously the tuning coil and associated wave-change switch could not be replaced without spoiling the whole design, but alternative makes *could* be used for most of the other components, provided that they have similar characteristics and are of equal quality. But if you are going to buy new parts, insist on being supplied with those specified because they have been carefully chosen to work together. At the same time their prices are in most cases lower than those of other components of equal quality.

Construction

This is extremely simple and straightforward, as you will gather by examining the wiring plan of Fig. 2 and the photograph, Fig. 3. The conventional arrangement of panel and baseboard has been followed because this is the best and simplest for a small unit of the kind we are dealing with. First of all prepare the panel and baseboard, drilling the former in the positions indicated in Fig. 2, to take the bushes of the two condensers and the spindle of the wave-change switch. The switch is attached to the panel by two long bolts, with nuts, and the correct positions of the holes for these are best found by using the bakelite flange as a template. You will

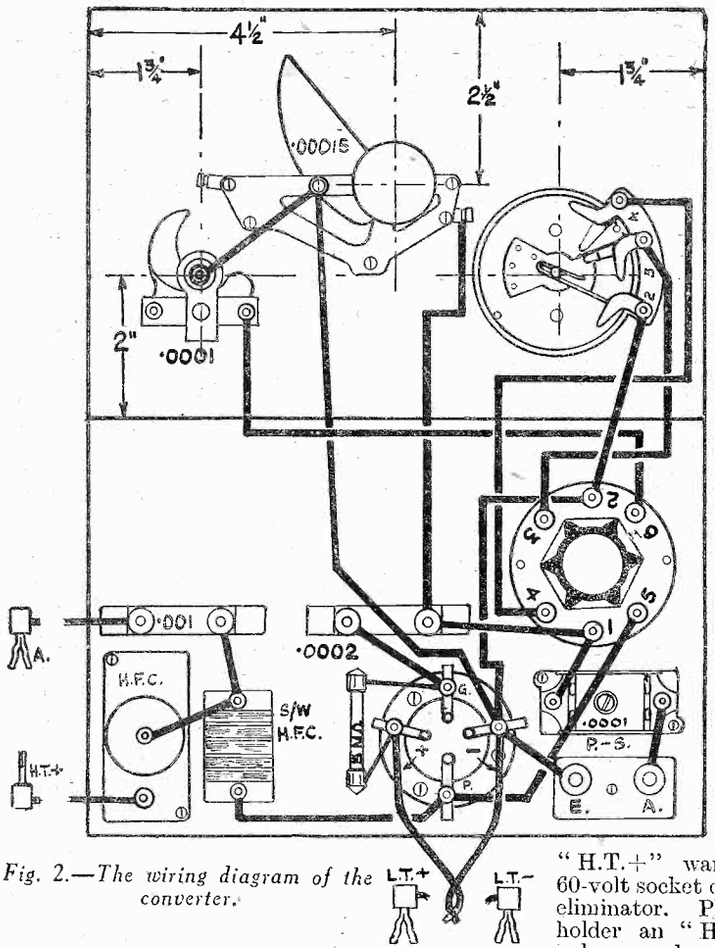


Fig. 2.—The wiring diagram of the converter.

wish to stain and polish the panel, so this should be done before screwing it to the baseboard. Next, lay all the components on the baseboard in the positions shown in Fig. 2; make sure they all fit comfortably in their places before finally screwing them down.

Wiring

It will be found easiest to adopt a system in wiring and to work from the right (looking at the back) towards the left. It should be mentioned in passing that the grid-leak is attached to the valve-holder terminals by means of its own connecting wires. In attaching the two L.F. leads and spade terminals, notice carefully the negative-positive terminals on the valve-holder (clearly shown in Fig. 2). Keep all flexible leads as short as possible or efficiency will be impaired.

LIST OF COMPONENTS.

1 Plywood Panel, 9in. by 6in.
1 Baseboard, 9in. by 6in. by ⅝in.
1 .00015 mfd. tuning condenser, with slow-motion dial (Jackson Bros.).
1 Dial pointer (Bulgin).
1 .0001 mfd. reaction condenser (Jackson Bros.).
1 Triple-range S.W. tuner (Lissen).
1 Triple-range wavechange switch (Lissen).
1 .0001 mfd. pre-set condenser (Colvern).
1 .001 mfd. fixed condenser (T.C.C.).
1 .0002 mfd. fixed condenser (T.C.C.).
1 3 megohm grid-leak, with wire ends (Dubilier).
1 S.W. valve-holder (Eddystone).
1 S.W.H.F. choke (Bulgin).
1 H.F. choke (Lewcos).
1 Terminal block; marked "A" and "E" (Lissen).
1 Wander plug; marked "H.T.+" (Belling Lee).
3 Spade terminals; marked "L.T.+," "L.T.—" and "A" (Belling Lee).
1 length "Glazite" connecting wire, 2ft. twin flex, screws.
Approximate cost, 37s.
Also, if required, 1 type 210 H.F. or 210 H.L. metallized valve (Cossor).

The Converter in Use

And now to put the converter into use. First transfer the aerial and earth leads from the set to the appropriate terminals on the converter. Connect the "aerial" wander plug of the latter to the aerial terminal of set, leaving the earth terminal free. Join the two L.T. leads to the filament terminals of a valve-holder in the set. Then put the "H.T.+" wander plug into the 60-volt socket of the H.T. battery or eliminator. Plug into the valve-holder an "H" or "H.L." type valve, and everything is ready. Due to the method of connecting the L.T. leads, the on-off switch in the set will also be operative on the converter.

Set the receiver to the very bottom of the long waveband, and proceed to tune-in on the converter. Turn the reaction condenser to its midway position, and rotate the tuning condenser as slowly as possible by means of the slow-motion knob only. A whistle will not be heard when a station is being tuned in unless the set itself is in the oscillating condition. After tuning in the first station, try the effect of adjusting the reaction condenser on the converter; unless this is set to the position of oscillation nothing will be heard at all. Having found the best position, adjust the reaction condenser on the set. This latter will act in exactly the same way as on broadcast reception, and can thus be employed as a volume-control.

Lastly, try the effect of tuning the set to a different wavelength. This might make it necessary to alter slightly the tuning of the converter. When the best tuning position for the set has been found it can be left entirely alone whilst tuning is carried out on the converter itself. Although it has been said that the reaction condenser on the converter does not require to be operated at the same time as the tuning condenser, it is sometimes possible to increase the strength of a signal by making a careful adjustment to the reaction condenser. As the valve in the converter must be kept in a state of oscillation a higher reaction setting will be required when receiving on the longer wavelengths. No mention has yet been made of the functioning of the wave-change switch. The knob has a rotary motion, and when turned to the furthest anti-clockwise position it gives the highest wavelength range. When turned through a small angle in a clockwise direction it "clicks" into the secondary position, and then, by turning it a little further, it "clicks" again as it comes into position for the lowest wavelength range.

The Aerial Condenser

The optimum setting for the pre-set aerial condenser depends on the aerial in use. If longer than 60ft., the condenser should be screwed back to its "minimum" position, but when a shorter aerial is employed, better results will be obtained by increasing the capacity. It should be remembered that, if the capacity is too great, the valve will probably be prevented from oscillating, and, in consequence, nothing will be heard.

The Converter as a Single-valve Receiver

It was mentioned towards the beginning of this article that the converter could, if desired, be used as a complete receiver. As it is capable of bringing in scores of stations at headphone strength, no doubt some of my readers will wish to try it in that way. To do so, all you have to do is to connect a pair of phones between the H.F. choke and the H.T. positive lead. Besides connecting the L.T. leads to the accumulator a wire must be taken from the negative accumulator terminal to the negative socket of the high-tension battery.

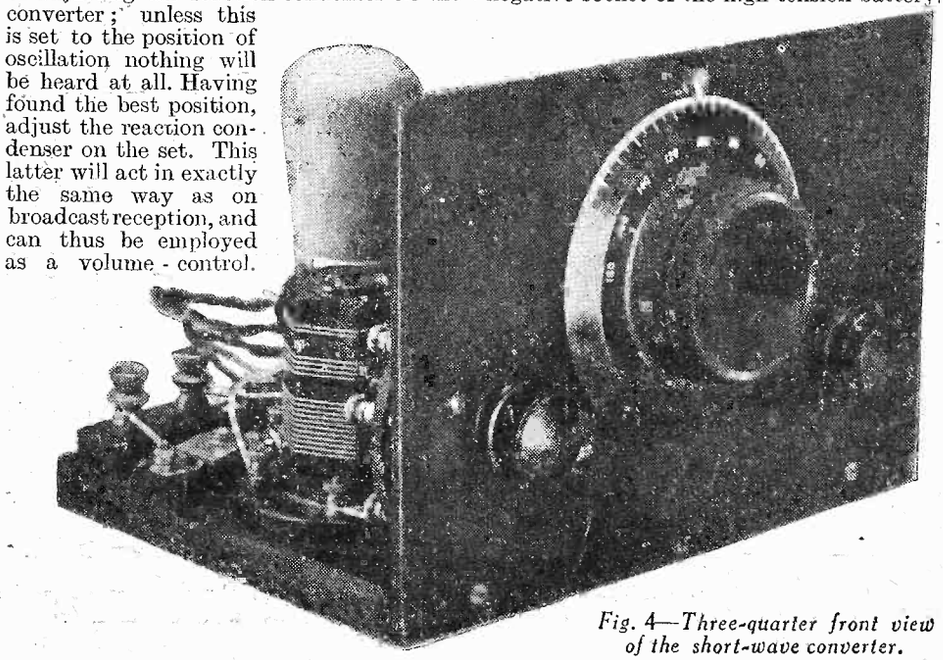


Fig. 4—Three-quarter front view of the short-wave converter.

WIRELESS IN EVERY ROOM

A More Detailed Description of the Arrangements Shown in the Phototone Supplement Presented with the issue dated December 10th

By
H. J. BARTON CHAPPLE,
Wh.Sch., B.Sc. (Hons.), A.C.G.I., D.I.C., A.M.I.E.E.

TO have wireless on tap in every room of the house is a phase of wireless enjoyment, the benefits of which are open to all, but realized only by a comparative few. The reason for this is inexplicable, although it may be attributed to the fact that many people think the only way in which it is possible to have wireless reception in every room of the home is to use a portable or transportable set which can be carried about at will. While this very definitely offers one solution, it only

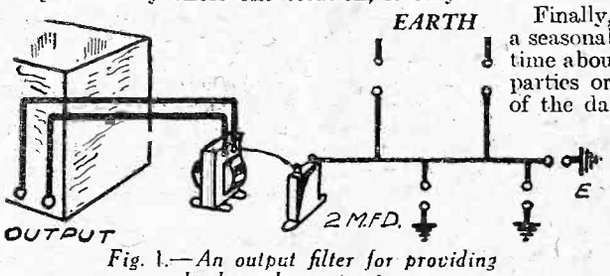


Fig. 1.—An output filter for providing loud-speaker extensions.

allows the programme received to be enjoyed in the particular room in which the set happens to be located at the time. Of course, those outside the room may hear the items if the set is running "all out"; but matters are then unpleasant for those seated in the room, as the volume of sound is too excessive to be pleasant, while coupled with this is the temptation to overload the speaker or output valve (or both), with consequent distortion. These latter remarks apply with equal emphasis to receivers other than portables, so the solution to our problem of being able to listen to wireless reception in every room still remains to be explained.

Many Benefits Obtainable

Before embarking on this, however, let me suggest a few of the benefits that come to my mind in this connection. First of all, it may be inconvenient to feel that one must be confined mainly to a particular room of the house just because the wireless set is there. As a general rule it is better to locate the set itself in very close proximity to the points where the aerial lead-in and earth wires enter the room. This may be the dining-room, drawing-room, lounge, or even the kitchen; but how nice it would be after enjoying the evening meal to the strains of a delightful orchestra or the voice of a well-known singer, to be able, metaphorically speaking, to transport this to the drawing-room or study, as the case may be! Again, think of a person lying on a bed of sickness, and realize how the long hours of convalescence can be whiled away by a suitable choice of a wireless programme which can be heard in the room itself. The children become a little out of hand in the nursery where they are compelled to play owing to the inclemency of the weather. Why not give them some additional amusement by having a loud-speaker in their room so that they can listen to an appropriate programme? Perhaps it has never occurred to you that the servant problem would be a little less prominent, if it could be pointed out that wireless was available in the kitchen for leisure hours, or when carrying out normal domestic duties.

Finally, to bring the whole matter to a seasonable conclusion, since Christmas-time abounds with the festive spirit and parties or family re-unions are the order of the day, the host has an opportunity of adding still further to his popularity by providing his guests with wireless reception in all those extra rooms which have to be used owing to the increase in family numbers. This time of the year is a most appropriate one to realize how easy it is to confer these benefits on the whole household, at quite a reasonable cost, the actual figure in pounds, shillings and pence varying with individual taste.

How to Arrange the Wiring

It is just as easy for anyone to have their loud-speakers in every room as it is to have electric light or heat, and the necessary wiring involved can be carried out without damage to the decorations. If it is inconvenient or awkward to run the cable or leads under the floor boards, what better than the top of the skirting or the picture rail? In the Christmas number was shown the interior of a house with the loud-speaker positions indicated, including one for use when weather permits wireless in the garden. First of all let us consider the two simplest methods which can be adopted for loud-speaker extensions, namely, series and parallel wiring (see Fig. 2, A and B). In the series method, Fig 2 A, one wire from an output terminal on the set passes to a connection on a wall jack or one of a pair of terminals mounted on a bracket or ebonite strip. A wire then links the second point on this wall jack or the remaining terminal on the bracket to the first terminal or jack point on the next extension position, and so on. This process in effect means taking a loop of wire between the pair of output terminals, and breaking it at the individual loud-speaker extension positions and inserting the chosen connecting device.

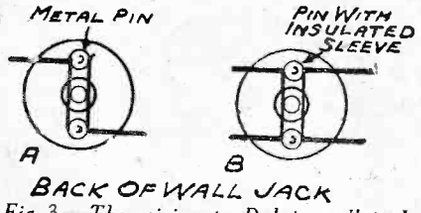


Fig. 3.—The wiring to Bulgin wall jacks.

Series Connections

With the series method of working it will be noticed that if any one loud-speaker is removed, the remainder are rendered inoperative, so it is necessary to make an arrangement for short-circuiting each position when the loud-speaker is not in use. A short length of wire or a strap of brass will suffice in the case of a pair of terminals, but with some wall jacks a short-circuiting device is already incorporated. For example, a Bulgin wall jack, resembling externally an ordinary electric light tumbler switch with the knob removed, has a double spring making connection with a metal pillar electrically in contact with the outer cover (see Fig. 3 A). The insertion of a loud-speaker plug opens the prongs of the spring and establishes contact with the plug, thus placing the speaker in circuit. A withdrawal of the plug reverses the process. If ordinary jacks are preferred to the slightly more expensive wall jacks designed specifically for the purpose, then, in the case of a series-extension scheme, use a single-circuit closed jack as indicated in Fig. 4 A. Loop together the long shank and short leaf contact and join the wire at points (a) and (b) as illustrated. An insertion of the plug will then break the circuit as before and re-establish the short on withdrawal. Messrs. A. F. Bulgin supply a complete range of components for the purpose.

The series method of working, while saving wire, is really only suitable for use in conjunction with speakers of similar resistance, and the output valve should have a fairly high impedance for matching purposes—say one of the pentode type. A more popular scheme is the parallel method of wiring shown in Fig. 2 B. Here a pair of wires is taken from the two output terminals of the set to each extension position and linked to the terminals or jack provided. In effect, all the positions are placed in "parallel" electrically, and all the loud-speakers can be in use at the same time if desired, without affecting each other individually. With, say, a Bulgin wall jack, then the metal pin previously referred to is sheathed with an insulating tube so that the double spring is not short-circuited at one end on withdrawal of the plug. If a short circuit does take place, then all the speakers will be out of action.

Parallel-wiring System

Fig. 4 B shows how the parallel-wiring system can be carried out with ordinary jacks, using in this case the single-circuit open type. In either of these wiring schemes it is necessary when using loud-speakers

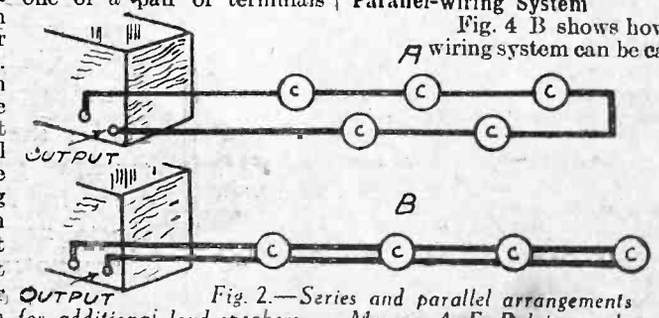


Fig. 2.—Series and parallel arrangements for additional loud-speakers. Messrs. A. F. Bulgin supply every type of plug, switch and jack for this purpose.

(Continued on page 694)

The Practical Wireless SELF-

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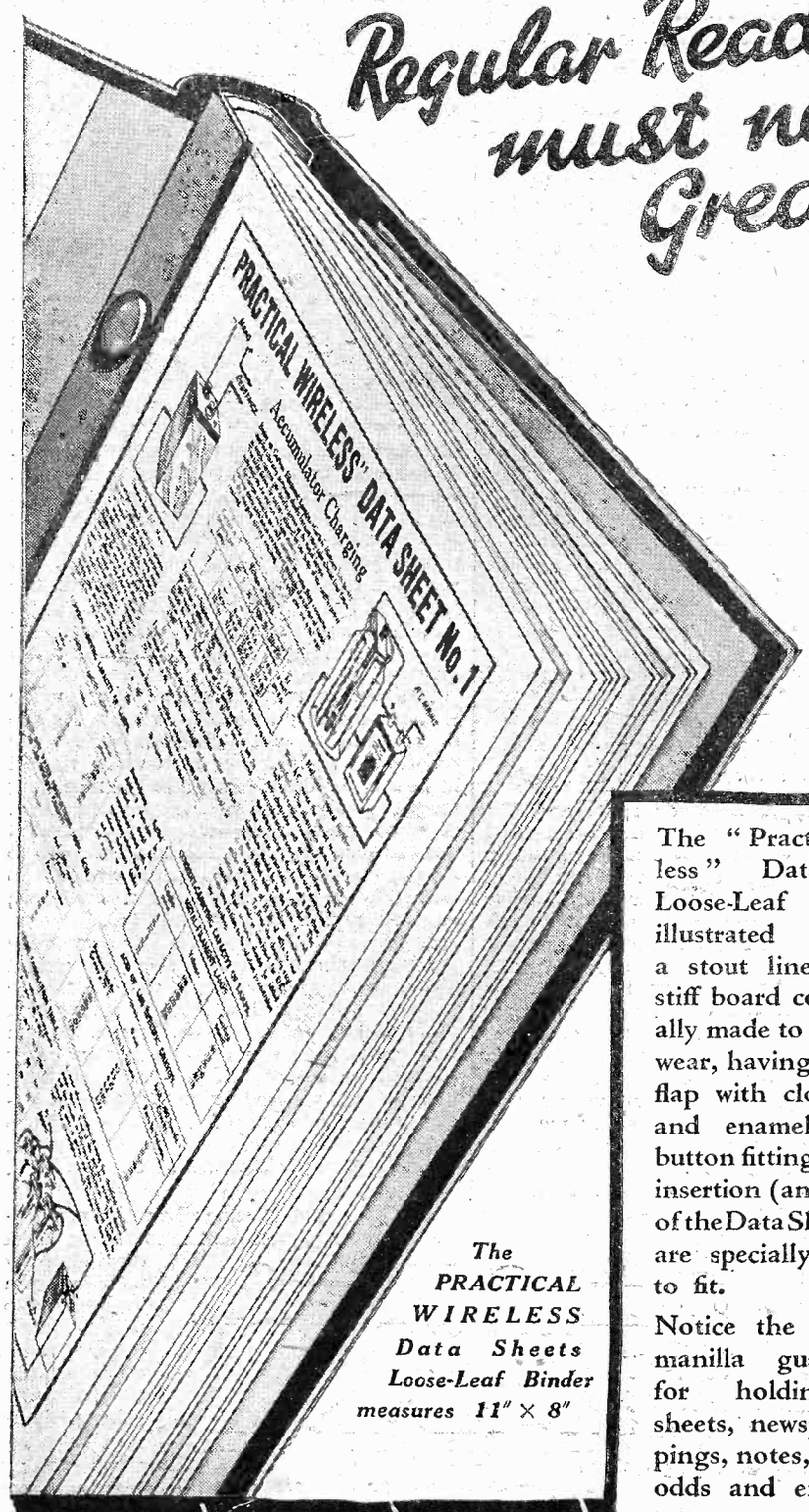

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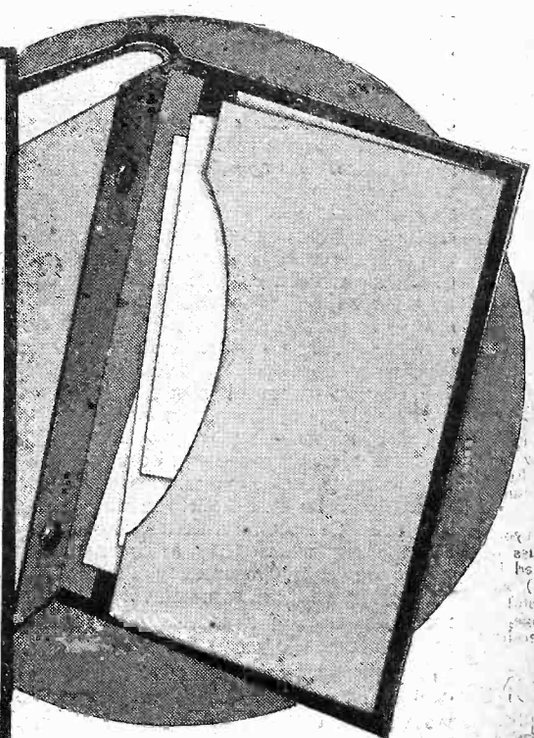

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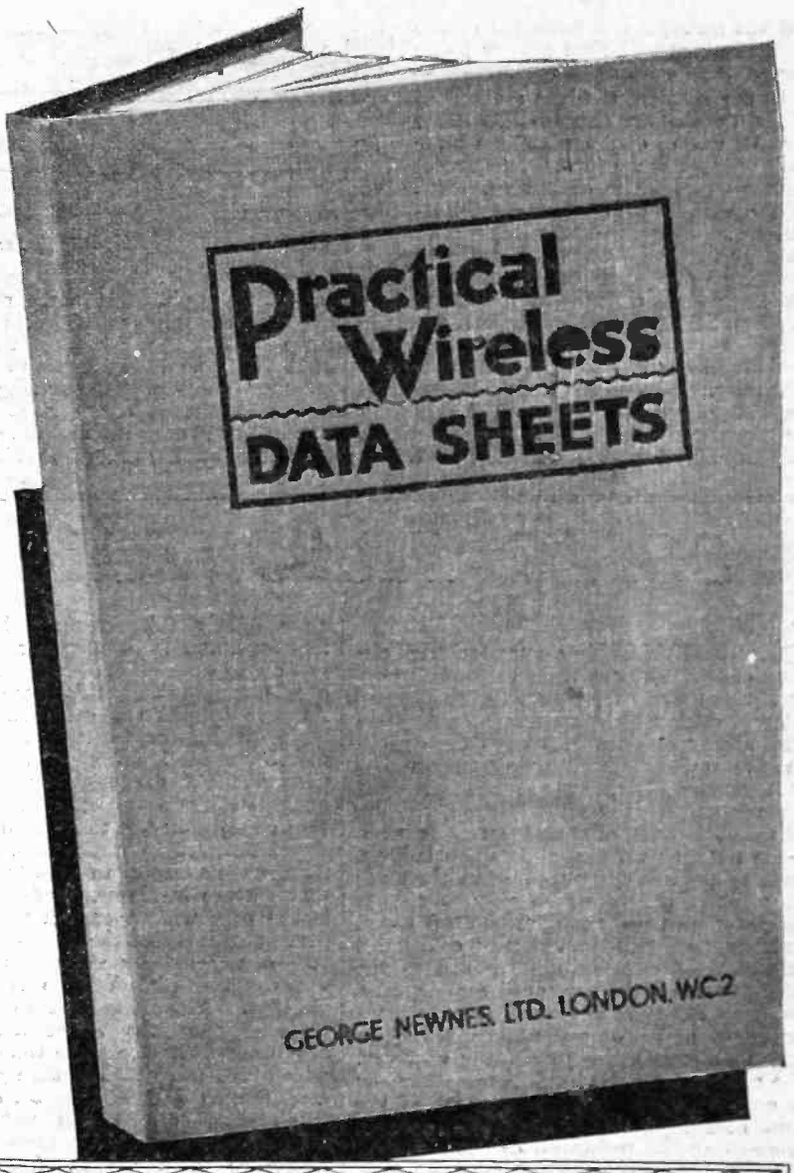
No. 4.—Mains Transformers.
No. 5.—Wire and Wire Gauges.
No. 6.—High- and Low-Frequency Chokes
No. 7.—Condensers and Condenser Values.
No. 8.—Battery Eliminators.
No. 9.—Screws and Screw-threads.

Other titles will be announced in due course.



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WIRELESS IN EVERY ROOM

(*Continued from page 691.*)

with marked polarity to see that corresponding positive positions are linked together with the parallel working, and similarly for the negative leads; while for series working the lead should be such that positive of one point goes to negative of another all the way through. The current through the windings of the loud-speakers will then always be in the same direction.

In my opinion, the best method of all is to use the choke-output filter circuit when contemplating simple loud-speaker extensions. The use of long leads from the output terminals of the wireless set often causes instability, and produces a whistling or howling in the loud-speaker owing to capacity and interaction effects. Furthermore, a proper matching up between the impedance of the valve and the impedance in the anode circuit is really essential if the valve is to work at its maximum efficiency, and the constant addition and removal of a loud-speaker at the extension positions produces a varying load and makes this impossible without the choke. Whenever possible use an output choke and a 2 mfd. coupling condenser as shown in Fig. 1. Then if it is convenient to make an "earth" connection at each extension position only one wire need be run. The wire is joined to one terminal of the loud-speaker at each listening position, while the second terminal of each loud-speaker is joined to earth. The earth really forms the return medium to the set in every case, since at the receiver itself the negative H.T. is earthed. Be sure to see that the common point of the coupling condenser and L.F. output choke is joined to the valve plate output, or, of course, the scheme will not work. If it is inconvenient or impossible to have an earth connection at each listening point, then it will be necessary to link up all these "earth" connections to a return wire passing to H.T.—. When it is desired to have the speaker connected permanently and not have a plug and jack for insertion and withdrawal, it is necessary to include a tumbler or snap switch to put the loud-speaker in and out of circuit. Naturally, this is placed in series with the speaker lead.

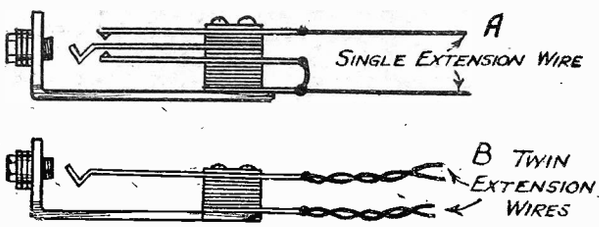


Fig. 4.—The wiring to Bulgin jacks for series or parallel connections.

The simple schemes just enunciated work admirably, confer a great boon on wireless in the home, and render good service. It may be found that certain wiring runs bring about a trace of hum or noises owing to induction from the house electric mains; but if this happens, just choose a different route for the wire. Alternatively, use lead or any metal-sheathed single or twin cable and earth the outer covering. Obviously, the insulation of any type of extension lead must be above suspicion or a breakdown may occur, and time and pleasure will be sacrificed in locating the fault

SOME PRACTICAL PARAGRAPHS

Cold Light

PERIODICALLY in electro-technical circles the subject of cold light crops up, and there has been such a revival of interest during the past few weeks. Several papers and lectures have been given on the subject, and consideration has been given to the range of gases that glow when current is passed through them. The best known of these gases is neon—the neon sign tubes and lamps being a familiar sight in our streets—but there are very many others which possess similar characteristics to neon. None of them, however, possesses the virtue of cold light. Indeed, most of them are inclined to the infra-red end of the chromatic scale, with a resultant tendency to give off more warmth than light, and a consequent great reduction in efficiency in terms of lighting capacity. The ordinary electric bulb has an efficiency of only about 10 per cent., most of the remainder being taken up in heating and overcoming the resistance of the filament. In our receiving valves the efficiency is not, of course, measured in terms of lighting capacity, although one would have been excused for so thinking in the days of bright emitters. We are only concerned with the electron flow at a given temperature, and the advent of the dull filament was a great stride. Numerous experimenters are continually going on endeavouring to find filaments that will give sufficient emission at even lower temperatures and consequently lower current consumption. At the same time, it must be remembered that current consumption does not assume the same importance nowadays, with the greater use of the supply mains, as it did when the carting about of hefty accumulators was the order of the day. Still, who can say what our valve manufacturers, the most progressive in the world, will be offering us next?

Metal Filament versus Carbon Filament

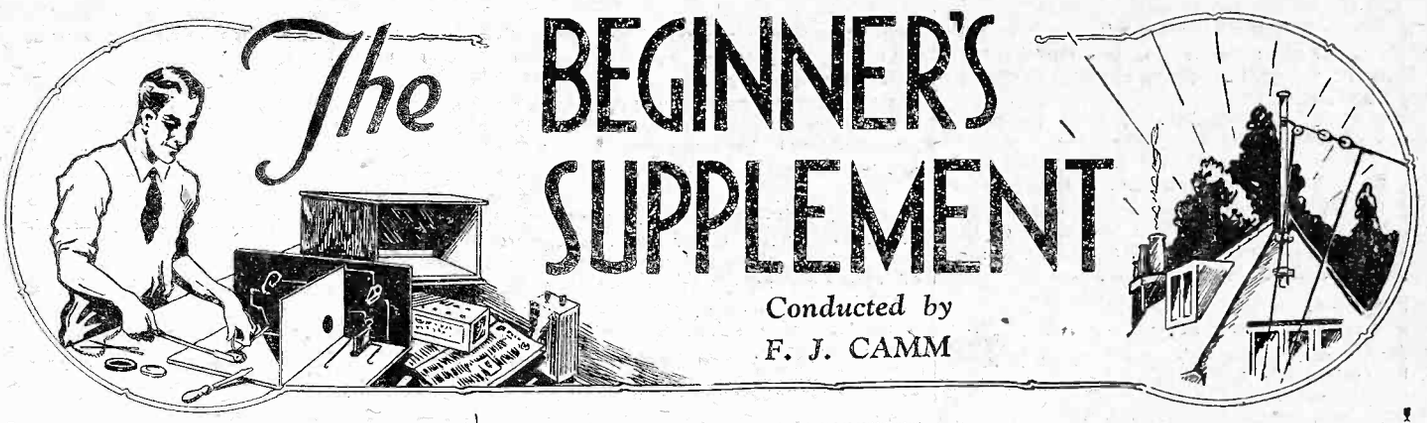
CONTINUING the subject of cold light, it is generally accepted that the fire-fly and the glow-worm share the honours of giving the most efficient light of this class. Their light is given by chemical reactions, and is of such a nature that it can all be seen by the range of the human eye, meaning that there are practically no rays toward the infra-red end of the scale which are more felt than seen. The metal-filament lamp is much more efficient than the old carbon-filament prototype, and there is also a rather interesting distinction concerning the two lamps that might be of interest to radio men. The metal filament increases in resistance as the temperature increases, whereas the reverse is the case with a carbon filament. The result of this is that the metal-filament lamp is less affected by variations in voltage, whereas the carbon lamp is very much affected. When the voltage in a metal filament rises the temperature does so accordingly. At the same time, the resistance also rises, which in turn prevents any considerable rise in current, so that the balance of current and temperature is maintained at a fairly even level. The resistance of a carbon lamp is halved when the filament is incandescent.

"Micro-ray" Transmissions

AN interesting installation is shortly to be erected at Lympne for cross-channel communication with the French air authorities, and even those of you who are used to working on short waves will be surprised at the small wavelengths used, while at the same time you will be able to appreciate the difficulties involved. The apparatus is known as the "Micro-ray," and communication will be carried out on a wavelength of 15 cm. or 0.15 metres. The transmitting and receiving aerials will be less than one inch in length, and the "micro-rays" which are generated in a "micro-radion" tube have a frequency of more than 2,000,000,000 per second. The rays are fed from the tube to the transmitting aerial, and concentrated by a series of mirrors into a fine pencil of rays, which are finally thrown into space by a circular reflector of about 10 feet in diameter. A similar station equipped with identical apparatus will be installed at the French Air Ministry's aerodrome at St. Inglevert. The cross-channel service will be used to announce the departure and arrival of aircraft not fitted with wireless, and the stations will be working in the New Year. We don't suppose you will hear them!

'Ware Mirrors

THE use of mirrors to deflect wireless waves would thus seem to be full of possibilities, but have you noticed that very poor results with portable receivers can often be traced to the effect of mirrors in the room? This was brought to our notice some time ago where a portable set was being used on a sideboard which had a large centre mirror. When the set was placed in front of this mirror the results were poor indeed, an improvement being noticeable as soon as the set was moved away from it. The portable, of course, had a frame aerial in the lid, and this was parallel to the mirror, which was acting as a large metal screen. No wonder the results were poor!



Buzzer Wavemeter

A WAVEMETER, that is an instrument for determining wavelengths, which employs a buzzer in order to produce the necessary radiations. The wavemeter acts as a miniature transmitting station and can be set to radiate on known wavelengths.

Suppose, for instance, you have a receiving set and you wish to know to what position you must set the tuning dial to get a station which is supposed to be transmitting on, say, 400 metres. What you do is to set the buzzer wavemeter to radiate on 400 metres and place it near your set. You then tune your set until you can hear in the speaker or 'phones the buzzing note given out by the wavemeter. The position of the tuning dial which gives the loudest signal is the setting desired. At that point your set is tuned to 400 metres and the exact position of the dial can be noted and marked. In the same way other wavelengths may be arrived at and, if necessary, your set can be completely calibrated by setting the wavemeter to radiate on a series of different wavelengths. (See also "*Buzzer*" and "*Wavemeter.*")

"C" Battery

A term used in America and some other countries to denote the grid bias battery. Under this system the low-tension battery, or accumulator, is called the "A" battery and the high-tension (H.T.) battery is designated the "B" battery.

Capacity

(of an accumulator or storage battery) is the amount of electricity it will deliver when fully charged. This is measured in

THE BEGINNER'S ABC OF WIRELESS TERMS

ampere-hours. (See "*Ampere-Hour.*") For instance, if the capacity of an accumulator is said to be 20 ampere hours (amp. hrs.) it means that, theoretically, it will deliver current at the rate of one amp. for twenty hours—or its equivalent, say, half an amp. for forty hours or two amps. for ten hours. In practice, however, it will be found that the capacity of an accumulator depends to some extent on how quickly it is discharged. The quicker the current is taken from it the less time it will actually last. This means that an accumulator which would give, perhaps, half an amp. for forty hours, would most likely not last for ten hours if discharged at the rate of two amps. all the time.

Sometimes the capacity of an accumulator is stated as an *intermittent* rate. This is rather misleading to the uninitiated, but means that the *actual* capacity is half of this figure. Thus, if you see "20 amp. hrs. intermittent" or "20 amp. hrs. int." printed on an accumulator, you will know that the accumulator will actually give only 10 ampere-hours of electricity.

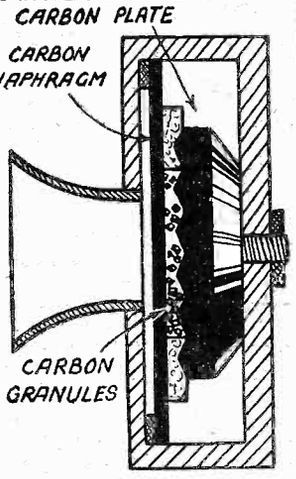


Fig. 2.—A carbon microphone —showing the arrangement of carbon granules and block.

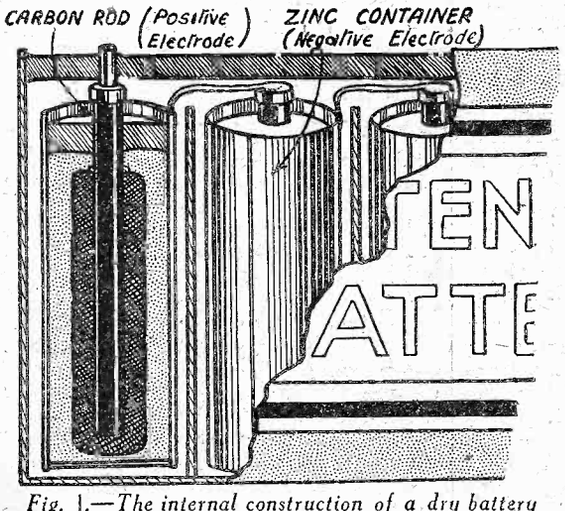


Fig. 1.—The internal construction of a dry battery of the high-tension type.

Capacity

(of a condenser)—is its ability to store up electricity. It is measured by the amount of electricity which will cause a difference of potential of one volt between the plates of the condenser. A condenser which required one *coulomb* of electricity put into it to cause a difference of one volt in the potential of the plates would be said to have a capacity of one *farad*. This unit is too large for practical purposes, so we more often speak of *microfarads* (*mfds.*). A microfarad is a millionth part of a farad.

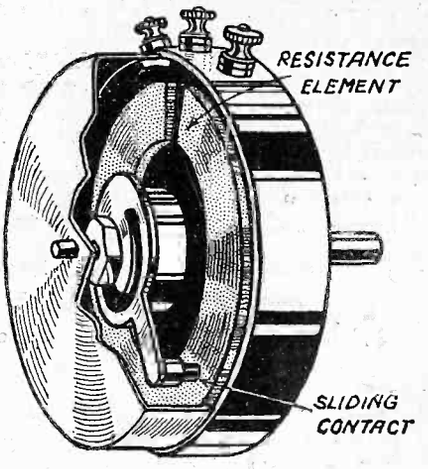


Fig. 3.—One type of potentiometer or variable resistance.

Carbon

The form of carbon that is met with in electrical and wireless apparatus is known as *gas carbon*, and is a by-product of the gas industry. It is a hard, black substance, and although non-metallic is a comparatively good conductor of electricity. A small stick of carbon about two inches long is used as the positive element in each of the cells of dry batteries as used for high tension and grid bias purposes. (See Fig. 1.)

Carbon is also used in the construction of the carbon microphone (See *Microphone*). This usually consists of a thin carbon disc or diaphragm and a carbon plate. These are separated by a small gap which is loosely filled with small pieces or *granules* of carbon. (See Fig. 2.)

Another form of carbon is *graphite*, and sometimes compounds of graphite are used as resistance elements in both fixed and variable resistances. Fig. 3 shows one form of variable resistance in which the element is in the shape of a circular disc. A revolving arm makes a rubbing contact with the element.

Carrier Wave

The wireless waves or high-frequency oscillations given out by a telephony transmitter such as a broadcasting station. The oscillations are not of uniform intensity, but vary according to the speech or music that is being transmitted.

The idea behind the term "carrier wave" is that the speech, etc., is "carried" by these oscillations from the transmitter to the receiver.

Cascade

Wireless and electrical apparatus such as valves, amplifiers, etc., are said to be connected in cascade when the output of the first is joined to the input of the second, the output of the second to the input of the third, and so on.

Cathode

A term used to denote the *negative* pole of a piece of apparatus. It is more particularly used in reference to the negative electrode of valves, X-ray tubes, vapour lamps, etc. It is the element from which the negative particles of electricity or *electrons* are given off.

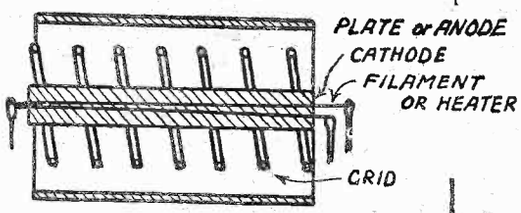


Fig. 5.—The cathode of an indirectly-heated valve.

In a battery-heated valve the filament is the cathode, as it is from this that the electrons emanate. (See Fig. 4.)

In a mains valve, that is one made for use in an all-mains set, the filament is not the cathode, but is merely used to heat an element which surrounds it. This element is called an *indirectly-heated cathode*, and it is from this that the electrons are given off. Being of greater mass than the filament it has the advantage that it remains at an even temperature in spite of fluctuations in the filament current. This is why it is used in mains valves. If a battery type of valve were used in a mains set the rise and fall in the alternating current used to heat the filament would cause a corresponding rise and fall in its temperature, and thus cause fluctuations in the emission of the electrons, resulting in violent mains hum. The indirectly-heated cathode, by reason of its insensitiveness to rapid changes of temperature, gives out a constant stream of electrons and thus overcomes this difficulty. Fig. 5 is a sectioned view of a mains valve showing the indirectly-heated cathode.

Cat's Whisker

The fine wire used in some crystal detectors to make contact with the crystal. It is usually made in a spiral form like a small spring as in Fig. 6. The point of the cat's whisker is moved over the surface of the crystal until a sensitive spot is discovered. Best results are usually obtained when the point rests on the crystal with the very lightest pressure. Various metals have been used for cat's whiskers, including gold and silver, but very little advantage seems to accrue from the use of precious metals. A piece of fine copper wire gives quite satisfactory results.

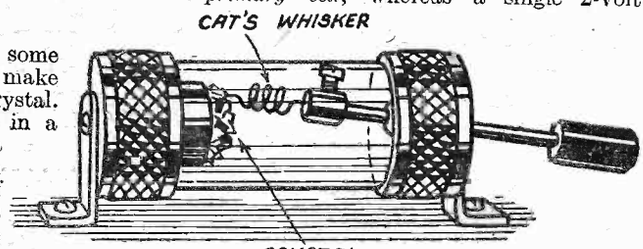


Fig. 6.—A standard form of crystal detector.

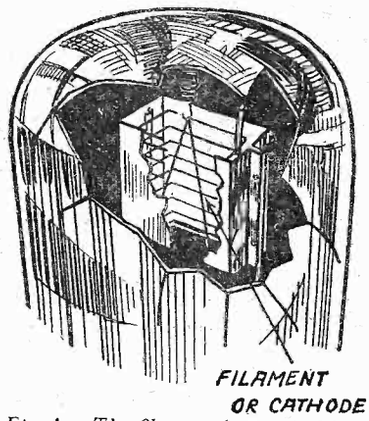


Fig. 4.—The filament (or cathode) of an ordinary battery-heated valve.

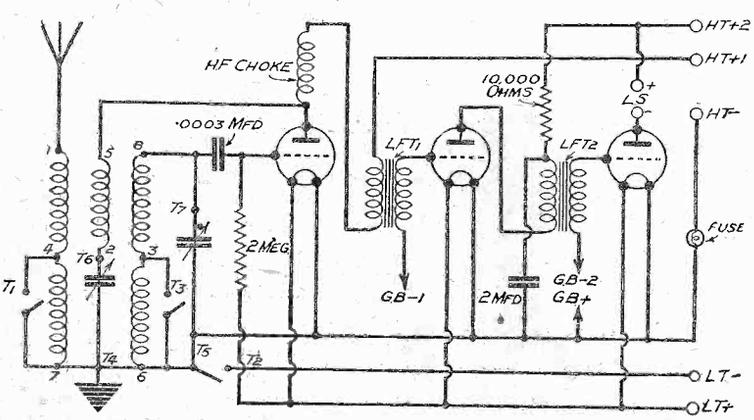
Cell

A single unit in a battery is called a *cell*. In the case of ordinary batteries which cannot be re-charged it is called a *primary cell*, whereas a single 2-volt accumulator or storage battery is known as a *secondary cell*. The term "battery" is often misapplied to a cell. A battery is a collection of cells and a single 2-volt accumulator is a cell and not a battery. A car battery, on the other hand, really is a battery, as it contains several secondary cells joined together, so also is an H.T. battery, since it is made up of a number of primary cells.

A cell whether primary or secondary usually consists of two conducting elements, such as two dissimilar metals or a metal and a stick of carbon. These are separated by a fluid or paste. When the two elements are joined by a wire chemical action takes place in the cell and causes an electric current to flow along the wire. A section of a typical cell is shown in Fig. 1.

THE SOLO KNOB THREE

Owing to pressure on our space in the Christmas number (December 10th issue) it was not found possible to publish the circuit of the Solo Knob Three. This is now given for the benefit of those readers who prefer to wire up a receiver from a theoretical diagram. It should also be noted that two Belling Lee terminal mounts, and four Belling Lee terminals, type B, marked Aerial, Earth, L.S.— and L.S.+, are required in addition to the list of components given in the Christmas number. For the benefit of those who are constructing this receiver the complete list of components is repeated.



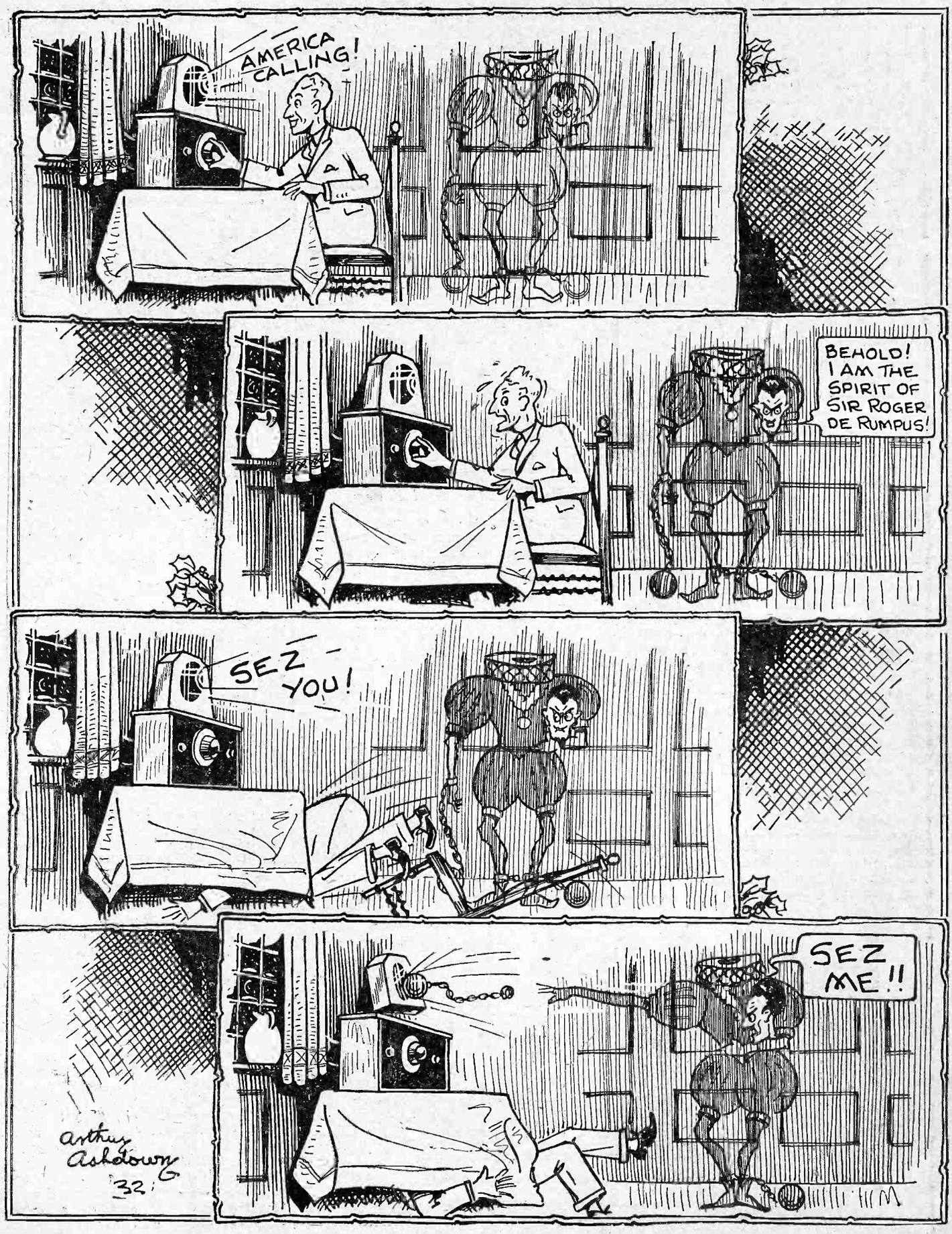
The circuit of the Solo Knob. The construction of this receiver was fully described in the Christmas number, dated December 10th..

1 Lissen Ganged Condenser Tuning Control Unit.

1 Telsen Matched Screened Coil.

1 Ready Radio 3-1 Transformer.
1 Telsen Ace 5-1 Transformer.
1 T.C.C. .0002 mfd. Fixed Condenser, Type S.
1 T.C.C. 2 mfd. Fixed Condenser, Type 50.
1 Graham Farish Horizontal Grid Leak Holder.
1 Graham Farish 2 megohm Grid Leak.
1 Bulgin Baseboard Fuse Holder and Fuse.
1 Bulgin 10,000 ohms Spaghetti Resistance.
1 Graham Farish Snap H.F. Choke.
3 W.B. 4-pin Valveholders.
1 Ebonite Panel (Permcol), 12in. by 7in.
2 Belling Lee Terminal Mounts.
4 Belling Lee Terminals, Type B, marked Earth, Aerial, L.S.— and L.S.+.
1 Coil Glazite Connecting Wire.
1 Cossor 210 Det. Valve.
1 Cossor 210 L.F. Valve.
1 Cossor 215 P. Valve.
1 Belling Lee 5-way Battery Cord.
1 Ediswan 105-volt Super H.T. Battery.
1 Ediswan 9-volt Grid Battery.
1 Ediswan 2-volt 40 amp. Accumulator
1 Ormond Loud-Speaker, Type 452.
1 Osborn Cabinet, Type 178.
1 Tin of Filt.
1 Wooden Baseboard, 12in. by 10in.
Screws, Flex, 3 Wander Plugs marked G.B.+, G.B.1 and G.B.2.

OUR ARTIST SUCCUMBS TO AMERICAN RADIO INFLUENCE



ALL ABOUT GRID BIAS

Valuable and Complete Information about an Important Subject

By G. V. COLLE

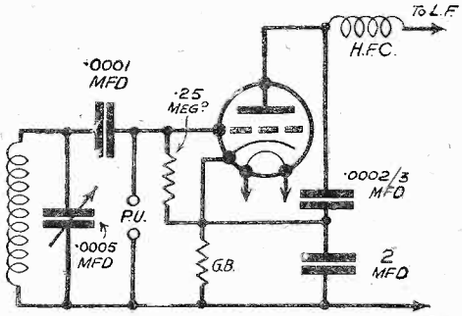


Fig. 2.—Typical detector arrangement.

IT is inevitable when one is engaged for many years in the technical branch of an industry such as radio, to acquire a first-hand practical knowledge of constructional "snags." It is equally certain one also discovers where theory and practice differ, particularly after building no less than one thousand sets of various designs ranging from crystal to multi-stage super-hets. Such is the writer's experience, and should anyone consider this savours of unnecessary pride, it can only be excused on the ground that it lends support to the recommendations made hereunder on grid-bias schemes.

During the past two years in particular, immense strides have been made by manufacturers of fixed condensers and resistances to produce components suitable for the indirectly-heated mains valves, and whereas formerly these parts were universal, large in bulk, and expensive, they can now be purchased in specialized forms. Take, for instance, the fixed condenser connected across the grid-biasing resistance in the cathode lead of an indirectly-heated mains valve, in which it acts as a reservoir capacity. Until of late, this condenser was of quite small capacity, ranging, say, from .5 to 2 mfd., tested to 200 volts or so working voltage. An examination of a valve list will show such valves rarely, if ever, require more than 40 volts negative grid bias, and consequently one had to pay for a condenser literally too good for the purpose. Nowadays, dry electrolytic condensers of lower working voltage rating are procurable at cheaper or equal prices and with capacities ranging from 10 to 100 mfds.

Grid-biasing Resistance

The extra smoothing afforded by the larger capacity (and, incidentally, considerably smaller bulk of the condenser) is apparent in the lower residual "hum" level normally achieved, due to the larger reservoir action. Turning to the grid-biasing resistance itself, this was formerly quite a clumsy affair, consisting of a round rheostat winding arrangement, or a clumsy former wound with many turns of wire, out of proportion to the current to be carried.

Here again rapid strides have been made in reducing the bulk of the component, and classifying the current dissipation in watts or milliamperes. Among the types procurable there are synthetic graphite resistances in vacuum, compressed solid graphite or leaky compounds and wire-wound asbestos cord elements wound around small grooved porcelain or heat-resisting formers. Each of these resistances is a specialized component, inasmuch as the maker suggests it be used for certain purposes and fills "gaps" with other types.

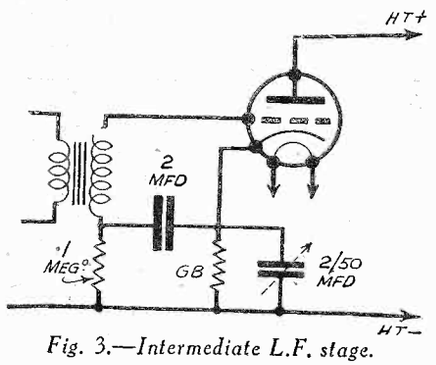


Fig. 3.—Intermediate L.F. stage.

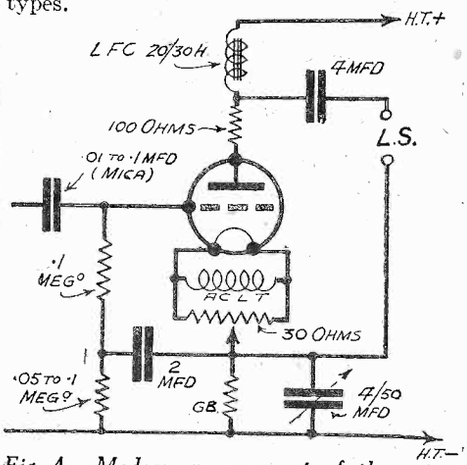


Fig. 4.—Modern arrangement of the output stage, employing directly-heated mains valves.

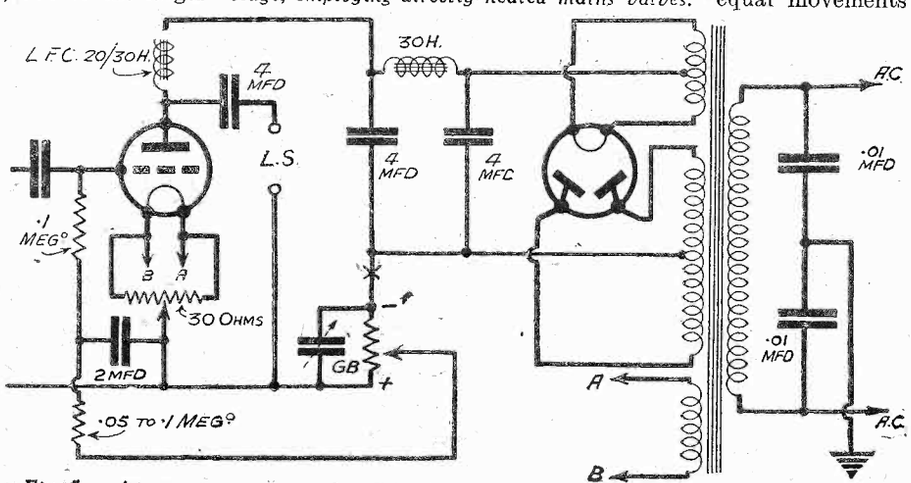


Fig. 5.—Arrangement where the G.B. resistance for the last valve acts as a H.T. voltage dropper.

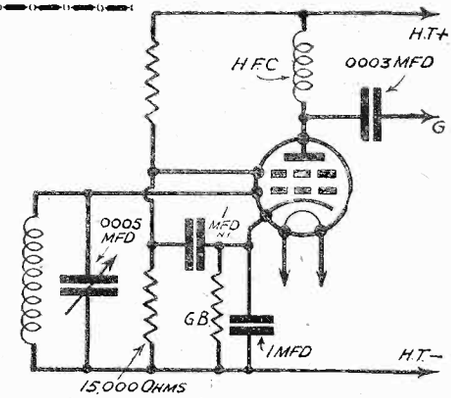


Fig. 1.—Simple arrangement for variable grid bias.

Taking practical examples, a wire-wound affair would undoubtedly be recommended for the voltage-dropping resistance in the cathode lead of an L.F. or power valve, where the anode current (and consequently the current in the cathode lead) is considerable. For a mains H.F. S.G. valve of standard type a resistance other than a wire-wound affair would be suitable, always provided it is rated to carry the current consumed by the valve, plus a safety margin of, say, 25 per cent.

Grid-bias Voltage for Variable-mu Valves

The variable-mu screen-grid valve, which is of modern design, necessitates quite a different kind of resistance for the grid bias, since it operates by changes of grid-bias voltage, and consequently calls for a variable resistance. This latter component is, of course, as old as radio itself, but owing to the high values of anode current produced at low grid-bias voltage the resistance element must of necessity be wire-wound, and, furthermore, of a substantial gauge of "Nichrome" wire. To produce equal volume changes for equal movements of the control knob, and especially with 1932-3 variable-mu valves, the wire resistance track must have practically a logarithmic action, achieved by tapering the resistance element.

It is necessary to qualify the latter statement by adding that the taper element is only necessary where the grid-bias voltage alone is varied (see Fig. 1). Certain other volume-control schemes include a reduction of aerial input with an increase of grid-bias voltage as in Fig. 7, and here the resistance should be of equal value for equal movements of the knob; in other words, the resistance element can be of a standard type, subject to current-carrying conditions. Referring more fully to the circuits reproduced here, Fig. 2 is a typical detector arrangement for "pick-up" or radio reproduction. An external volume control is a necessity with the "pick-up," otherwise overloading will occur. The G.B. reservoir condenser can be of low voltage type, rated according to the valve-maker's suggestion, and of a moderate capacity as marked, or up to 10 mfds.

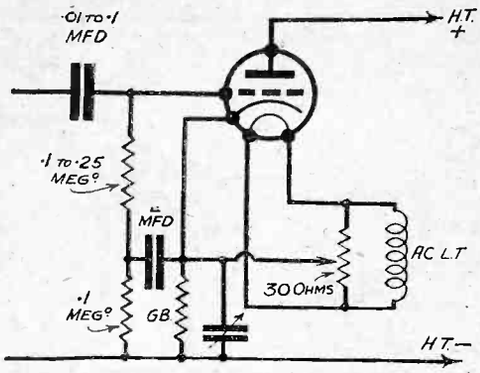


Fig. 6.—Useful arrangement employing five-socket valve holder, enabling direct or indirect heated A.C. valves to be used without wiring modification.

highly-efficient valves, the Mazda PP5-400 and Marconi and Osram PX25.

An Unusual Circuit

A somewhat unusual circuit is shown in Fig. 5, the G.B. resistance for the last valve also acting as a voltage-dropping H.T. resistance, it being assumed the H.T. voltage output is in excess of what is required by the set. The value of the device lies in the fact that constructors can make use of A.C. transformers or H.T. supplies of high power with small sets. If the output of the H.T. unit is some 100 to 150 volts in excess of requirements, it is possible to include the field winding of a M.C. loud-speaker at the point X and use a series resistance for G.B. strictly to the value for correct biasing. Both the "field" and the resistance must be capable of carrying the *total* anode current of the set, and calculated on this basis.

An extremely serviceable device is shown in Fig. 6, since it is possible by employing a five-socket valve holder to utilize either a direct or indirectly-heated A.C. valve without wiring modifications. Of course, the G.B. resistance must be replaceable if the requirements of the valves used are different.

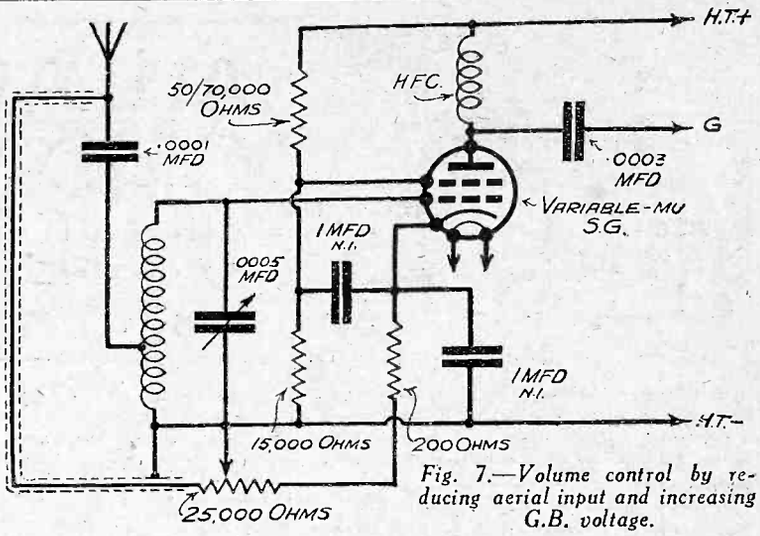


Fig. 7.—Volume control by reducing aerial input and increasing G.B. voltage.

Decoupling

Fig. 3 illustrates an intermediate L.F. stage (or a low-powered, indirectly-heated output valve). Particularly is the attention of the reader directed to the decoupling device in the grid circuit, it having been assumed there are other L.F. circuits, or considerable H.F. amplification before this stage. Strange as it may seem, set designers pay little or no attention to devices of this nature, as, in the writer's experience, a little arrangement of this nature often cures a tendency to "motor-boating." Increases in the H.T. decoupling arrangement are usually tried, at increased cost and often at the expense of H.T. voltage, which is reduced, due to the inclusion of a higher value resistance in the H.T. positive lead. For one L.F. stage, grid decoupling is usually redundant.

An example of a modern output L.F. stage, employing a directly-heated slow heating mains valve, is given in Fig. 4, and full use is made of an electrolytic G.B. condenser. Since these condensers have polarity owing to their internal construction, it is very important their outer metal cases (negative) are joined to the common H.T. negative lead. On a metal chassis the round canister type are inverted and fixed through a hole in the metal and locked with a single nut. The circuit is applicable to those modern and

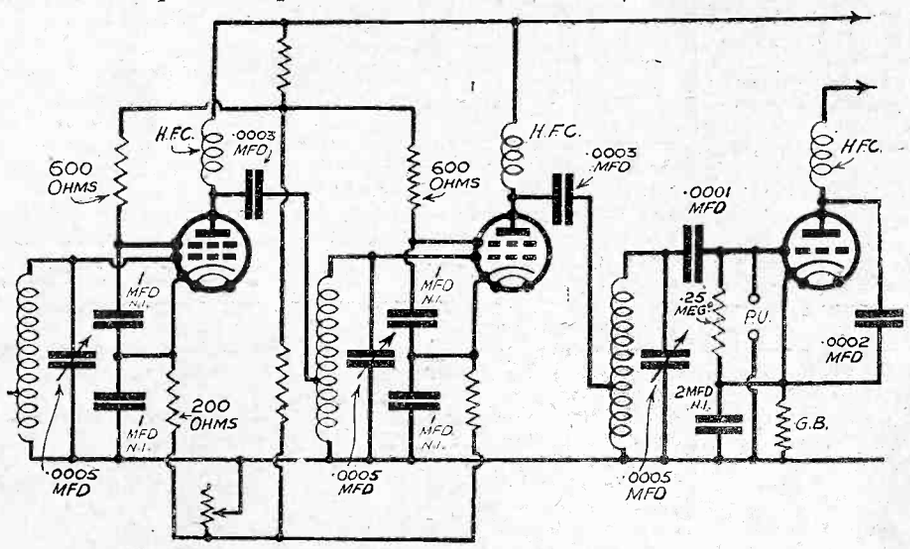


Fig 8.—An elaboration of Fig. 7, employing two variable-mu stages.

Fig. 8 is an elaboration of the former, two variable-mu S.G. stages being employed. The volume control should be a resistance with a logarithmic winding as mentioned previously.

Precautions When Using a Pick-up

For super-het. enthusiasts and users of sets having two S.G. stages, the circuits Figs. 9 and 9A will prove of interest, being detector (2nd detector for super-hets.) circuits utilizing S.G. standard valves. Both arrangements are practical ones, having been thoroughly tested. Provision is made for "pick-up" with *external* volume control. In Fig. 9A, and using the pick-up, switch "A" is open, "B" closed, and

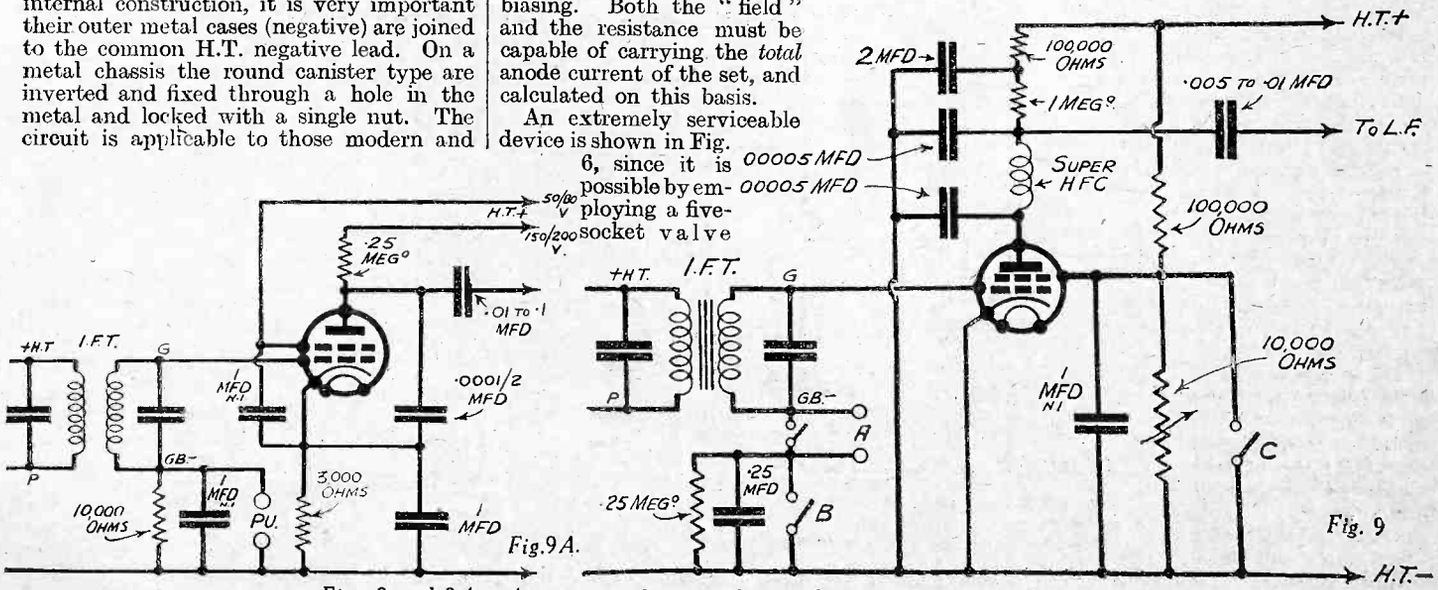


Fig. 9A. *Fig. 9*

Figs. 9 and 9A.—Arrangement for super-hets. and sets employing two S.G. stages.

"C" open. The reverse order is the case for radio reception. With certain valves switch "C" can be omitted, but in any case it is important that all radio controls are "de-sensitized" when using the "pick-up."

To avoid misunderstandings, it can be explained at this stage Figs. 1, 2, 3, 7, 8, 9 and 9A are applicable to D.C. indirectly-heated valves as well as A.C., although in Figs. 2, 8, 9 and 9A precautions are necessary in order to guard against shocks with the "pick-up," as sometimes the negative mains lead is above earth potential to the full extent of the mains voltage. In such instances the use of a "pick-up" transformer, ratio 1 to 1, or fixed condensers in each lead is called for. On A.C supplies precautions of this nature are unnecessary.

Automatic grid bias is only beginning to be realized as a practical possibility on portable battery sets, and Fig. 10 is a typical example of one possible arrangement. The basic circuit is one of four valves as shown, and grid bias is derived from a voltage drop depending on the *total* anode current in the H.T. negative lead. A useful table accompanies the circuit, and should prove of value to prospective constructors.

This table will enable resistances to be chosen for practically any type of portable receiver, and covers the complete range of voltages required.

The actual components may be of any type, provided they are chosen to carry the current without heating, and are at the same time small and light in weight.

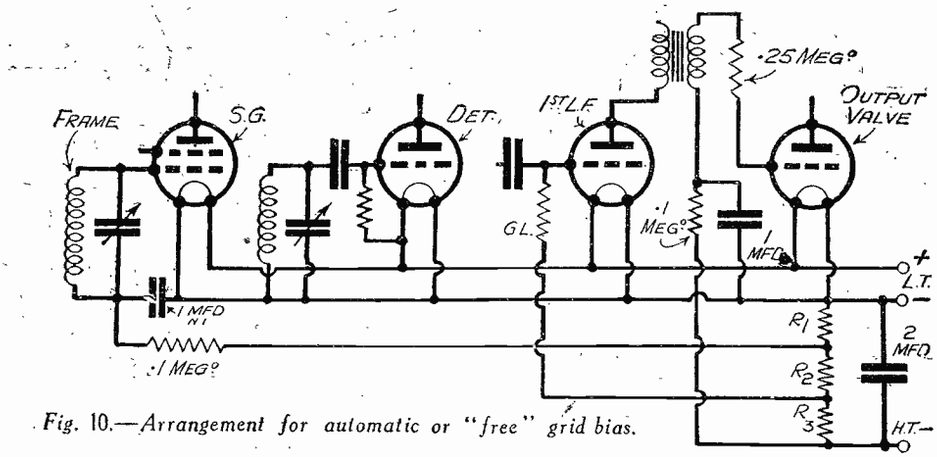


Fig. 10.—Arrangement for automatic or "free" grid bias.

G.B. RESISTANCES FOR PORTABLE BATTERY SET.

Total Anode Current M/A	Total Approx. R1+R2+R3	R1. G.B. H.F. Valve		R2 (+R1) G.B. 1st L.F.			R3 (+R1+R2) G.B. 2nd L.F.			
		.9v.	1.5v.	1.5v.	3v.	4.5v.	6v.	7.5v.	9v.	12v.
* 7	1,300	130 (150)	215 (200)	215 (200)	430 (400)	643 (600)	857 (750)	1,070 (1,000)	1,290 (1,000)	1,714 (1,500)
* 8	1,125	112 (100)	188 (200)	188 (200)	375 (400)	562 (600)	750 (750)	937 (1,000)	1,125 (1,000)	1,500 (1,500)
* 9	1,000	100 (100)	166 (150)	166 (150)	333 (300)	500 (500)	666 (600)	833 (750)	1,000 (1,000)	1,333 (1,000)
*10	900	90 (100)	150 (150)	150 (150)	300 (300)	450 (400)	600 (600)	750 (750)	900 (1,000)	1,200 (1,000)

* Nearest commercial resistance values.
Intermediate values obtainable by parallel or series connections of two or more resistances.

Note.—The value of R2 can be found by deducting the value of R1 chosen previously. R3 is then chosen and the values of R1 plus the *final* value of R2 (R2—R1) deducted.

TAMING THE ETHER GIANTS

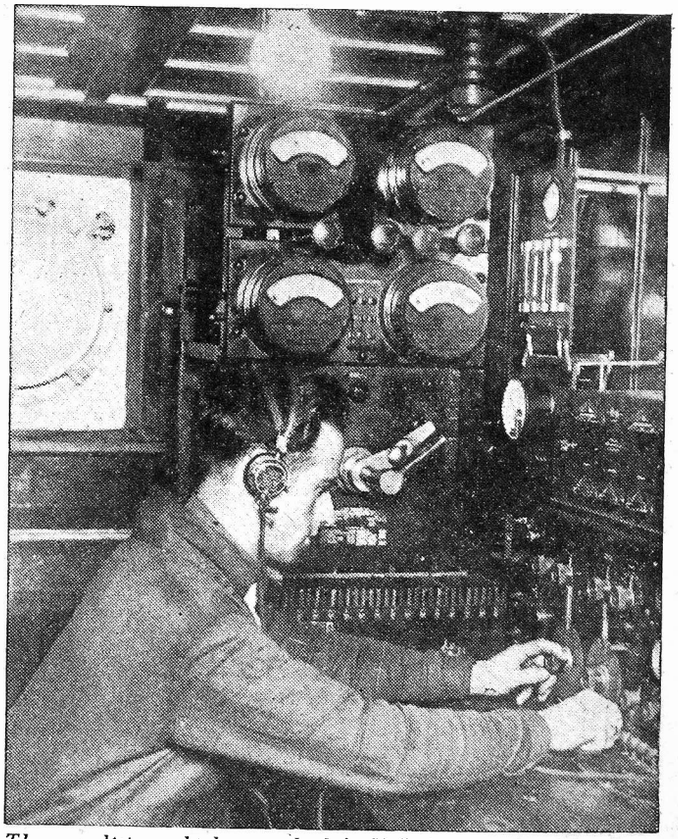
By A. J. WOOD

THE gradual increase in the number of broadcasting stations adopting high power, whilst satisfactory in some respects, presents for many listeners a problem that is not easy of solution. They find these stations butting in when they are not wanted, and no amount of dial adjustment will altogether eliminate them. It is particularly disconcerting when the interference upsets the local programme you are listening to, as is often the case. If these listeners are using an outdoor aerial and their sets are not very selective, they stand very little chance of improving matters short of a radical alteration of their sets, and this is not always practicable, often for reasons of economy. Nevertheless, if they are willing to compromise in the cause of comfortable listening, they have a remedy at hand which is both easy and economical to apply. Let them try the simple expedient of a short indoor aerial, not one that goes somewhere upstairs, or all round a picture rail, but simply a short length of insulated stranded wire (about 8 feet or so will do) suspended from a hook on the picture rail, and just long enough to reach down to the aerial terminal of the set.

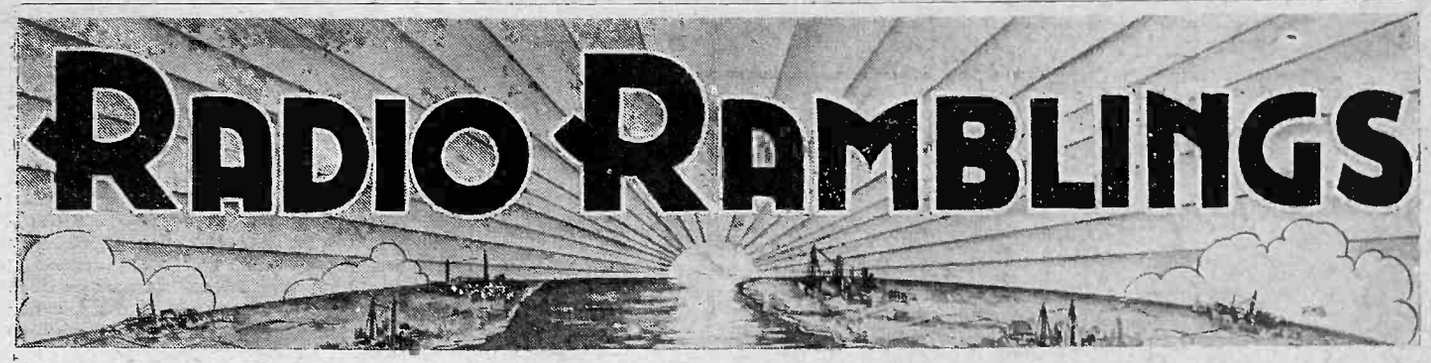
Speaking from my own experience, I was much surprised when I first tried it out as an experiment, and found what could be done by such simple means. I really tried it in the first instance to cut down the great strength (using an outside aerial) of the Moorside Edge transmitters. Even on so short an aerial as this they are still very strong, and need no reaction. Much to my surprise, however, I soon found out that its use was not confined to receiving the local in comfort, but, with the aid of reaction, was eminently satisfactory in also bringing in a number of the more powerful foreigners at quite good strength, clear of interference. Leipzig, Stuttgart, Strasburg, Poste Parisien, Breslau, Heilsberg, and Trieste were all received at good loud-speaker strength without pushing reaction to the limit on a simple three-valve set (o-v-2), so that a set using a stage of H.F. ought to do very well indeed on such a short aerial as above described. I may add that other stations were also heard, but I have only mentioned those that were really good enough for loud-speaker reception.

As more foreign stations will shortly be increasing their strength, and still further complicate matters, this short indoor aerial should greatly assist those whose sets are a bit too powerful for a decent measure of station separation on strong signals. Actually the position is this: If foreign stations will not reduce their power, then those listeners who are troubled by them can easily adjust themselves to the new conditions by taking steps to minimise their interference by the simple means suggested. This will give just that necessary degree of "selectivity" to suit the circumstances. The outdoor aerial can be left for special occasions, if desired.

MUSIC FOR ARCTIC EXPLORERS.



The expedition which recently left U.S.A. to explore the Arctic regions under Lieut.-Commander Richard Byrd, will be kept entertained by music received on the powerful wireless equipment they carry.



JOTTINGS FROM MY NOTEBOOK.
By "DETECTOR."

Cutting Out the S.G. Valve

FOR reception of the local stations an S.G. valve is often a disadvantage because it tends to cause both detector and low frequency valves to become overloaded. There are various ways of cutting out the S.G. stage for local reception and a number of these have previously been described in PRACTICAL WIRELESS. In general the methods consist of transferring the aerial from the aerial coil to the second tuned circuit. This is very simple of accomplishment and is sometimes fairly satisfactory, but has the serious disadvantage of causing a tremendous drop in selectivity due to the elimination of one tuned circuit. It is possible, however, to cut out the S.G. valve without any loss of selectivity whatever. By connecting a .0001 mfd. pre-set condenser between the anode of the S.G. valve and the "top" of the aerial coil the two coils form a band-pass filter. An "On-Off" switch is connected in the filament lead so that an economy can be effected by cutting off the L.T. supply to the first valve. The .0001 mfd. pre-set condenser must first be adjusted to the position which gives the desired degree of selectivity, but afterwards it can be left entirely alone. This condenser could be brought into circuit by means of a switch, but the capacity of the latter would probably have a bad effect and so it is better to leave one terminal connected to the coil and connect the other to the anode of the S.G. valve, by means of a short length of flex, each time the valve is to be cut out.

Pick-Up Improvement

MANY listeners are disappointed when first trying a pick-up on their set because they find reproduction far from satisfactory. Generally the reason can be traced to a fault in the amplifier (even though it works well enough on radio), but much can be done to improve results by connecting different condensers and resistances across the pick-up terminals. Sometimes a resistance or condenser by itself will do the trick but quite often best results are obtained by combining resistances and condensers as shown in Fig. 1. If a 10,000 ohm variable resistance is available this should be tried first; afterwards try a .001 mfd. pre-set condenser and then combine the two. A little experiment on these lines will enable you to get just the tone required, and, if suitable valves are chosen, needle scratch can be greatly reduced.

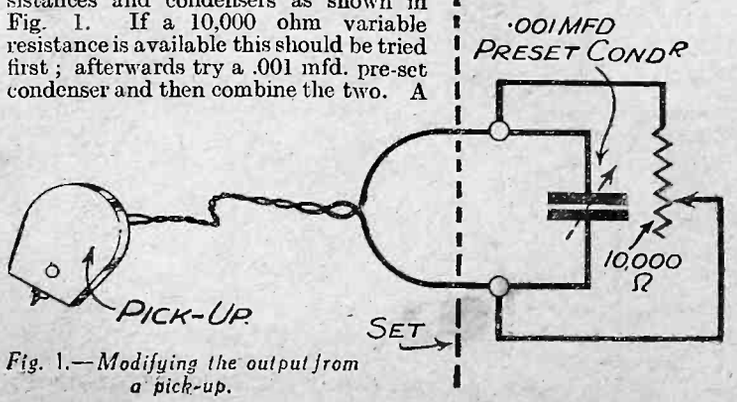


Fig. 1.—Modifying the output from a pick-up.

Sun-Spots

RECEPTION conditions are remarkably good this winter; in fact, in my opinion, they are quite as good as they were in 1925. The reason is attributed to presence of sun spots, which are known to have a great effect on the propagation of wireless waves. Sun-spot cycles occur about every seven or eight years, and during the sun-spot periods conditions are abnormally good. I remember that during the winter of 1924-25 I was successful in bringing in quite a number of American and Canadian medium-wave stations on a single valve set. Of course, I used phones, but by adding a "2L.F." amplifier decent loud-speaker reception was possible. At that time I did not consider it any great feat to tune in all the British and Continental broadcasting stations then in existence on a single valve set, and stations like Madrid, Ecole Supérieure, and Radio Belgique were very popular. When one considers that most of these stations then worked on a power of 1½ kilowatts or less the results appear all the more remarkable.

Distant Reception.

BUT to return to the present season; we find loud stations all round the dials and the greatest difficulty is to eliminate the unwanted ones. Selectivity is all-important, but even if your set is not selective you need not be deprived of American reception because the number of stations working after midnight are comparatively few. I have stayed up until 2 a.m. a few nights recently and have been rewarded by the good reception of quite a number of stations from the other side of the Atlantic. The most consistent stations have been WGY, WGZ, WBG and KDKA, but others have been picked up at intervals.

Nearer Stations

IN regard to nearer stations I have found the Italians best of all. Trieste on 247.7 metres, not usually a very powerful station, is coming through with tremendous "punch" and with only faint fading. Rome is the same old steady signal, always reliable and always worth listening to. Turin, Genoa, Milan and Florence are not quite so loud but can be brought in with ease at any time after six o'clock or so. The Germans—Leipzig, Heilsburg, Langenberg and Koenigswusterhausen—seem to be louder than ever, but I find Mühlacker rather a difficult station because almost every time I have tried for him he has been badly heterodyned. The French stations are fairly reliable, and Poste Parisien is regularly good when clear of Hamburg. Radio Normandie is very loud but subject to rapid and violent fading; at one moment he has to be toned down and at the next, is only just audible. On the long waves Warsaw is the star turn at present. This station rolls in at good strength at any time of day, and very often blots out Eiffel Tower almost completely. His strength is very similar to that of Radio Paris, and he puts out some first-rate programmes of light music. Of course, the many Russians are easily received, but they rarely give any programmes worth listening to.

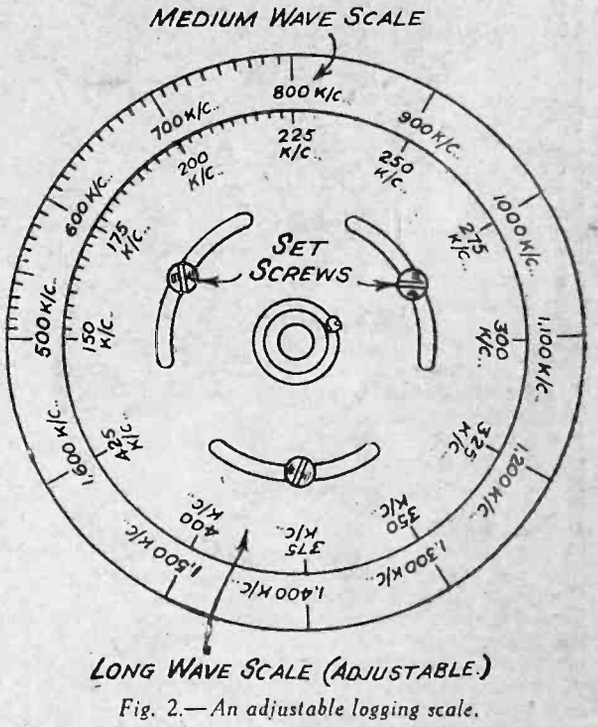


Fig. 2.—An adjustable logging scale.

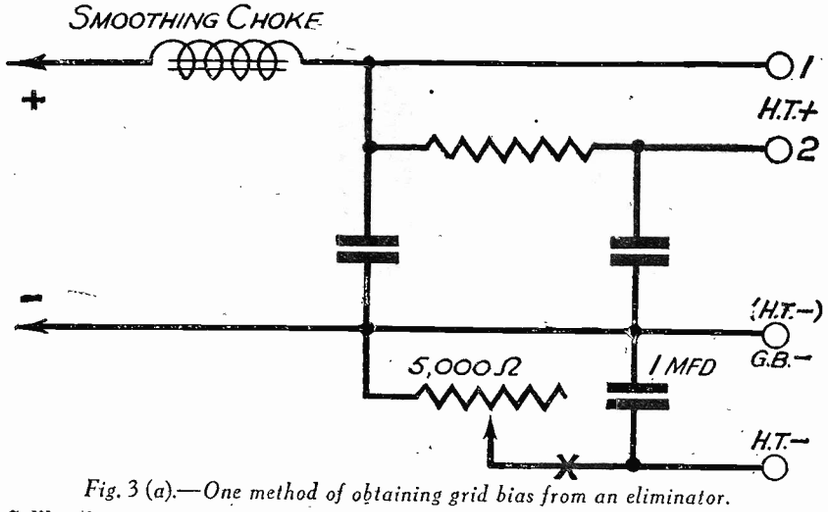


Fig. 3 (a).—One method of obtaining grid bias from an eliminator.

Station Calibration

IT seems rather peculiar to me that so many manufacturers should be making sets with station-calibrated dials. I suppose these are all very well for people who require only comparatively few stations and who wish to obtain them in the simplest possible manner. But what will happen when stations change their wavelengths, as they are bound to do from time to time? In my opinion the best form of calibration for a family set is that in which the tuning dial is marked off in wavelengths or frequencies. It is then only necessary to have a list of stations to make it a perfectly straightforward matter to set the dial for any one of them. This system cannot become obsolete whatever changes take place in the matter of wave-length allocation.

Calibrated Tuning Condensers

THIS brings up another point. Why do not our manufacturers supply tuning condensers with a frequency calibrated dial? I am sure it would be very much appreciated, and it would be easy enough to make in accurate form for use with S.L.F. condensers. Of course, the setting of the dial would depend upon the coil with which the condenser was used, but that would not offer any difficulty if the dial were made circular and marked off all round its circumference. All that would be required would be to tune in a station of known frequency, turn the dial to the appropriate setting and lock it in position. The condenser would then be calibrated for the complete wavelength range. Admittedly a second scale would be required for long and medium waves, but I do not see why the two could not be arranged for by mounting two concentric celluloid scales on a metal disc. The outer scale would be fixed to the disc but the inner one would be made so that it could be adjusted independently. I give a sketch of my idea in Fig. 2; by chance some reader might care to experiment with it.

G.B. from an H.T. Eliminator

MOST high-tension eliminators have no provision for grid bias supply, and so, when used with a set having the usual type of directly heated battery valves, a grid-bias battery is necessary. This is obviously a disadvantage, and I want to explain two ways of obtaining grid-bias from an ordinary H.T. eliminator; both apply equally well to either a D.C. or A.C. instrument. The first method is to connect a variable resistance between the H.T. negative terminal of the eliminator and the corresponding terminal of the set. The previous H.T.— terminal will now supply the negative bias voltage. A 1 mfd. condenser should be connected across the resistance to provide a by-pass for alternating currents. All connections are shown in the diagram of Fig. 3 (a). By adjusting the 5,000 ohm variable resistance any G.B. voltage from 0 to 30 or so can be obtained; in all cases the resistance should be set to the highest value consistent with good reproduction. A disadvantage of the above method is that the grid-bias voltage is taken away from the total high-tension supply, and thus, as the G.B. voltage is varied, a corresponding variation (in the opposite direction) will occur in the H.T. voltage. The latter difficulty can be overcome in the manner illustrated by Fig. 3 (b). Here the voltage drop across the smoothing choke is employed to provide negative bias. So that a variable voltage may be obtained, the choke is shunted by a 50,000 ohm potentiometer from the slider of which the negative G.B. voltage is taken. If the smoothing choke is at present wired in the positive supply lead it will have to be transferred to the negative; it will be just as effective for smoothing purposes when put in the latter position. When using either of the arrangements described in conjunction with a sensitive receiver it might be advisable to connect a 100,000 ohm de-coupling resistance in the G.B. lead at the point marked with a cross.

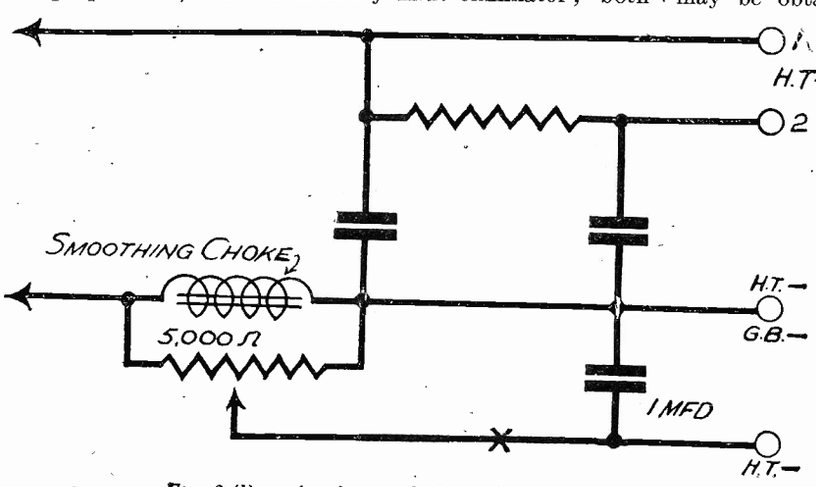


Fig. 3 (b).—Another method of adjustable grid bias.

Tone Compensation

IT is well known that a pentode gives extra emphasis to the higher notes, and for that reason it is usual to fit some kind of filter to reduce high-note response. Whilst this might be desirable in most cases, it is not necessary in a set having ultra selective tuning circuits, for the latter tend to "cut" the high notes to an appreci-

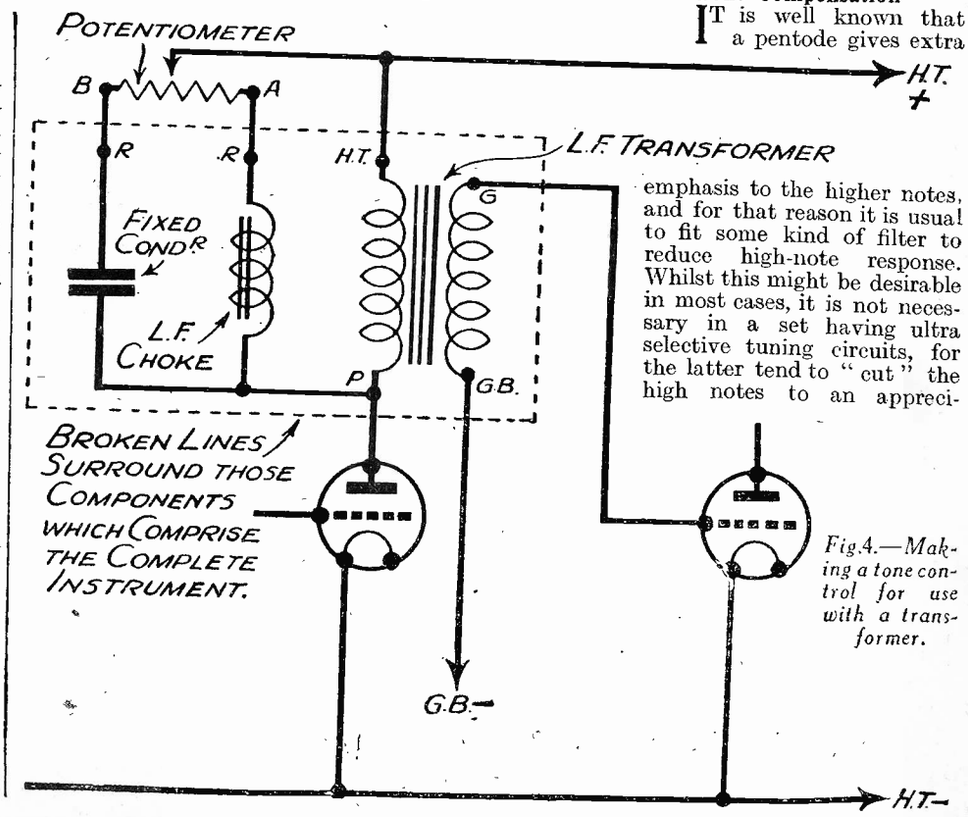


Fig. 4.—Making a tone control for use with a transformer.

able extent. Thus, instead of using tone compensation *with* the pentode, the valve itself *gives* a fair amount of compensation to the rest of the circuit. This is worth knowing when building a simple set using one of the new highly selective tuners such as the Colvern "T.D." coil.

Sensitivity and Power

JUDGING by the wording of many of the queries received, it would appear that there is a large number of readers who imagine that the words "sensitive" and "powerful," as applied to a wireless receiver, have the same meaning. This is not so; the word sensitive is applied to the high-freqency and detector end of the set, whilst the word power is used in reference to the low-frequency portion. The distinction will more readily be understood if it is pointed out that a 2 S.G.-Det. receiver would be sensitive since it would have a big range, and would respond to very feeble signals. But having no L.F. amplifying stages, the set could not be considered powerful, because it would probably be incapable of operating a loud-speaker at all. On the other hand, a Det.-2 L.F. receiver might be so designed that it would receive only the local station, but it would probably bring in that station at full strength on the loud-speaker. For that reason the set would be considered powerful.

The "How" and "Why" of Tone Control

I HAVE been asked a few times lately to explain how a tone control transformer functions. Before giving a direct answer, I must make it clear that the tone-control transformer really consists of three components housed together in the same container; these are (1) an ordinary L.F. transformer, (2) a small L.F. choke, and (3) a fixed condenser. The way in which they are wired up is shown in Fig. 4, and it will be seen that one side of both the choke and the condenser is connected to the plate end of the transformer primary. An external potentiometer (generally .25 megohm or so) is joined between the other end of these components, and the slider is connected to H.T. positive. When the potentiometer slider is moved to the end marked "A" the L.F. choke is put in parallel with the transformer primary, but when moved to position "B," the fixed condenser is in parallel with the primary. By moving the potentiometer slider between ends "A" and "B," the choke and condenser are made to have varying effects on the primary winding. Now the effect of the choke is to reduce the inductance of the plate circuit, and as the inductance is reduced the lower frequencies are able to leak away through the plate circuit, and so escape amplification. The condenser acts in reverse fashion by providing a leakage path for the higher musical frequencies. It will thus be clear that either high or low notes can be suppressed (or reduced in intensity) by adjusting the potentiometer.

SPECIAL NOTICE!

WIRELESS CONSTRUCTOR'S ENCYCLOPÆDIA.

Readers who are qualifying for the above volume should read the special announcement on page 675 of this week's issue.

Some T.C. transformers are intended only for reducing low-note amplification, and they have no effect whatever on high notes. These have an L.F. choke, and series variable resistance connected across the transformer primary. Adjustment of the resistance varies the effect of the choke on the plate circuit.

Pentode Corrector

BY the way, you might be interested to know that Messrs. Telsen have recently introduced a "Pentode Tone-Compensator." It consists only of a 25,000-ohm resistance, and .01 mfd. condenser joined in series and housed in a bakelite case, but it makes a very convenient component. The corrector is merely connected by its two terminals to the speaker terminals of the set. As it costs only 3s. 6d., it should prove a popular line.

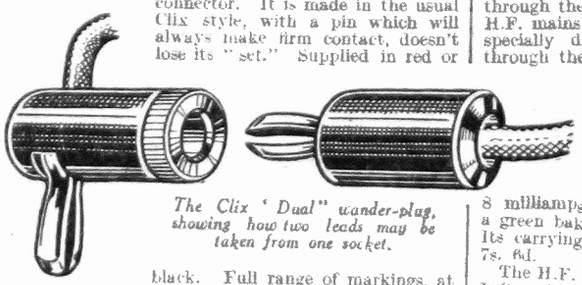
Suppression of Electrical Interference

I AM pleased to learn that the French authorities are now introducing legislation with a view to eliminating all forms of electrical interference which at present tend to mar radio reception. It is a bold step, but I understand that it will make illegal the sale and installation of any electrical machinery which is not completely "silenced" in the electrical sense. It seems rather a pity that similar regulations cannot be made in this country, for apparently, however severe interference might be, neither the Post Office nor the B.B.C. has any real control over it. The P.O. officials can suggest remedies, and can supply cheaply the necessary apparatus for silencing, but beyond that they are powerless.

What we Found..

CLIX "DUAL" WANDER PLUG

THE need for an extra tapping or branch from a flexible lead is continually arising. Frequently two leads are wanted from the same point on the G.B., H.T. battery or eliminator; branch leads to another loud-speaker; an aerial extension to another set, or a quick change of connection to the other side of an aerial condenser. For all of these, and many other purposes, the new CLIX "Dual" wander plug does the job neatly and efficiently. It is really a wander-plug and socket combined, with the pin at right angles to the socket, thus forming a branch, or three-way connector. It is made in the usual Clix style, with a pin which will always make firm contact, doesn't lose its "set." Supplied in red or black. Full range of markings, at the popular price of 2d. each; a half-dozen of these should be included in everybody's kit. Lectro Linx Ltd., 254, Vauxhall Bridge Road, London, S.W.1.



The Clix 'Dual" wander-plug, showing how two leads may be taken from one socket.

THE BROWN H.T. BATTERY SUPERSEDER

THE provision of High Tension current for a small set is met very satisfactorily by this instrument, which operates solely from a 2-volt accumulator. It thus obviates the need for H.T. batteries, and gives always a current of even voltage. The principle is that of an A.C.—D.C. vibratory converter, combined with a transformer which steps up the pressure to about 100 volts. The transformer output is rectified by means of a Westinghouse metal rectifier, and smoothed by means of chokes and large-capacity condensers. A potential divider is tapped and connected to four sockets for H.T. negative, and positive 85, 55, and 40 volts. A switch is also incorporated. The entire apparatus, mounted on bakelite base with screening cover, occupies less space than the usual 60-volt dry battery, its size being only 7in. by 4½in. by 3¼in. It is sold only by Electradix Radios, 218, Upper Thames Street, London, E.C.4, and is a remarkable bargain at the price of 37s. 6d.

BULGIN REMOTE CONTROL UNIT

FOR those who require a really luxurious arrangement, a Bulgin remote control is the thing. The mere insertion of the loud-speaker plug into its jack operates the unit, and the set is automatically switched on. Removing the plug when finished causes it to switch off again. The unit comprises a simply relay, which is operated by a small current from the L.T. battery. A ruby glass indicator shows when the set is "on" or "off." The current consumption need hardly be considered, for it is a mere .06 ampere. The Remote Control Unit is made by A. F. Bulgin & Co., Abbey Road, Barking, London, E., and costs 10s. 6d.

CLARION RADIO FURNITURE

A CABINET for the new set. Does this matter always get the consideration it deserves? We think not. And yet, what is the sense of constructing a receiver which performs excellently, and then fitting it into a box of crude design and worse finish, stamping it indelibly as an amateur production? And yet this is so often done.

The "1933" catalogue of Clarion Radio Furniture will open your eyes as to the possibilities of the home-constructed set, listing, as it does, a variety of cabinets to suit all tastes and pockets. There is the "Classic"—costing from 18s. 6d., a chaste design which is ideal for a Tudor, or severely-furnished room. Then the "one-o-one" to "one-o-six" series, embodying six different designs, all accommodating the loud speaker, at 19s. 9d. Radiogram cabinets, bookcases and cellarettes in antique and ultra-modern styles are also included. Many constructors will be interested in the "chassis," on which the set can be built. It incorporates the baffle board for loud-speaker, and fits various Clarion cabinets, or can be used for the adaptation of one's own furniture. So, before settling about your new cabinet, send for the catalogue to Clarion Radio Furniture, 28-30, Mansford Street, London, E.2.

THE BULGIN H.F. MAINS CHOKE

INTERFERENCE, in its many forms, does not always get into the set *via* the aerial, but often through the medium of the mains unit. The special H.F. mains choke made by A. F. Bulgin and Co., is specially designed to stop H.F. currents arriving through the mains. The choke should be placed in one of the leads feeding the eliminator, with a condenser (about .01 mfd.) connected at either end, and the free terminals of the condensers connected to earth. The choke has an inductance of 40,000 micro-henries, and a D.C. resistance of 120 ohms. There will thus be a drop of potential of only 1 volt for each 8 milliamps carried. The instrument is housed in a green bakelite case, and has interlocked terminals. Its carrying capacity is 100 milliamps. The cost is 7s. 6d.

The H.F. Dual Mains Choke is specially suitable for D.C. valves, and is connected to both poles of the mains. With a D.C. resistance of 64 ohms, it will drop 16 volts at .25 amp., and has an inductance of the order of 60,000 microhenries. It is housed in a universal mounting, aluminium finished screening case, and is moderately priced at 10/-.

BRITISH GENERAL H.F. CHOKE

A GOOD H.F. Choke is a component which can be put to many uses, and this particular choke is certainly a high-class article. The windings are protected by a nicely finished, non-corrodible, moulded case, which keeps out damp and dust. The actual windings have a resistance of only 400 ohms, yet the inductance is of the order of 125,000 microhenries. The method of winding gives the low self-capacity of 4.5 micro-microfarads, so that the choke would be quite efficient for H.F. coupling purposes, even in the anode circuit of a screen-grid valve. The price is 5s. 6d., which, of course, is very reasonable for a component of this nature.

PLATELESS ACCUMULATOR

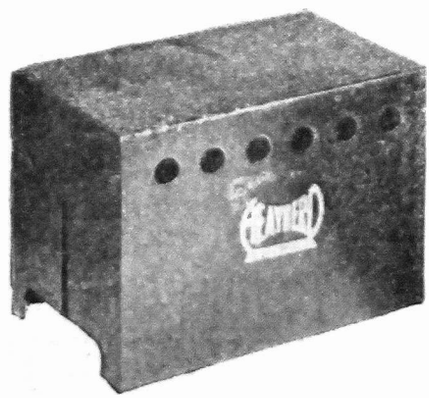
IN our issue dated 3rd December, we described under this heading a new type of extremely efficient plateless storage battery. We attributed this product to the firm of Fuller, owing to the association of that name with the block type of battery. We understand, however, that this is not the case. The Block batteries referred to are the sole property of Block Batteries, Ltd., and not the Fuller Accumulator Co. and we hasten to correct this inaccuracy. Mr. L. Fuller, the inventor of the original Fuller Block battery has severed his connection with the Fuller Accumulator Co and is now a director of Block Batteries, Ltd., and it was due to the association of his name that the misunderstanding occurred. There is no connection between the two firms.

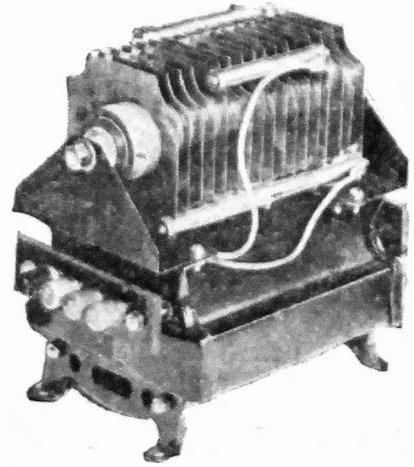
HELLESENS CONDENSERS

THE firm of Hellesens are well-known as manufacturers of various types of battery as well as condensers. We have received a very interesting range of condensers from this firm the most interesting of which are the electrolytic condensers in dry form. These are shaped in the same manner as the well-known 2 mfd. condensers, and are cased with waxed cardboard. The connections are brought out as long flex leads, the two coverings being red and black for identification purposes. The anode of these condensers consists of pure aluminium foil, on which is formed, electrochemically, a very thin film for dielectric purposes. The cathode is also of aluminium in a paste electrolyte. The condenser may be mounted in any position, and although no mounting lugs or other devices are fitted, it will not be found difficult to secure it in a receiver. These condensers are also available as blocks, having two or more positive leads and one common negative lead, and will be found very convenient for use in the construction of mains units.

HEAYBERD TRICKLE CHARGER

THERE is a great deal of disappointment when the accumulator suddenly ceases to function in the middle of an interesting item. In addition, there is a certain amount of inconvenience in carrying an accumulator to the charging station, especially if the accumulator chances to be one of the larger 6 volt types and the station is situated some distance away. The Trickle Charger does away with all worries attending the charging question, and in addition keeps the battery in good condition by permitting regular and constant charging. The charger illustrated is the new Heayberd Model A.O.2, which delivers .5 amp. The method of building up this charger is very unique, the base consisting of a standard Heayberd Mains Transformer, upon which is bolted a Westinghouse Metal Rectifier. A terminal strip at one end of the instrument enables the charger to be connected to mains of any voltage from 200 to 250, and at the opposite end of the instrument a terminal strip is provided with four terminals—a common negative, and positive terminals for 2, 4 or 6 volt accumulators. There is therefore absolutely nothing to understand in using this type of instrument, and the metal box shown on the left of the illustration goes over the rectifier and completely screens it. The holes enable ample ventilation to be obtained and keeps the rectifier cool. On test the current was found to be a full ½ amp., and at the price of 35s. this is a most valuable accessory. A larger model giving 1 amp. at 6 or 12 volts is also obtainable at 42s. 6d.





The Heayberd A.O.2 half-amp. charger, with cover removed.

Practical Letters from Readers.

The Editor does not necessarily agree with opinions expressed by his correspondents

That Heterodyne

SIR,—First of all, let me thank you for PRACTICAL WIRELESS. I have been connected with radio since 1915, from which date I served as a sea-going operator until 1925. Since then I have found considerable interest in the construction of many receivers. I am also a keen short-wave listener, my knowledge of morse making this waveband extremely interesting. Your publication is indeed practical, and I commend it to anyone wishing for a more comprehensive knowledge of wireless. For the benefit, possibly, of other readers, will you please qualify the following statements in your issue of 5th ult., Vol. 1, No. 7.

On page 322, under the heading, "Frequency Separation," you deal with the difficulty some stations experience in keeping to the 9 kc/s separation, and the consequent interference experienced by listeners due to heterodyning. The last sentence reads: "In such cases interference is inevitable, and we listeners *can do nothing to overcome it.*"

Turning to page 352 of the same issue you describe a heterodyne stopper. You here explain how the heterodyne whistle can be removed, either by tone control or "stopper," in the anode circuit of the detector-valve. Again turning to page 358, in reply to W. H. G. (Paddington) you refer to the heterodyning of London Regional by a German station, and then state, "this cannot be cured from the receiver end."

Have I "slipped up" somewhere, or are these contradictions? The theoretical explaining of how the "stopper" works is sound, but why conflicting statements on pages 322 and 358?

I again thank you for an extremely interesting publication, and wish you all success. While you keep to your present policy of not dealing with programme criticism and continue to publish circuits which are more likely to suit we people of small bank balances, I guess you'll go right ahead.—A. W. MANN (Petworth).

P.S.—I was glad to read how W. B. Richardson puts your correspondent, Maxwell Smith, of Thornton Heath, wise. Surely a strip of hot air. Very cute that last sentence.

A Club Member's Thanks

SIR,—I have read with great interest the varied articles in PRACTICAL WIRELESS. As a member of a local club, with a membership of over eighty, your weekly talks dealing with the functions of the various components of a receiver appeals to me immensely. How many constructors know the actual working of their sets? Your weekly article solves the problem, and should be read out to members each week. There is one point I miss in nearly all wireless journals, *i.e.*, coil construction. This is what we want badly, and I would be pleased to see a series of articles on how to make tuning coils in your splendid radio journal.—V. HARVEY (Cardiff).

[*We have in hand one or two articles on coil-making which will be published shortly.*—ED.]

A Bouquet

SIR,—I feel that it would be rather churlish of me to withhold my thanks to you for your remarkably good journal, PRACTICAL WIRELESS. I have just finished reading through No. 7, and I find it even richer, if possible, in really useful information than its predecessors. Indeed, for the past six weeks, those issues have provided me with the most interesting and instructive evenings I can remember to have had for the past twenty years, and that is saying something.

Fellows like myself, who regard wireless as the finest hobby of the age, and who take it rather seriously, are indeed fortunate to have at our elbow such a valuable guide.

I like the clarity, and the smooth, intimate style of your writers, and the knowledge contained is very easily assimilated. You have, indeed, a fine set of contributors. Might I ask for something?

1. That your journal will never alter its style.
2. That it may go a little deeper into technicalities, and the mathematics of wireless.
3. That you give us some more "How to make" articles.

I should also like to have explained such matters as "side bands, side band cut-off," and why, as it is said, band-pass tuning results in side-band cut-off. And could you, some day, give us a clear exposition of the paths of the current through, say, a three-valve set? I am also subscribing to the *Newnes Complete Wireless* which I find to be of the same high standard as PRACTICAL WIRELESS. Again, thank you for your very fine journal.—H. E. BURROWS (Warrington).

CUT THIS OUT EACH WEEK

DO YOU KNOW?

—THAT an air-spaced coil is more efficient than one wound with the wire in contact with the coil former.

—THAT an S.G. potentiometer and a gramophone volume control may be ganged together to reduce the controls on the panel.

—THAT an earth screen between the windings of a mains transformer reduces the tendency to hum interference.

—THAT special test records bearing all the instruments of the orchestra are obtainable for test purposes.

—THAT a milliammeter in the anode circuit of the detector valve provides a certain method of showing the correct tuning point.

—THAT the glass of a window may be used as the dielectric of a coupling condenser for series aerial tuning.

—THAT records which have warped may be straightened by placing between glass sheets in a warm place.

NOTICE

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL WIRELESS. *Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor,* PRACTICAL WIRELESS, *Geo, Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.*

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

More Congratulations

SIR,—I have much pleasure in offering my congratulations on your production of an excellent wireless paper. I have read each of the first eight numbers, and have obtained as much technical reading material from each as from a monthly journal priced at 1s. I have given a permanent order for your paper, and wish you every success for the future.—H. PARKINSON, B.Sc. (Wigan).

A Wireless Traders' Appreciation

SIR,—As a wireless trader I think I ought to know a little respecting radio, both theoretical and practical. I have taken wireless journals since the early days of radio, but until your first publication I cannot recollect a periodical which so ably assists the wireless amateur, and in addition refreshes the minds of one or two of the old hands. Wishing your journal every success.—F. W. T. BAKER (Wolverhampton).

A Plea for Portables

SIR,—May I suggest that your experts design a simple four-valve portable, for whilst there are plenty of circuits published that deal with ordinary sets the portable receives little and inadequate treatment. I have searched for some time for a really good circuit that will meet the requirements of the intelligent amateur, and I have been baffled. I have made up the portables designed by other experts from time to time and either they have had insufficient power or they are hopelessly unstable.—V. BENYON-HARRIS (Matlock).

Practical Letters from Readers

(*Continued from page 707.*)

Fuses

SIR,—Thanks for a very sensible paper. PRACTICAL WIRELESS is on order, and I hope it will always be. It is very helpful and clear, and the sketches are well desired. I have been asked to write to you by several for a whole page on an important subject—*Fuses*—their working, position, rating, etc. Such an article would no doubt help to save pounds. No journal has yet given a comprehensive article on fuses, so please! Also an article on all types of switches, and their uses, would be appreciated. Thanks again.—R. C. (Liverpool).

[*An article is in hand for early publication.*—ED.]

Moving-Coil Loud-Speakers: A Correction

SIR,—I note with satisfaction that you have published my article *re* switching of alternative loud-speakers, in your current issue under "Practical Pars." I would point out, however, a slight error in the text which may cause some confusion in the minds of your readers.

In the third para. from the end "two moving-coil type of loud-speakers" should read "two moving-*iron* type of loud-speakers."—FRANCIS S. J. COOPER (Brixton).

Testing Polarity of Mains

SIR,—I do not consider by any means that the coupling of a receiver or eliminator, as stated in your Nov. 12th issue, is as dangerous as the pole-finding test described in PRACTICAL WIRELESS a week or two ago.

The reasons for this are obvious, coupling any electrical appliance to the mains, amateur or professional alike with sense, rather than work with live wires, takes off the power. In the pole-finding test described he is handling live leads. I admit the fuse may blow in case of a short circuit, but even that takes time, the experimenter may not trouble to note size of fuse, even electricians are sometimes careless. It is quite possible for anyone not used to this sort of thing to short the leads, resulting, perhaps, in a shock or burnt fingers. Why this risk when the remedy is so simple? I suggest a 60-watt lamp or other suitable resistance in circuit with one lead, then, of course, the most serious thing one can do is, light the lamp, and the danger in handling the wires is considerably reduced.

I find that after fifteen years' practical experience it is much better to be sure than sorry. I may add I am not really a nervous fellow myself. I hope in the interest of readers and PRACTICAL WIRELESS you will give this space and I heartily wish your paper every success.—V. P. BROWN (Hollinwood).

[*We can only reiterate what we have already said on this subject.*—ED.]

A Gold Mine

SIR,—I am a very interested reader of your paper, PRACTICAL WIRELESS, and would like to add my congratulations and thanks, to others, for such an abundantly interesting book.

I think that many readers, like myself, are not always experimenting, but very much wish to improve their general knowledge of electricity, etc., as applied to wireless, and this paper supplies the means.

(*Continued on page 709.*)

Practical Letters from Readers

(*Continued from page 708.*)

I hope there is enough material left to keep it up to standard of interest for a long time to come.

The Encyclopædia will be a gold-mine to many.—S. LAURIE (Seven Kings).

A Home Constructor's Thanks

SIR,—It usually requires a great effort for me to sit down and write a letter, but this time it seems somewhat of a pleasure. From the crystal-set days I have been interested in wireless, and have derived a lot of pleasure in making and using same. When it came to valve-sets, I was stumped. I now look forward to Wednesday, because of your paper, which gives me more satisfaction than any other weekly paper I have ever picked up. I am looking very eagerly forward to the time when I get the "Wireless Constructor's Encyclopædia." It has occurred to me that a set might be designed that could be converted to varying requirements, such as a S.G.4. By pulling out a knob on the front panel, it could be converted into a S.G.3, and by pulling out another knob, a straight-two set; then again, by pushing in the first knob, it is converted into a straight-three. To those using batteries, it would be a saving in H.T. and L.T. current, as the local station is tuned in the most, and two valves will do that on the loud-speaker. Wishing PRACTICAL WIRELESS the greatest success.—H. PALETHORPE (Bromley).

The S.G. Amplifier

SIR,—Your correspondent, Mr. Harold Stripe, in his letter on the above subject in the issue of PRACTICAL WIRELESS, in endeavouring to correct L. F. Thomas, does not himself present a true solution of the problem.

It is required to determine the voltage applied to the screening-grid of a valve, through a fixed potentiometer consisting of upper and lower arms, made up of resistances of 30,000 ohms and 50,000 ohms respectively. Although your correspondent reaches the conclusion that the upper and lower arms of the potentiometer do not pass the *same* current, yet his first step, when ascertaining the voltage applied to the screening-grid, is "Find the total current passed by the potentiometer by dividing its resistance into the battery voltage."

Suppose the current taken by the screening-grid to be 0.6 milliamps, and that passed by the potentiometer to be p milliamps; then the total current passed by the upper arm will be (0.6 + p) milliamps, and the voltage drop across the resistance (30,000 ohms) will be $\frac{(0.6 + p)}{1,000} \times 30,000 = (18 + 30\ p)$ volts. The total current passed by the lower arm of the potentiometer is p milliamps, and the voltage drop across the resistance (50,000 ohms) will be $\frac{p}{1,000} \times 50,000 = 50\ p$ volts. Clearly, the sum of these two voltages must be equal to the battery voltage, which is assumed to be 150 volts, so that we have $(18 + 30\ p) + 50\ p = 150$, from which it follows that $p = 1.65$ milliamps. This is the total current passed by the lower arm of the potentiometer, and the voltage drop across the resistance (50,000 ohms) will be $\frac{1.65}{1,000} \times 50,000 = 82.5$ volts. This is the voltage applied to the screening-grid. The total current passed by the upper arm of the potentiometer will be $0.6 + 1.65 = 2.25$ milliamps, and the voltage drop across the resistance (30,000 ohms) will be $\frac{2.25}{1,000} \times 30,000 = 67.5$ volts.

—IAN D. WALKER, B.Sc. (Eng.) (Broadstairs).

Band-Pass Three Valver Wanted

SIR,—Having decided to change over to your paper and become a regular reader, may I suggest that at some early date you publish details of an inexpensive S.G.-Det.-Power receiver incorporating band-pass tuning, as I feel sure a set of this type would meet the requirements of many home constructors, or, alternatively, perhaps you could give articles explaining how to convert ordinary sets to band-pass tuning? May I also be allowed to make another suggestion? This is, that in your description of new sets could you not give, in addition to the name of the components used in the actual set, suitable alternatives, as a number of constructors probably have several components lying idle which could be utilized without having any adverse effect on the efficient operation of the receiver? Wishing your paper every success.—E. R. STROUD (West Norwood).

An Appreciation from the West Indies

SIR,—I have received the first issue of your publication, PRACTICAL WIRELESS, and I must say that it is a useful contribution to wireless literature. Keep up the standard, and I think you will obtain many more readers. As far as Malaya is concerned, we can get nothing above the 200 metres band, the best is below 100 metres, and in the way of kit sets we are badly off. Now why not have a special weekly page devoted to short-wave work in general, and give us a Kit Set to build composed of the latest and best components, say, once a year, and in this respect I give you the government ruling, which is strictly enforced here, this is that no receiver can be licensed unless the "first stage is high-frequency with a screen-grid valve." Thus you will realise that the majority of the so-called "all wavers" are useless as far as this country is concerned.—W. M. EDWARDS (Penang, S.S.).

RADIO TERMS ILLUSTRATED

Selectivity

Courtesy of Eelex Products

RECEIVERS AND THEIR RECORDS

(*Continued from page 686.*)

cannot be received whilst the set is actually oscillating. If these instructions are carried out, even the mere beginner will log stations with the "Kilodyne," and, especially, with the coil-tuning wavelengths around 40 metres, as on this band almost every evening British and Continental amateur experimental transmitters are working until a late hour.

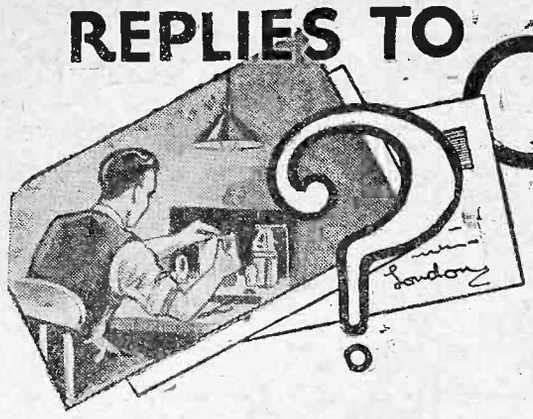
The "Kilodyne Four" was tested over a period of several days, and during that time a large number of broadcasts were heard on the loud-speaker, both during daylight and the darker hours of the evening. It was a matter of satisfaction to find that regularly at 1.0 p.m., G.M.T., W3XAL, Boundbrook, N.J. (16.878 m.), was heard as it came on the air, and the transmission was held steadily until dusk. On the same coil, W2XAD, Schenectady (19.72 m.), and DJB, Zeesen (19.737 m.), also provided good signals. Clear telephony was picked up from IAC, Coltano (Italy), and from Berlin. The harmonic of Moscow (T.U.) was also found, as well as G5SW, Chelmsford. The coil comprising the 24-50 metre waveband gave even better results, and permitted the logging of telephony from Rugby, Cairo, and Rocky Point. Broadcast transmissions were captured from KDKA, East Pittsburgh (25.27 m.), 2RO, Rome, G5SW, DJA, Zeesen, W3XAL, Boundbrook, N.J., UOR2, Vienna, Moscow and HVJ, Vatican, as well as tests from the new Empire Broadcasters GSC and GSA, for the benefit of the African Zone. It was in this waveband that some twenty British, French, Spanish, and German Amateur broadcasts were heard during one evening. The 40-85 m. coil also proves useful, inasmuch as it includes many high-power stations, such as WEM, New York (40.54 m.) used for the relay of broadcasts from Geneva, etc., W8XK, East Pittsburgh, again the Empire Broadcaster, Eindhoven (Holland), HVJ, Vatican, and the usual batch of Amateur experimenters to which reference has already been made. It will be noticed that the coils "overlap" and, consequently, on many occasions, where on the lower coil it may be difficult to tune in a station, it frequently happens that louder signals are obtained when using the higher one. As a matter of fact, the three coils cover all the wavelengths of real value to the listener. The medium-wave coil (250-500 metres) can be considered useful as a stand-by, inasmuch as it will permit the reception of a number of British and Continental broadcasts. Although, owing to the aperiodic aerial circuit it is not highly selective, it was not a difficult matter to separate the National from the Regional stations in the heart of London, and broadcasts were heard from some of the more powerful European transmitters. In general, the output from the pentode valve was sufficient for loud-speaker work even with distant signals. The "Eddystone Kilodyne Four," as a kit of component parts but without valves, accumulator, batteries, or loud-speaker, costs £7 17s. 6d., it is supplied by Stratton and Co., Ltd., Eddystone Works, Birmingham. Other models, such as the "Kilodyne All-Electric Four," working from A.C. mains, and two- and three-valve battery short-wave receivers, are also supplied by these makers. The "Eddystone Kilodyne Four" is a sound proposition, and can be strongly recommended to the radio enthusiast who wishes to explore the ether for programmes other than those put out by the Home or Continental studios.

H.M.V. Super-het Ten

IN view of the interest shown in the special model of the "His Master's Voice Super-het Ten Audoradiogram" in glass which was exhibited at Olympia, and at other radio exhibitions elsewhere, The Gramophone Co., Ltd., is manufacturing a few of these, which will be retailed at £225. The cost of the special model shown at Olympia was £300, but the experience gained with the production of the first model has enabled further instruments to be made at a lower cost. Warning is given as to the need of delicate handling of one of these sets.

LET OUR TECHNICAL STAFF SOLVE YOUR PROBLEMS

REPLIES TO QUERIES and ENQUIRIES by Our Technical Staff



The coupon on this page must be attached to every query.

If a postal reply is desired, a stamped addressed envelope must be enclosed. Every query and drawing which is sent must bear the name and address of the sender. Send your queries to The Editor, PRACTICAL WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2

SPECIAL NOTE

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

(1) Supply circuit diagrams of complete multi-valve receivers.
(2) Suggest alterations or modifications of receivers described in our contemporaries.
(3) Suggest alterations or modifications to commercial receivers.
(4) Answer queries over the telephone.

ERRATIC REACTION

"Lately, I have converted my Det. L.F. receiver from a plug-in coil to a Dual Range coil tuning. Now I find, while reaction is smooth and even throughout the medium waves, it is only obtainable up to 10 degrees on the high waves. Do you think it is the fault of the receiver, or the new coil? The reaction condenser is the one matched with the coil."—(H. F. B., Taunton.)

As the condenser you are using is the one intended for the coil, it is obviously of the right value. The fact that it does not work on the long waves would tend to show that the anode load is not of the correct value, and this may give rise to a rather high voltage drop. You should, therefore, vary the value of the high-tension applied to this valve, and we think you will soon cure your trouble.

THE EARTH CONNECTION

"I have been reading your article on Earths. As I live in the front of the house and the nearest earth is about 25 feet away, do you think that would be too much for my set, as I have only got a gas-pipe earth nearest my set. If I tried the garden, it would be about 30 feet away. When I get a foreign station it is loud, and then it will go quiet and then loud again and so on. Do you think you could solve this for me?"—(A., King's Cross.)

The earth which you are now using (the gas-pipe) may be a better one than the long lead to the garden, but the only way to satisfy yourself on this point is to try out both of them. The gas-pipe may be nearer, but may also be less efficient, whilst on the other hand, although a long lead will be required to the garden, the ultimate connection may prove more effective. The variation in strength to which you refer is probably only caused by fading, and this cannot be cured by anything you can do. It can be minimized by fitting a more powerful receiver, but then the signal will still vary in strength, although you may provide sufficient amplification to enable the weakest signal to provide sufficient loud-speaker strength.

THE A.C.—D.C. UNIT.

"Having constructed your A.C.—D.C. Eliminator, as described last week, could you tell me the approximate output in milliamps when working same from 150 volts D.C.?" (A. O., Leyton.)

The Output on terminal No. 3 will be about 100 volts at 9 m.a. If you take more current, the voltage will drop; if less, then the voltage will rise. If you require a higher voltage, use a 2,500 ohms (or less) resistance in place of the 5,000 ohms resistance which was recommended. Make sure, however, that it is rated for the current to be used.

MAINS VARIATION

"I have a fairly good all-mains receiver, which takes a rather large current. I have noticed repeatedly that on some occasions the quality is not up to the standard usually given by this set. The principal time when reception is marred is on Saturday nights. On Sunday nights the reception seems very good, in fact, probably the best of the week. I am surely not imagining things, but I do not see how the set can alter its reproduction on different nights. Perhaps one of your technical staff can offer some solution?"—(J. G., Kensington).

There is a perfectly logical explanation of the fault you are experiencing. The voltage from the mains supply should be constant, but in some localities there is a heavier load imposed on the power station on nights when all the shops are working late with their large electric displays and other lighting. This results, if the power station has a bad regulation, in a drop in the voltage supplied, and your receiver is then working with a voltage which is below that required for good quality reproduction. We think if you can measure the voltage output from your eliminator section, you will find that this is the explanation.

EXTERNAL TONE CONTROL

"I have got a commercial receiver which is built on the all-metal principle, and is a most excellent receiver in all respects. I have recently bought a new loud-speaker, and this does not satisfy me on all types of music and speech. On some things it is beautiful, but on others it is appalling. I should like to introduce some form of tone adjustment, but I must emphasize that I do not wish to interfere with the inside of the receiver. I wonder whether you can tell me in a few words how to introduce this form of control."—(H. Y. T., Bognor.)

The simplest method for your case is to include across the output terminals a variable resistance and a fixed condenser. The value of the condenser is .01, and the resistance should have a value of 10,000 ohms. The actual values may, of course, be modified to suit your speaker and output arrangements. The two components should be joined in series, that is, one terminal of the resistance joined to one terminal of the output; the other terminal of the resistance then joined to one side of the condenser; the other terminal of the condenser is then joined to the remaining output terminal. The speaker is joined in the usual way. Adjustment of the resistance will vary the tone to suit your requirements.

JELLY ELECTROLYTE

"I have made up a portable receiver, and in order to complete the design I wish to instal a small accumulator of the unspillable type. I have an ordinary accumulator by me, which is quite all right for size, but it is not of the unspillable type. I should like to fill it with the jelly acid, but am doubtful whether this is obtainable from the shops or whether it can be made at home. I should be glad if you could tell me how to make it."—(R. T. G., Balham.)

The jelly electrolyte is made by dissolving sodium silicate in the ordinary acid solution. The crystals should be added slowly until jellification takes place.

FOR MAINS ELIMINATORS

"I noted recently that you stated that one could use ordinary valves for full rectification in an eliminator. I am not aware how this can be done, but I should appreciate it if you could give me some instructions regarding the employment of valves in this manner."—(H. T., Harrow.)

Two ordinary valves may be employed for full-wave rectification by ignoring the grid of the valve, and employing each valve for half-wave rectification. The filaments should be wired in parallel, and the anode of each valve should be joined to the ends of the secondary, as with an ordinary full-wave rectifying valve. The filament winding must, of course, supply sufficient current for the two valves, and the centre tappings of both filament and H.T. windings are employed in the usual manner for H.T. negative and positive leads.

BAND-PASS TUNING

"I wish to try out the band-pass tuning about which so much is said in these days. Unfortunately I have got a good set, but very little spare money, so I wondered if I could, by any conceivable means, improvise such tuning with my existing apparatus. I use two tuning condensers with an H.F. stage, and, therefore, have two tuning coils. I would not mind sacrificing one tuned circuit, and would use an aperiodic H. F. stage if the band-pass tuning really improved selectivity as it is supposed to do. Perhaps you can suggest an improvisation or, at least, put my mind at rest about trying out the scheme."—(S. D., Bromley.)

You can certainly rig up a band-pass tuner, but you will have to bear in mind that the arrangement is only temporary, and should not be kept in use permanently. The two coils which you are using should be arranged so that no interaction can take place (unless they are screened), and the two coils should be joined together at one end, and that end earthed. The tuning condensers are joined across each coil in the usual manner. At the "top" end of the coils, that is, the end which is joined to Aerial and grid condenser, some form of coupling unit should be employed. This may be a small variable condenser, a variable resistance, or a fixed resistance. A value of 100,000 ohms would be suitable for a try-out. If you find that the arrangement gives you what you require, you should purchase a pair of accurately matched coils; if possible, those specially designed for band-pass circuits.

OBSOLETE COMMERCIAL SETS

"I have got the opportunity of buying a well-known commercial receiver which was very popular two or three years ago. Would it be worth while buying this and using the component parts for making an up-to-date circuit. Would I save much by doing this?"—(Y. U. J., Cardiff.)

We do not think it would be at all worth your while spending money on the obsolete set. Some of the components are, no doubt, quite good, but wireless has made such strides in the last two or three years, that much more efficient components are now available for less than you would probably be paying for the parts in the set in question. We do not, therefore, advise you to carry out your idea.

DATA SHEET No. 14

Cut this out each week and paste it in a notebook.

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WE are informed by Messrs. Ferranti, Ltd., that they are now manufacturing their standard Cartridge Type Wire-Wound Resistance, "W" pattern, as well as the new Fixed Type "F," in the 750 ohm size. The price of the Interchangeable Type with holder is 3s. 9d., or without holder, 2s. 9d.; and the price of the corresponding fixed type is 3s. 3d. These, as well as their other wire-wound types, are suitable for a dissipation of up to 2½ watts, the resistance element being wound on a sectionalised moulded bobbin with silk insulated wire. Their accuracy is within 5 per cent. of the rated value. Details of other resistances and a full range of other Ferranti components are given in their list R1. The address is Hollinwood, Lancashire.

CLARION RADIO CABINETS

A WIDE range of Receiver, Radiogram and Loud-speaker Cabinets is given in a well printed brochure just issued by Clarion Radio Furniture Co., 28-38, Mansford Street, London, E.2. There are Table Grand Models, Consolette Cabinets, and a new type of "All Square" cabinets of very attractive design. Another innovation is a new Radiogram Cabinet of futurist design. Made in oak, French-polished, and with black feet, it will accommodate any modern chassis set, and make a handsome piece of furniture. Many other patterns of cabinets to suit all requirements are included in the brochure, a copy of which can be obtained on application to above address.

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A FINE range of moving-coil speakers is given in the latest catalogue issued by Epoch Radio Manufacturing Co., Ltd. Amongst the various instruments listed is model 99k, a permanent magnet speaker with a sensitivity of a very high order. This speaker is fitted with an interchangeable diaphragm. There are also model ES, a powerful D.C. speaker designed for incorporating in modern A.C. sets where the field coil can be used as a smoothing choke; and model D2S, a powerful unit for heavy work, and capable of handling 10 watts undistorted input. Interchangeable diaphragms in three tonal characteristics are available for this speaker, and a useful impedance matching chart printed in the catalogue shows at a glance the diaphragm suitable for the required transformer ratio and valve impedance. The address is Exmouth House, Exmouth Street, London, E.C.1.

Broadcast Query Corner

UNDER the above title, with the assistance of a recognized authority on foreign broadcasting matters and a regular contributor to wireless publications both at home and abroad, we are inaugurating a special Identification Service, which should prove of great assistance to our readers. When tuning in well-known stations it happens frequently that listeners pick up wireless transmissions of which they fail to recognize the origin. It is to solve these little problems that the *Broadcast Query Service* has been organized.

Although the service is mainly applicable to broadcasting stations, wherever possible replies will be given in regard to morse transmitters (commercial stations, fog beacons, etc.) and short-wave broadcasts. For the identification, however, of stations operating on channels *below* 100 metres it will be evident to inquirers that a closer estimate of wavelength must be submitted than in the case of broadcasts on the medium or long waveband if successful identification is to be carried out.

All inquiries should be addressed to *The Editor*, PRACTICAL WIRELESS, 8-11, *Southampton Street, Strand, London, W.C.2*, and the envelope marked *Broadcast Query Service*, in top left-hand corner. Stamped addressed envelope should *not* be enclosed, as replies cannot be sent by post, but will be published in due course, in each issue of PRACTICAL WIRELESS.

Replies to Broadcast Queries

ZIPANTI (Edinburgh): Geneva (760 m.); although only 1¼ kilowatt, it is sometimes well heard. B. MCCAULEY (St. Johnston): Cannot trace transmitter for lack of detail, but ship-shore telephony (on about 220 m.). NELSON (Stepney): (4) WTAM, Cleveland (Ohio) National Broadcasting Company network on 280.2 m.; (5) LR6, Radio Nacion, Buenos Aires on 345 m.; (6) WCAU, Philadelphia (Pa) Columbia Broadcasting System network (256.3 m.); (7) WTIC, Hartford (Conn) N.B.C. (282.8 m.); (8) No.

LES (Liverpool): (1) (*a*) WCAU, Philadelphia (Pa.), on 256.3 m.; (*b*) WABC, New York, on 348.6 m.; (*c*) WJZ, Boundbrook, on 394.5 m.; (*d*) WJSV; Alexandria (U.S.A.), on 205.4 m. (2) (1) WBZ, Boston (Mass.), on 302.8 m.; (2) WTAM, Cleveland, (Ohio), on 280.2 m.; (3) WPG, Atlantic City (N.J.), on 272.6 m.; (4) WOR, Newark (N.J.), on 422.3 m. W. R. CLARKE (Cornwall): (1) WBZ, Boston (302.8 m.), and WIXAZ on 31.35 m.; KUKU is the call sign of a mythical station adopted by the "Cuckoo" Club for a series of sketches broadcast through the National Broadcasting Company Network; (2) WABC, New York, on 348.6 m.; (3) WTAM, Cleveland (Ohio), on 280.2 m.; (4) WCAU, Philadelphia (Pa.). on 256.3 m. (5) WJZ, Boundbrook (N.Y.), on 394.5 m.: the "z" is pronounced "zee," hence your misunderstanding it for "v." ETHER SCRAPER (Poole): Warsaw. The call was: Radio Polskie Warszava (phon.: Varschavva), on 1,411 m. CURIOUS (Nottingham): KDKA, East Pittsburgh (Pa.), and WBZ, Boston (Mass.), direct. SUPERHET (Bala): Details submitted are too vague to permit identification of transmitter but ship or shore-ship telephony (trawlers, etc.).

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