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Practical Wireless

Published every Wednesday by
GEORGE NEWNES LTD.
Vol. 1 No. 19
JANUARY 28th, 1933

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1933 Walnut ADAPTAGRAM

PETO-SCOTT CO. Ltd., 77, City Road, London, E.C.1.


January 28th, 1933

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Pr. W. 26/1/33.
You are going to use a Lissen 3-gang Shielded Coil Unit in your “FURY FOUR”! It is a simple set to build—because of these Lissen Coils. It is an easy set to handle—because of the perfect matching of these Lissen Coils. Its advanced yet simplified circuit design is made possible only by the Lissen Coils. Its high selectivity depends upon them.

Break-through on the long wave-band is entirely eliminated. Damping losses are exceptionally low. Shielding is particularly complete. These Lissen Shielded Coils are matched in inductance to within 1 per cent. Price of 3-gang Coil Unit, as specified by Mr. CAMM for the “FURY FOUR” 26/-

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Hungary Launches Out

THE 18.5 kilowatt transmitter at Lázárhegy, which broadcasts the Budapest programmes, will be replaced in September, 1933, by a new 120 kilowatt station. To relay the capital entertainments, a 3 kilowatt transmitter on the island of Gépel operates on 960 m. between 7.0 and 11.0 p.m. G.M.T. Two of the four relays to be added to the Hungarian broadcasting system are already testing; they are Magyarovar (6 kW) on 209.7 m., and Nyíregyháza (6 kW) on 267.4 m. A further station is under construction at Pécs, formerly FunkKirchen. Should it be found that with the existing transmitters a fully adequate service cannot be given to the country, Hungary proposes to build five more stations to work on the lower wavelengths.

Short Wavelengths for Broadcasters

ACCORDING to a decision taken at the Madrid Conference, a new waveband comprising 25,600-26,600 kilocycles (11.07-11.27 metres) has been granted for the use of broadcasting stations. With a 9 kilocycles separation, not less than 111 transmitters could be housed in this section. In addition, in future no spark stations will be allowed to use the 220 metre band between 9.0 a.m. and 10.0 p.m. G.M.T., and thus interference by morse signals from a.m. and 10.0 p.m. G.M.T., and thus use the 220 metre band between 9.0

Germany's Education Push

OF 55,000 schools existing in Germany, over 20,000, with an aggregate number of two and a half million pupils, are equipped for the reception of the educational courses broadcast by Königswusterhausen.

Birds in a Gilded (?) Cage

AT the WEAF, New York, studio, A situationon top of the new Amsterdam Theatre in that city, the platform from which the broadcasts are carried out is separated from the audience by a huge glass screen. In this manner more than six hundred spectators may view the

START MAKING THE "FURY FOUR" NOW!

THE SET WHICH WILL MAKE RADIO HISTORY.

FURTHER DETAILS OF THIS REMARKABLE RECEIVER APPEAR ON PAGES 894 to 897 OF THIS ISSUE.

artists without disturbing the entertain-

ment.

The First Radio Singers

IT is not generally known that the first relay of an operatic performance took place at New York on January 19th, 1910. On this occasion the voices of Caruso and Emma Destinn in Puccini's Tosca were transmitted, at low power, from the roof of the Metropolitan Opera House in that city.

New Interval Signal

FOLLOWING a competition organised by the Poste Parisien, Paris, the studio officials have adopted, from the numerous suggestions put forward by their listeners, a posthorn, as used by the old mail coaches, for their interval signal. Every possible kind of sound was submitted by the technicians and constructors; they included a peal of laughter, and even the cooing of a dove, as the universal messenger of peace!

An Effective S.O.S

DURING recent manoeuvres in California, four naval aircraft stations, which were to land at San Diego, were caught in a thick fog. At the request of the authorities, the local transmitter (KGB) was requested to broadcast an appeal to the inhabitants of the city to rush as many motor-cars as possible to the airport so that their headlights would clearly show up the field. Within twenty minutes of the announcement of the appeal, three thousand cars left for the airport, and in the glare of six thousand headlights all aircraft glided safely to earth.

Mr. W. Bryan Savage, of 292, Bishopsgate, has moved his offices and works from the above address to a new model factory at 668, Clerkenwell Road, E.C.I, with a goods entrance at 25/27, Great Sutton Street.

Soviet Radio Developments

WITH the population of Moscow approaching the three million mark, the authorities now contemplate a listening tax which is to be graded according to the classes of the community. Members of the Red Army, who are forced to listen to the broadcasts during certain periods of the day, will only pay fifty copecks; students and war invalids will be placed on the same footing. On the other hand, a larger revenue may be derived from civil servants and military and naval officers, who are to be mulcted to the extent of two roubles. Revenue may be derived from civil servants and military and naval officers, who are to be mulcted to the extent of two roubles. The heaviest tax is to be imposed on business men and other persons connected with industries and trade. At present Russia operates 59 broadcasting stations with an aggregate energy of 1,488 kilowatts, but further high-power transmitters are being shortly added to the system. We hope the Berne Bureau will bear in mind the present state of the other.
Listen to the Argentine

L2 (phon : Ell air dos) Radio Patria is one of a number of transmitters at Buenos Aires, Argentine Republic, which, operating on 231.5 m. (1,295 kilocycles), is frequently well heard in the British Isles. Broadcasting at midnight and 2.0 a.m. G.M.T. If you wish to search for it, tune in either of the Hamburg relays, Flensburg or Kiel, in the early part of the evening, make a note of the condenser settings, and when the European stations have closed down, twist the dial slowly over the small section included between 227.4 and 232.2 metres.

New Wavelengths for German Stations

In view of the fact that certain channels allotted to other countries and borrowed by Germany must now be returned to their owners, a re-arrangement is to take place in the wavelengths of some of the transmitters. It is expected that the 5 kilowatt Freiburg-im-Breisgau station, and the new trier relay will be ready for operation within the next five or six weeks. They will take the Frankfurt-am-Main programme instead of that of Stuttgart as originally planned, and will work on 256 metres (1,157 kilocycles). In addition, Portugal requires the 283 metre channel for the Lisbon high-power station under construction, the Berlin relays Magdeburg and Stettin, have been in common with Bremen, Hannover, and Flensburg, which up to the present have broadcast the Hamburg radio entertainments will all operate on 227.4 (1,319 kilocycles). The construction of the new high-power transmitters destined to Berlin and to Hamburg is being hurried forward.

When the Regional plan is complete, an entire readjustment and reallocation of the German wave-lengths may take place in co-operation with neighbouring countries.

New Radio Musical Comedy

The Castle on the Hill is the title chosen for an original operetta which will be broadcast by the B.B.C. transmitters in March. It is being specially written for the microphones by G. Denis Freyman, with music by Mark A. Lubbock, the authors of The King can do no wrong. One of the main features of this show is the inclusion of three orchestras, one of which is a Pagane band, as the plot is enacted in Hungary at the time of the 1919 revolution.

1933 Relays to the U.S.A.

In the course of eleven months the National Broadcasting Corporation of America relayed 140 radio programmes from foreign countries and of which respectively twenty-one and fifteen were contributed by Great Britain and France. The list was topped by Switzerland, which supplied the United States with forty-three transmissions, Germany coming a good second with thirty-two broadcasts. In addition, the Columbia network contributed several and ten foreign relays from thirty-three cities in nineteen different countries during the same period. Most of these transmissions are taken on short-waves, and stations as Eddy, Frangis, Berlin-Nauen and Kootwijk.

A Giant of Volts and Watts

The new Munich super-power station which you may hear every evening on 532.9 metres, although possessing an aerial energy of 75 kilowatts, is so planned that its power can be doubled at comparatively short notice, by increasing a radiation at the lower of the two ratings some 450 kilowatts are required, and this energy is drawn from the lure generating station which supplies through a five mile cable a current reaching some 20,000 volts.

Calls from Venezuela

BETWEEN midnight and 4.0 a.m. G.M.T. daily, and again between 5.0 and 7.0 a.m. listeners on the show are likely to hear one of the most unusual and interesting programmes heard this year in Western Europe.

The Prince’s New Aeroplane

OUR greatest propagandist, H.H. the Prince of Wales, has just placed an order for a big aerial limousine, which will be one of the largest and fastest private aeroplanes in the country. “Bristol” engines, of the same type as Captain Uwins used when he recently broke the world’s altitude record, will be incorporated in the Vickers’ “Viostra” aeroplane which will have a seating capacity for twelve passengers and a cage for two pilots.

But perhaps the most interesting part of the equipment is a large and powerful wireless set that will be installed in the cabin, and which will be able to pick up broadcasting as well as inter-aerodrome communications.

Mr. Pickle

A recent broadcast carried out by W.EAF, New York, from Ellis Island, the immigration station in New York harbour, the programme included items by a Spanish soprano, an Italian tenor, a Russian bass, a Japanese xylophone player, a French singer, a German baritone, an English pianist, a Danish accordionist and a Lettish choir. The transmission was conducted by a Hungarian, and all announcements were made by a Czech! An All-American programme!

New Brussels Studio

The new studio of the national radio of Belgium is situated at Ixelles, on one of the main suburbs of the Belgian capital, and will contain a number of studios and a concert hall.

INTERESTING and TOPICAL

WIRELESS AND THE CRIMINAL

In a French police headquarters motor garage is installed a central wireless post, connected up with the headquarters. A number of drivers are always near at hand ready to leave for any place on receipt of the order. In the garage are installed petrol pumps which can fill up at the rate of 60 litres a minute and the reservoirs have a capacity of 5,000 litres.

SOLVE THIS!

Problem No. 19.

After nearly a year's use, Jackson found that the batteries of his set were nearly expired. He therefore bought a new set and a new (1.5) battery and connected these to his set. When he switched on, however, he got no signals, although he had a click in the Loud Speaker. What do you think he had done to prevent the reception of signals?

Three books will be awarded for the first three correct solutions received. Mark envelopes Problem No. 19 and send to the Editor, PRACTICAL WIRELESS, 30 Southwark Street, Strand, London, W.C.2 to reach us not later than January 28th, 1933.

SOLUTION TO PROBLEM No. 18.

Smith joined the Potentiometer across the L.T. terminals instead of across the filament terminals of a valve-holder, and therefore the On/Off Switch did not disconnect the Potentiometer when the set was switched off. Consequently, the accumulator was discharging through the potentiometer the whole time.

The following three readers received books in connection with Problem No. 17.

How to use our free gift Handy Gauge

ON the cover of every copy of this week’s PRACTICAL WIRELESS is an envelope containing our indispensable Home Constructor’s Handy Gauge. It is specially designed to withstand hard use. The various uses to which the gauge may be put are shown pictorially on this page. You should remember that it is an accurate engineer’s gauge and treat it, therefore, with care.

The lower series of holes relate to the diameters of B.A. Screw Sizes from No. 0 to No. 6 and the centre series of holes give the corresponding Tap Drill Sizes. For purposes of comparison a table is given here, showing how it

The gauge, therefore, accurately made to B.V.A. standards, may be used as a drill gauge for this purpose, the holes being the correct diameter for valve legs.

Wood Scraper

Every woodworker knows that for fine-fitting joints on cabinets, and other work intended to receive a high polish, the finishing touches to the surfaces of the wood must be given with a wood scraper. Our Handy Gauge serves this purpose splendidly. It is only necessary to hold the gauge vertically on an oil stone and rub it backwards and forwards on the stone to give it a smooth edge with two cutting surfaces. The illustration shows how it should be used.

Stripping Insulation from Wire

On the right of the gauge is a V-slot chamfered off. This slot will probably be used far more than the other parts of the gauge, for by slipping the wire into this notch and rotating the gauge round the wire two or three times the insulation will be severed and a pull on the gauge will remove the desired piece of insulation. It will be found that this notch is a most effective insulation stripper.

Exact Instructions on the Many Uses to Which Our FREE-GIFT GAUGE MAY BE PUT

EXPLICIT INSTRUCTIONS ON THE FREE-GIFT GAUGE MAY BE PUT

Gauging the diameter of a screw thread.

The Gauge as a Universal Trammel

The gauge may also be used as a trammel for scribing the position of holes of certain diameters by screwing the gauge down by one of the two corner holes and using a pencil in an appropriate hole. It will be found that a wide range of hole diameters can be scribed in this way.

Stripped Threads

Every home constructor has experienced the annoyance caused by a screw whose top thread has closed over on to another, thus preventing the nut from being screwed on. In such a case insert the threads in the V-notch and wind the gauge towards the end of the screw or bolt. This will rapidly clear the thread. The gauge itself is made in 21-gauge steel, equivalent to a thickness of 0.032in. This fact is mentioned as readers might like to use it as a comparator for 21-gauge, and under.

Loop Forming

In one end of the gauge you will find two holes close together. By placing a couple of screws in these holes loops may be formed on the end of wire. Place the end of the wire in the slot of one of the screw heads and proceed...
THE DESIGN AND OF SIMPLE

In This Article, FRANK PRESTON, F.R.A., gives

PRACTICAL WIRELESS

January 28th, 1933

THE DESIGN AND OF SIMPLE

In This Article, FRANK PRESTON, F.R.A., gives

Principal Requirements of a Portable

Let us first consider what are the principal requirements of a successful portable. First and foremost the set must be compact; it must also be light in weight and economical in its consumption of high and low tension current. Since a frame aerial must be used as a "collector," efficiency at the high-frequency "end" must be as high as possible. The degree of low-frequency amplification need not be very great because enormous volume will not be expected; even if it were it could not be obtained since we are (due to considerations of weight)

The Circuit

As when designing any type of set, the first thing to consider is the circuit which shall be employed. Naturally, this will depend very largely on the range of reception and volume level required, as well as upon the permissible weight and size of the complete outfit. As a matter of fact, the weight of the receiver itself will not be very great in any case, and will be much less than that of the batteries. But the design of the set will determine the battery current, and, therefore, battery size, and so we must consider the outfit as a whole rather than think of any one part separately.

Theoretically, it would appear that two stages of S.G. amplification would be desirable to compensate for the small signal pick-up of the frame aerial, but in

Fig. 2.—An S.G.-Det-Pen circuit with aperiodic coupling between S.G. and detector valves.

Fig. 5.—A cabinet.

Fig. 1.—A very good circuit for a three-valve portable.

Fig. 8.—A rotary D.P.D.T. switch used as a combined on-off and aerial wavechange switch.

restricted to the use of a balanced armature type of speaker unit.

To FILAMENT TERMINALS ON VALVE HOLDERS

TO L.T.—

TO LOWER END OF FRAME WINDING

TO FRAME AERIAL TAPPING

It is very evident from the letters sent to us by many of our readers that portable sets, especially those which can be built easily and at low cost, are greatly in demand. Several readers have asked for a constructional article on a simple and effective portable set, and they may rest assured that their needs will be catered for by at least one complete design which will be published in future issues of PRACTICAL WIRELESS, but I have no doubt that there is a large number of experimenters and constructors who would like to design their own in such a way that use can be made of components which happen to be on hand. For this reason I feel sure that some information regarding the main features underlying the design of portable sets as a whole will be appreciated.
CONSTRUCTION PORTABLE SETS

You some Useful Information on a Popular Subject

Practice it is found very difficult to obtain adequate stability with such an arrangement, and as a result the "two-S.G." portable is practically unheard-of. Moreover, a single S.G. stage, if well designed, will permit of really astonishing long-distance reception, while being fairly easy to design and not difficult to tune.

S.G.-D.-Pentode

The circuit of Fig. 1 has a single S.G. valve followed in turn by a detector and pentode, and is an arrangement which I can recommend with confidence. Coupling between the first two valves is on the tuned-grid system, and therefore these tuning condensers are required. But the two latter components can be ganged together if one is prepared to go to a little trouble in adjusting the size of the frame aerial and inserting "padding" condensers, of which I shall say more later on. Reaction is applied to the tuned grid coil through a variable condenser, and by allowing the detector tuning to be made aperiodic, as is shown in Fig. 2.

The latter objection can be removed by eliminating the tuned grid circuit, and so making the detector tuning aperiodic, as indicated here. Aperiodic H.F. tuning is distinctly satisfactory and, if well "interpreted" will afford good reception of at least a dozen stations under average conditions. It could be made little more powerful by substituting a two-stage L.F. amplifier for the pentode, and in that case a few more stations would be available at good strength. This circuit has one "fault," however; if two tuning controls are necessary or a fair amount of care and skill must be exercised in "matching" the tuned circuits.

The circuit of Fig. 1 has a single S.C. stage L.F. amplifier in the detector circuit. But the two objections, that is, not by the elimination of a tuned circuit, but by the removal of the reaction control, which was previously effective on the tuned grid coil. But reaction can be applied by adding another winding to the frame aerial and connecting one end of this to the anode of the S.G. valve through a variable condenser as shown in broken lines. When reaction is employed in this way the set will show a fair degree of efficiency, and will have a range sufficient to cover a few of the more powerful stations both at home and on the Continent. All component values are the same as those shown in Fig. 1. A receiver made according to the circuit of either Fig. 1 or Fig. 2 will require only about .45 amperes of low tension and some 6 or 7 milliamps of high tension current, and both batteries may thus be of the smallest capacity. The high-tension battery should have a maximum voltage of no less than 99, when "H.T. + 1" will be taken to the highest tapping, and "H.T. + 2" to about 60 volts. To ensure that the H.T. consumption is as low as possible, the highest grid-bias voltage consistent with good "quality" should be employed.

Det.-2 L.F.

Another type of circuit, which, so far as I am aware, is not used for any commercial portable on the market, is that comprising a detector followed by two L.F. stages. It would appear that such a circuit would be practically useless for a set operating on a frame aerial, but I can say from experience that this is not by any means the case. A well-designed Det.-2 L.F. portable, with sensitive reaction control, is a remarkably efficient instrument capable of excellent reproduction from the nearest Regional and National transmitters. I have a set of this kind in use at the present time, and although it was built for purely "local" reception, it will bring in such stations as Radio-Paris, Ëmp, Warsaw, and others.
and Leipzig at almost any hour of the day. Admittedly, these latter are not recorded at that volume, but they are sufficiently loud to be worth listening to.

A circuit of the set just referred to is shown in Fig. 3, from which it will be seen that it is remarkably simple. The frame aerial is provided with a reaction winding which operates through the usual 0.002 mfd. reaction condenser. A 200 ohm, non-inductive resistance is inserted in the lead from the anode of the detector valve to the reaction condenser to "steady" reaction control and to prevent the setting up of any spurious oscillation effects. The reaction winding is tapped, so that a portion is short-circuited simultaneously with the short-circuiting of the long-wave tuning winding, which greatly assists in the correct number of reaction turns, and the most suitable tapping point, reaction control remaining almost uniform over both wave-length ranges.

Apart from the use of a frame aerial, the circuit is very similar to that of a really modern Det.-2 L.F. receiver. The "fixed" kind, and is not unlike that of the "Selectone," recently described in these pages. Decoupling is very thorough, resistances and condensers for this purpose being included in the anode circuits of both the detector and first L.F. valves. The detector feeds the first amplifying valve through a parallel-feed transformer. The 100,000 ohm "stopper" resistance is included in the grid circuit of the second valve. The last (power) valve receives its input through a tone-control transformer, which is useful in compensating for the high-note loss almost inevitably occasioned by the extremely selective tuning circuit. As a result, the set is capable of providing very good quality reproduction at a reasonably high volume level. In the circuit reproduced, grid bias is obtained in the usual way from a 9-volt battery, but it would be rather better to provide automatic bias in the manner explained on page 323 of Practical Wireless.

Wireless No. 7. A set made according to the circuit of Fig. 3 will be even more economical in both H.F. and L.F. current than one using the circuits of Figs. 1 and 2. It will, in fact, take only about 35 amperes of low tension and some 6 milliamps of high tension current, when operated at suitable voltages.

One of the three circuits given, or a slight modification of one of them, will satisfy practically any requirement, so, after deciding on the one to be used, attention can be turned to the practical constructive details.

The Containing Case

The exact form of construction will depend primarily upon the type of containing case selected. This might be either of the suitcase or cabinet pattern, as typified by one of the sketches, Figs. 4 and 5. If the set is to be really portable, and carried about from place to place, the suitcase is certainly to be preferred, since it can be closed up and rendered less susceptible to jolts and jars. In addition, since the frame aerial is more remote from the set than is the case with a cabinet portable, there is rather less danger of unwanted reaction and H.F. instability.

But, on the other hand, the cabinet style of container is rather easier to make (and cheaper to buy), whilst being somewhat more convenient for use in the home. It also has rather more speaker accommodation, so that a larger unit can be employed, and, being of greater over-all dimensions, allows the frame aerial to be rather larger and more sensitive. I think I have given a fair statement of the "pros" and "cons" of both types, so I must leave the final choice entirely with you.

Suitcase Type

And now, for the moment, I will suppose that you have decided to make your set in suitcase form. The size of the container must first be decided on, and the dimensions given in Fig. 6 are suitable for practically any set having up to four valves.

The battery compartment will accommodate about 90-95 milliamperes of current, and the high tension battery of standard type (measuring 9in. long by 5in. wide), a 3-volt grid bias battery, and a 2-volt unspillable accumulator, such as the Exide type PC3, measuring approximately 5in. by 3in. by 3in.

It need not be mentioned that it is absolutely essential for a set of this type that the accumulator should be unspillable, because it will occupy various positions when the set is being moved about. Notice that a space is left between the battery partition and the bottom of the case; this allows all the battery leads to be passed through without the necessity of removing wander plugs.

Receiver Chassis

The chassis of the set may be of various patterns, but that shown in Fig. 7 is one that I have found particularly good. Since the baseboard is carried on fillets, much of the wiring can be done below it, and this makes for improved appearance. All battery, frame aerial, and loud-speaker leads are taken from the underside of the baseboard, and so they can pass straight through the gap in the partition without being visible at all.

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A CONDENSER is made up of two or more conducting plates separated by some kind of insulator known as a dielectric, such as air, mica, paper, or bakelite. The capacity of a condenser depends upon the area of the plates, the distance between them, and the nature of the insulation; the bigger the plates or the closer they are together, the greater the capacity. It offers a complete barrier to direct current but is often spoken of as not preventing the flow of alternating current. In Fig. 1, showing a simple condenser, the plates of air are replaced by mica sheets, the plates of a battery respectively, see Fig. 2, that when there is a deficiency of electrons, the plates of the battery will become positive (short of electrons), the respective terminals on the battery will receive an abundance of electrons, the plates of the battery will become negative (an abundance of electrons). This electron movement from the battery to the plates of the condenser, for when a current is applied, the electrons tend to move over to the positive plates in an attempt to balance the deficiency of electrons, although, due to their rigid cohesion to the matter with which the dielectric is composed, they are unable to do so, but the strain on the electrons is greatly increased. If the electron shortage is so intense on the positive plates, that is to say, if too high a voltage is connected across the condenser, the electron strain will become too great and the current will force its way through the dielectric from the negative side, that is to say, if too high a voltage is connected across the condenser, the electron strain will become too great and the current will force its way through the dielectric from the negative side. This electron movement from the battery to the plates of the condenser is not prevented by any means of resistance, but in the case of alternating current, the condenser does not prevent the flow of the alternating current, but is often spoken of as not preventing the flow of alternating current. In Fig. 1, showing a simple condenser, the plates of air are replaced by mica sheets, the plates of a battery respectively, see Fig. 2, that when there is a deficiency of electrons, the plates of the battery will become positive (short of electrons), the respective terminals on the battery will receive an abundance of electrons, the plates of the battery will become negative (an abundance of electrons). This electron movement from the battery to the plates of the condenser, for when a current is applied, the electrons tend to move over to the positive plates in an attempt to balance the deficiency of electrons, although, due to their rigid cohesion to the matter with which the dielectric is composed, they are unable to do so, but the strain on the electrons is greatly increased. If the electron shortage is so intense on the positive plates, that is to say, if too high a voltage is connected across the condenser, the electron strain will become too great and the current will force its way through the dielectric from the negative side.

Connecting to a Battery

If the two terminals of a condenser are connected to the positive and negative plates of a battery respectively, see Fig. 2, a great movement or activity of electrons—particles of electricity—will take place, for there is always a universal balance of electrons to be maintained. This means that when there is a deficiency of electrons at any point, then to that point will they flow in an attempt to make good any shortage that may exist. Now the work of a battery is to create an electron shortage, and consequently a positive means it produces an electron shortage and negative implies an abundance of electrons, the plates of the condenser which are connected to the respective terminals on the battery will likewise become positive (short of electrons), and negative (an abundance of electrons). This electron movement from the battery will cease when the potential difference—difference in voltage—between the plates of the condenser are exactly the same as the battery.

The Dielectric

The insulation, or dielectric as it is called, plays a big part in the working of the condenser, for when a current is applied, the electrons tend to move over to the positive plates in an attempt to balance the deficiency of electrons, although, due to their rigid cohesion to the matter with which the dielectric is composed, they are unable to do so, but the strain on the electrons is greatly increased. If the electron shortage is so intense on the positive plates, that is to say, if too high a voltage is connected across the condenser, the electron strain will become too great and the current will force its way through the dielectric from the negative side. This electron movement from the battery to the plates of the condenser is not prevented by any means of resistance, but in the case of alternating current, the condenser does not prevent the flow of the alternating current, but is often spoken of as not preventing the flow of alternating current. In Fig. 1, showing a simple condenser, the plates of air are replaced by mica sheets, the plates of a battery respectively, see Fig. 2, that when there is a deficiency of electrons, the plates of the battery will become positive (short of electrons), the respective terminals on the battery will receive an abundance of electrons, the plates of the battery will become negative (an abundance of electrons). This electron movement from the battery to the plates of the condenser, for when a current is applied, the electrons tend to move over to the positive plates in an attempt to balance the deficiency of electrons, although, due to their rigid cohesion to the matter with which the dielectric is composed, they are unable to do so, but the strain on the electrons is greatly increased. If the electron shortage is so intense on the positive plates, that is to say, if too high a voltage is connected across the condenser, the electron strain will become too great and the current will force its way through the dielectric from the negative side.

Storing Electricity

When the battery which has been coupled to the condenser is removed, the condenser will be left in a charged state, one plate will be negative and the other positive. If the two plates are joined together, or short circuited by a length of wire, a small current will momentarily flow, for the electrons at the negative terminal will rush round to the positive terminal until a balance is obtained and the strain on the insulation will be removed, see Fig. 3. Therefore, it can be understood that the condenser is able to store electricity or electrical energy in the form of an electrical field between the plates; this also explains the reason why quite an appreciable shock may be had from a large condenser of 2 mfd. or over if the terminals are accidentally touched after the working current of the set is switched off.

Reverting back to the remark that a condenser does not prevent the flow of alternating current, this is not quite correct, for, if it did not prevent the flow, it would of course mean that the condenser had broken down. What actually happens when the condenser is connected to an alternating current supply is that the electron shortage will be alternately created on each side of the condenser, the electrons rushing to and fro, first to one set of plates and then to the other set of plates, but the balance of electrons will not be obtained by the current passing through the condenser. It is generally assumed though, for simplicity sake, that an A.C. current is able to be communicated through a condenser.

Care When Choosing Condensers

It will be seen from what has been written why it is so necessary, when building up a set, especially a mains receiver, to make quite sure that the condensers selected are suitable for their positions, for, should they be placed in a set where they are subjected to too high a voltage, they are bound in time to break down with some disastrous results. The fact also results in other components in the set. Where fixed condensers are used in mains sets for smoothing the supply and also those used as by-pass condensers, in fact, any of 1 mfd. and over, special attention has to be paid to their insulation, or rather the dielectric used, for when the supply from the mains first switched on the surge of current might be so great, sometimes being two to three times the normal voltage, that if ordinary voltage condensers are used they would fail. This is why the microfarad is used, which is one-millionth part of a farad (mfd.).

Potential RELATING to CAPACITY

This Article Describes some Interesting Facts about Condensers, both Fixed and Variable

By GILBERT E. TWINING

January 28th, 1933

PRACTICAL WIRELESS 879
movable plates working in fixed plates. When the amount of overlap of the movable plates is at the minimum the condenser has very little capacity, but, when they are completely overlapping, the maximum capacity is obtained. The tuning condenser, generally of 0.0005 mf, maximum capacity, is connected across the aerial coil (see Fig. 6); its work is to momentarily store up the current collected by the aerial. The aerial picks up an alternating current of very high frequency, and in exactly the same way as before explained for A.C. currents, it charges one side of the condenser, but through the condenser being connected to the coil at once discharges from the one side of plates, and flows through the coil to the other side of the condenser in an endeavor to maintain the balance of electrons.

N arrows are drawn within this diagram to illustrate the direction of the electron flow. A field of magnetic force is always momentarily opposed any change in current flow, and as the current through the coil is fluctuating, that is to say, always changing, then the amount of opposition this magnetic field offers is known as the inductance of the coil, and this is measured in henries. The current oscillates at a tremendous rate through the coil to the other side of the condenser (see Fig. 6) and then through the coil to the other; it is due to the tremendous speed of these oscillations, and the effect that they produce, that the wireless waves are able to be tuned. The frequency of the alternating currents depends upon the setting of the tuning condenser, i.e., its capacity. That is the reason why the condenser is variable in order to adjust the capacity of the condenser in conjunction with the inductance of the coil, the oscillations of which will then correspond with the oscillations or frequency of the broadcasting station it is desired to listen to; the receiving set can then be said to be in tune with the transmitting station.

Fig. 6.—Showing the tuning condenser connected across the coil.

REMOTE CONTROL SWITCHING DEVICE

HERE is an idea for switching a set both on and off from anywhere in the house. As will be seen from the sketch, it is a miniature clapper panel with a solenoid for switching off. The materials are easily obtained out of an old bell, a piece of 1/32in. or 1/16in. sheet iron for the clapper, a piece of light spring wire, and two bell pushes. The terminals in the sketch are placed for clearness in wiring, but they can be fixed anywhere on the panel. As most of the sizes depend on the size of the bell bobbins, readers will have to make their own sizes.

When the "on" push is pressed it energizes the solenoid and the plunger hits the tail of the pawl and releases the clapper. The clapper should be very light and the distance between the clapper and the face of the magnet as short as possible. The spring at the foot of the clapper should have practically no tension when the set is off. The lugs on the clapper should be at the point of balance. The nose of the pawl should have a slight downward tendency, but should be easily pushed up by the clapper when the set is switched on.

When the "on" push is pressed it energizes the magnet which draws up the clapper. The pawl engages the clapper and holds it, contact being made between the pawl and the clapper, and so switching on the set. When the "off" push is pressed it energizes the solenoid and the plunger hits the tail of the pawl and releases the clapper. The clapper should be very light and the distance between the clapper and the face of the magnet as short as possible. The spring at the foot of the clapper should have practically no tension when the set is off. The lugs on the clapper should be at the point of balance. The nose of the pawl should have a slight downward tendency, but should be easily pushed up by the clapper when the set is switched on.

The panel could be fixed close to the set and a three-core bell wire led to anywhere in the house, possibly next to the fireplace. When a "dud" spot comes on in the evening's programme a touch of the button cuts it off and puts it on again without leaving your seat by the fireside. Although the sketch may look rather complicated, the making of the panel should present no difficulty to the average radio constructor, and the remote control business is very fascinating. —WILLIAM LIDDELL (Dalmuir).

A Resistance Arrangement

The secret of the correct functioning of this arrangement lies in the somewhat alarming arrangement of resistances and condensers shown at the extreme right of the diagram. The resistances A, B and C, in series, are connected between the high-tension supply, and R1 is a negative resistance connected to earth and the earth wire of the set. This means that H.T. — is at a lower potential than earth to the extent of the voltage drop across A, B and C.

The cathode of the control valve is connected to the junction of B and C, so that it is at a higher potential than the grid of the same valve. This, of course, is equivalent to a negative bias on the grid.

Fig. 1.—A practical circuit employing automatic volume control.

Referring to the diagram shown as Fig. 1, the cathode of the control valve is seen to be at a potential higher than the grid. The chief difficulty in preparing a practical circuit as has been already explained, that the values of the various biasing and voltage dropping resistances depend upon the types and characteristics of the valves used throughout the set. In the accompanying circuit as shown in the diagram, the components are referred to by letter and clear instructions for calculating their values are given.

In order to simplify the diagram a single high-frequency stage is shown. The aerial tuning system is indicated as a conventional tapped coil with variable condenser, and the high-frequency coupling as the popular choke-fed tuned grid. The low-frequency side of the receiver and all the refinements such as wave-change switching and band pass filters are also omitted for the sake of clarity. It should be noted, however, that no fundamental change in the control arrangements is necessary when band pass tuning is used.

Referring to the diagram shown as Fig. 1, the anode circuit of the control valve is connected, via the condenser C1, to the grid of the detector valve, so that radio frequency signal reaching the detector is also applied to the grid of the control valve. The condenser C1 is necessary because, as will appear later, the detector grid is at a considerably higher potential than the control valve grid.

Much of the success of the control scheme depends upon the careful adjustment of the bias resistances A and B so that, unless a signal is actually being received, the anode current of the control valve is zero. The anode supply for the regulating valve is taken from the point E which, we have explained, is at a higher potential than H.T. —. A resistance R4 is included in the anode circuit, and its value must be so chosen that, when the anode current of the control valve is at its maximum, the drop across the resistance is equal to the maximum additional bias it is required to apply to the grid of the high-frequency amplifier. The controlling bias voltage thus produced can be set to any desired point by way of the regulating resistance R5 which are by-passed to earth by the condensers C2 and C4.

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Splitted up the Resistance

The value of resistance B has next to be determined. It must be such that the voltage drop across it is equal to the normal bias required by the control valve so that the accurate adjustment of the grid bias to the control valve so that the accurate adjustment of its working conditions can be made, and also to permit the point at which control starts to be pre-determined. Its value should be approximately twice that of B.

In order to save a certain amount of calculation the table which follows gives values for A, B and C for various values of total high tension current. The figures are approximate to enable standard resistances to be employed.

<table>
<thead>
<tr>
<th>Current (mA)</th>
<th>Resistance (ohms)</th>
<th>Total high tension current (volts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>60</td>
<td>600</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td>800</td>
</tr>
<tr>
<td>50</td>
<td>40</td>
<td>1,200</td>
</tr>
<tr>
<td>60</td>
<td>30</td>
<td>1,800</td>
</tr>
</tbody>
</table>

It must not be forgotten that these resistances will have to carry continuously the full high tension current of the set, so that they must be of the wire wound type of ample rating, resistors of the 5-watt type being indicated for C and of the 1-watt type for B. Resistance A should be of the wire wound variable type. Those who have the facilities for doing so may like to construct their own resistances, in which case a commercial rheostat might be employed for A, while B and C could be combined in one home-made unit with suitable adjustable clips by means of which the tapping for the control valve cathode and also for grid bias for the output valve can be taken off.

Preventing Feed Back

Because the anode current of the control valve is a rectified radio frequency current, and not a steady direct current, care must be taken to prevent any radio frequency components being fed back to the radio frequency stage via the control bias circuits. The precautions indicated in the diagram are the high frequency choke, which is of any good make, and the de-coupling resistance R5 which may be a grid leak of half a micro or more. Suitable condensers C3, C4 and C5 should be of the order of .5 mfd. and of the non-inductive type.

These few notes will provide the basis for the very interesting and instructive experiments. One or two small points can be added. In view of the 60 volts difference in potential between the cathode of the control valve and the cathodes of the multi-mu and detector valves, it is advisable to supply the heater current for the control valve from a separate 4-volt winding.

Alternative Programmes for Berlin

Until recently the König Wustraunen high-power transmitter was used during the day for the broadcast of educational courses and lectures: entertainments relayed from Berlin and provincial centres were only transmitted after 7.30 p.m. In future an entirely different programme will be available on this channel. The call has been altered to "Hier Deutschlandsender König Wustraunen," and is no longer coupled with that of Berlin.

Copenhagen on the Short Waves

The Danish transmissions usually heard through Kalundborg may be picked up almost nightly on 31.01 metres through OXX, Slambæk, a 500-watt short-wave station which relays the Copenhagen programmes. The opening signal consists of a short musical box melody in the form of tinkling bells. København, Kalundborg og Danmark's korbrole sender is the call you will hear between items in the entertainment.

Operative Performances and Radio Broadcasts

The Berlin Broadcasting station, following a series of tests, has succeeded in obtaining almost perfect results in the relay of performances from the Opera House. This has been secured by a complete alteration in the microphone installation, and pick-up units are placed in the wings, as well as on the front of the stage. In this manner it is no longer necessary to find room for a large number of the chorus members on the stage. Their voices passing through amplifiers can be blended with those of the singers. Loud-speakers in the auditorium combine the sounds picked up from both stage and wings, thus obviating any risk of the singer's voices being swamped by the orchestra. Further experiments on these lines are being carried out.

New Latvian Station

The Madona 35-kilowatt transmitter which will eventually replace the Riga station has recently broadcast on various wavelengths. A severe interference has been caused to the Florence transmissions, the wavelength having been temporarily altered to 453.2 metres.

Radio City, New York

The world's greatest amusement centre, standing in the heart of New York, namely, the Rockefeller centre, which includes a music hall and theatre will not be monopolised by radio alone, as originally planned. In view of economic conditions the programme will include films and side-shows (vaudeville) from which relays are to be made to the transmitter. Listeners to W2XAL, W2XAD, W2XAF, and other short-wave stations will be frequently given an opportunity of hearing excerpts from these performances.

Radio-Paris to Become PTT Transmitter

Confirmation is now to hand that the French State is taking over the Radio-Paris high-power station at Passy, and that the transmitter will be placed towards the end of March. According to a French newspaper, although the plant is in complete construction, the authorities may spend a further half-million francs or so in bringing it up to date! It is now fully expected that the Eiffel Tower will again suspend its entertainment broadcasts. Further, according to rumours current in Paris, the State authorities are also negotiating for Radio-Torino, which would then become a Regional transmitter.
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No. 2. 2nd H.F.: Cossor 220 S.G.* - 16/6
No. 3. Detector: Cossor 210 H.F.* - 7/-
No. 4. Output: Cossor 220 P.T. - 17/6

*Metallised.

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The loose binders for preserving in permanently consultable form the Data Sheets which are being given every week in PRACTICAL WIRELESS are NOW READY, and all readers who sent in reservation forms as published in our Dec. 24th issue should claim their binders in accordance with the conditions therein printed, without delay. The PRACTICAL WIRELESS DATA SHEETS LOOSE LEAF Binder as illustrated here has a stout linen-covered stiff-board cover specially made to stand hard wear, having a special flap with cloth hinges and enamelled press-button fitting for speedy insertion and removal of the Data Sheets which, as will be noticed from the sheet in this week's issue, are specially "holed" to fit. There is an extremely useful manilla gusset pocket on the inside back cover for holding loose sheets, newspaper clippings, notes, and other odds and ends.

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Data Sheet No. 1—Accumulator Charging—Dec. 17th, 1932
Data Sheet No. 2—Coils & Coil Winding—Dec. 24th, 1932
Data Sheet No. 3—Resistances—Dec. 31st, 1932
Data Sheet No. 4—Mains Transformers—Jan. 7th, 1933
Data Sheet No. 5—Wire and Wire Gauge—Jan. 14th, 1933
Data Sheet No. 6—Chokes, H.F. & L.F.—Jan. 21st, 1933

Those new readers who are desirous of completing their files of these Data Sheets may have those already issued for 2d. each from the address given above.
Easily-made Coil Formers

Useful coil formers can be made of wood, as shown in the accompanying sketch. The ends are hexagonal in shape and arranged to give the required diameter. At each of the six corners is screwed a length of dowelling rod which can be purchased cheaply from any wood-workers’ store, and these are screwed to the ends, care being taken to prevent the rod splitting. When the parts are ready to put together it is better to soak them all for a few minutes in melted paraffin wax. If the coil is to be fitted horizontally the ends are cut as shown in the sketch, and when they are switched on, so that it is impossible to tell, by visual examination, whether a filament has burnt out or not.

A Simple Selectivity Device

I have found this dodge quite useful, when reception is very good, to cut out unwanted stations. When the switch is in the position shown in diagram, condenser is out of circuit, but when in reverse position, as shown by dotted lines, condenser is in use and can be adjusted to suit requirements. The whole is screwed on ebonite or any wood painted a suitable colour. - J. G. BRACK (Sunderland).

Testing Valve Filaments

If your receiver fails suddenly for an unknown reason, it is advisable to make certain first of all that the valve filaments are sound. Many of the valves in common use nowadays are equipped with filaments which emit no visible glow when they are switched on, so that it is impossible to tell, by visual examination, whether a filament has burnt out or not.

Using a compass for testing valve filaments. Put the compass on the bench and set it so that the needle lies parallel with the turns of the coil. A sound filament will be revealed by a deflection of the compass needle as soon as the circuit is completed. Break the circuit, and the needle will swing back to its original position. If the valve filament has burnt out, the needle will not move at all. You can use this instrument, which is really a simple form of galvanometer, or current-indicating device, to test the continuity of any circuit of low resistance. - A. V. D. HOST (Wembley).

Series Parallel Switching

Series parallel switching is really a simple form of galvanometer, or current-indicating device, to test the continuity of any circuit of low resistance. - A. V. D. HOST (Wembley).

A Simple Selectivity Device

I have found this dodge quite useful, when reception is very good, to cut out unwanted stations. When the switch is in the position shown in diagram, condenser is out of circuit, but when in reverse position, as shown by dotted lines, condenser is in use and can be adjusted to suit requirements. The whole is screwed on ebonite or any wood painted a suitable colour. - J. G. BRACK (Sunderland).

Testing Valve Filaments

If your receiver fails suddenly for an unknown reason, it is advisable to make certain first of all that the valve filaments are sound. Many of the valves in common use nowadays are equipped with filaments which emit no visible glow when they are switched on, so that it is impossible to tell, by visual examination, whether a filament has burnt out or not.

Using a compass for testing valve filaments. Put the compass on the bench and set it so that the needle lies parallel with the turns of the coil. A sound filament will be revealed by a deflection of the compass needle as soon as the circuit is completed. Break the circuit, and the needle will swing back to its original position. If the valve filament has burnt out, the needle will not move at all. You can use this instrument, which is really a simple form of galvanometer, or current-indicating device, to test the continuity of any circuit of low resistance. - A. V. D. HOST (Wembley).

Series Parallel Switching

Series parallel switching is really a simple form of galvanometer, or current-indicating device, to test the continuity of any circuit of low resistance. - A. V. D. HOST (Wembley).
Adaptor for a Pocket-Meter

WHERE readings have to be taken in a confined space, so that the pointed terminal ends of pocket test meters prove inadequate, this adaptor will be found useful. Two spring clips, shaped as illustrated, are made from spring brass strip, and mounted under terminals on a small ebonite block, which, in turn, is mounted on a wooden one, the combined height of the two being equal to the distance from the back of the meter to the back of the pointed terminal end mounted at its base.

The clips have their ends bent over the edge of the ebonite block to prevent them from swivelling on the terminal shanks. The terminal ends of the meter can now be held quite firmly under the bulb holder, as shown in sketch, and connections taken from the terminals on the block.—T. W. WILLIAMS (London, N.19).

Gramophone Pick-up and D.C. Mains Receiver

WHEN using a pick-up with amplifiers incorporating D.C. mains pentodes it has been found that ample output for domestic purposes is obtainable using no previous low frequency amplifying valve. The Marconi-Osram bent-de D.P.T. has been found very satisfactory used in this manner, the coupling between pick-up and pentode being a 34-1 inter-valve transformer, which is generally available for the purpose. When used in the conventional manner the pick-up must be isolated from the grid and cathode circuits of the receiver by large and reliable condensers to avoid all possibility of shock. Using the present scheme, this may be avoided, and a single volume control may be made to function with both radio and record. The only piece of apparatus required in addition to pick-up and volume control is a double-pole double throw rotary switch. The circuit

December 29th, 1933

January 28th, 1933
Ring out the old: ring in the new

Triumph of plate-less accumulators

Nuisance of frequent re-charging overcome at last

The familiar glass-box accumulator is a thing of the past. The new accumulator is a handsome cylinder (covered in bakelite) giving twice the ampere-hour capacity. Thus, though no bigger than your 40 amp.-hour accumulator and costing little more, it needs charging only half as often. It is also much more durable.

This revolution is owed to the work of John Fuller, Faraday's collaborator and a founder of the battery industry—work that his son and grandson perfected. The negative electrode, a pasted lead cylinder, itself acts as the battery container—a central core forms the positive. With no "grids" to interfere, you get complete effect throughout the active paste. Brings your wireless up to date—the saving on re-charging alone would repay you!

BLOCK plate-less accumulators

80 AMP. HRS. 11/6

TEL. GRA: 3316.

BLOCK BATTERIES LTD, ABBEY ROAD, BARKING, ESSEX.

The new accumulator

1. Negative electrode is itself the battery's container—nearly all weight is thus active material.
2. Circular, gridless formation gives uninterrupted action throughout the paste.
3. Total result—Twice the amp. hour capacity per lb. weight.
4. No sulphation; Won't run down when inactive; No grid buckling; Extraordinarily long life; Almost unbreakable.

TAL/Br.15
ALL ABOUT YOUR RADIO BATTERIES

Radio batteries may be divided into two broad classifications, primary batteries and secondary batteries, or accumulators. Primary batteries are usually of the "dry" type, although the "wet" pattern is in successful use, more particularly for high tension work. Let us take the primary battery first, and by learning something of its working principles, obtain a better, and more economical result in our radio practice.

Strictly speaking the term "dry" is a misnomer as if the cell were really dry, no current would be forthcoming. The proper term would be non-aqueous, and this follows very closely the principles of the original Leclanché cell. Here a notable advance in construction appeared in the use of manganese dioxide as a depolarizer or recuperant.

To grasp the value of such a feature, let us examine the working of a primary cell, and see what the depolarizer does. In Fig. 1, we have a jar containing dilute sulphuric acid in which are the two plates Zn and Cu, which represent zinc and copper, respectively. This very elementary battery, actually one of the first ever devised, will give a small current at about one volt pressure—for a limited time only. And for the following reason. When the circuit is complete bubbles of hydrogen are released at the zinc plate which is at negative potential. These bubbles travel through the acid and attach themselves to the positive, or copper plate, which is normally at positive potential. As soon as this occurs the output of current will fall off rapidly, until it approaches zero at which point the battery is useless as a generator of current. But suppose we can supply the positive plate with oxygen, this will combine with the hydrogen and keep this "polarizing" effect under control. Here then is the function of a depolarizer, it keeps the unwanted hydrogen at bay, and whilst its beneficial action continues the battery will provide a useful supply until its elements are expended.

Leclanché Cells

The original Leclanché cell consisted of a jar containing a zinc rod—zinc is always used as the active element in primary cells. The construction of the dry battery follows very closely the principles of the old Leclanché battery. We arrive at the modern dry cell, a section of which is shown at Fig. 3. Here we have the zinc in the form of a cup A containing an absorbent which holds the excitant B in paste form. This excitant, with certain exceptions, is sal ammoniac as used in the former Leclanché type—which attacks the zinc and sets up an electro motive force or E.M.F. In the centre of the cup is a carbon rod surrounded by crushed carbon and manganese dioxide much in the same way as in the old Leclanché cell. At D, is an insulator to avoid short-circuiting the zinc and carbon elements, which are, of course, at opposite potentials, i.e., negative and positive.

The top of the container is sealed in by earthenware. Here then, is the function of a depolarizer, it keeps the unwanted hydrogen at bay, and whilst its beneficial action continues the battery will provide a useful supply until its elements are expended.

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Proper Care of Batteries

Having now gained some idea of the makeup, also the "whys and wherefores" of our dry battery we can apply the knowledge to useful effect. In the first place we must carefully guard against excessive discharge, and this entails two precautions. Firstly, we must not exceed the "dry cell" or "egg box," made of waxed cardboard, and filled in with paraffin wax. In some of the higher class high-tension batteries, several of the units are further enclosed in insulating capsules to "break" the leakage path at certain critical points.

A good battery will work well right down to nearly half its rated voltage, at which point, say, .8 to .9 volt per cell, its useful life is about ended.

These are connected in "series," i.e., carbon to zinc, which gives a total voltage of 1.5 times the number of cells, e.g., 80 x 1.5 = 120 volts. This being a considerable electrical pressure, it is obvious that no leakage must be permitted, as not only would the cells soon become useless, but excessively noisy in working even over their very short life. It is, therefore, the practice of the battery manufacturer to make the outer container in the form of a crate, or "egg box," made of waxed cardboard, and filled in with paraffin wax. In some of the higher class high-tension batteries, several of the units are further enclosed in insulating capsules to "break" the leakage path at certain critical points.

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WHAT IS TELEVISION?
A Short Series Explaining Fundamental Principles.

By

Obviously, the first thing to do is to tune in the London National Station on 261 metres, as this is the transmitter at present furnishing the B.B.C. television signals. These signals should be heard on the loudspeaker, and can be recognized easily as what may be described as a high-pitched steady note, with another high-pitched chirrup superimposed upon it. Once tuned in, change over the output connections on the set so that they feed the vision apparatus—neon lamp and synchronizing mechanism, if this latter has been included.

By the way, there has been a good deal of controversy concerning the correct term to describe the individual who looks in at a television transmission so that matters will be on a par with "listener," the generally accepted term for the man who sits at home and listens to the programmes provided for him via broadcasting. The word that finds the greatest favour, as far as the B.B.C. is concerned, is "looker." I wonder what readers of PRACTICAL WIRELESS think of this?
Curious Effects
When the speed has been correctly adjusted, the synchronizing mechanism will come into play and hold the image steady, but if the adjustments are not correct, the image will "hunt" vertically, that is, move up and down and give one the impression of watching a scene through the porthole of a ship as it gently rides the waves. Correctly operated, however, the image can be kept steady, but the image may, when it first comes to rest, be split vertically, somewhat in the manner indicated in Fig. 1, where two portions of a picture can be seen side by side. This explained quite simply, and arises from the fact that the disc has been pulled into a state of synchronization (see last week's article), and true synchronization is established, since corresponding disc holes or scanning areas at the transmitting and receiving ends are not in phase. The image is, in effect, moved bodily along to the left or to the right by the number of holes it is out of phase.

Rectifying Matters
To rectify matters with the ordinary apparatus, gently bring the disc from its correct speed by adjusting the resistance. The image will drift slowly upwards or downwards, and as soon as the double image has resolved itself into a single one, the motor speed must be readjusted to normal again. These synchronizing adjustments have to be done intelligently, but a little practice will soon put this right, just as is the case when tuning a new set.

In Fig. 1 is shown another possible occurrence, this being known technically as an image "out of frame." It arises when he is lacking in synchronization or synchronous motors are employed, and is due to the mechanism being set incorrectly when the disc holes. If no other device is available, it will be necessary to move round slightly the disc on the shaft, but the better and simpler alternative is to rotate either the whole case of the motor or adjust the position of the field coils by moving them a little round the motor case.

Interesting Records
The photograph indicated as Fig. 2 is interesting inasmuch as it shows a "looker" making adjustments to the speed control of an experimental Baird "television" used in Germany in the U.S. The image here was quite small, and appeared in the aperture seen on the right of the square front cabinet. In addition, Fig. 3 will show the reader how a looker will appear in his apparatus when properly phased and framed. The machine shown is one which was built by the German company, Fernseh A.G., and is designed for horizontal scanning, with a resultant picture shape differing from the English standard.

Fig. 4 records an amateur effort at building disc television receiving apparatus and is included to show the ingenuity displayed by constructors to obtain correct speed regulation. A remote control friction brake will be noticed, this apparently being preferred to the more usual electrical methods, but by all accounts it functioned to the satisfaction of the user, and after all, that is the main criterion.

The Television Wireless Set
Just a word now in connection with a wireless set to be used for the reception of the television signals. Here again is a case where individual taste can be exploited provided one or two points are borne in mind. First of all, do not forget that the absence or over accentuation of certain frequencies as a result of suppression or resonance in the wireless set, will quite easily spoil the image. The lower frequencies are responsible for the pictorial or pleasing effects, and if the set fails to go down to the "bass" notes it will no doubt be found that there is a kind of white light thrown up behind a person's head in the case of a close up image. In addition, the white background becomes almost black on the top of the image on either side, while the observer will notice beard-like shadows which have the effect of making the image look dirty.

On the other hand, if the higher frequencies are cut off there will be an absence of detail. The eye, for example, will look somewhat blurred or out of focus and too much imagination is required to get a true mental picture of the subject being transmitted.

From these remarks it will be gathered that the wireless set must be as free from distortion as possible. Tuning circuits, in consequence, must not be too sharp or ultra selective, otherwise we can say goodbye to the high frequencies, while at the other end of the scale do not have a rapidly falling response curve in the low frequency amplifier, or there will be a feeling of disappointment with the results obtained.

Negative Images
Another point to watch comes a little earlier in the system. In aerial reception no account has to be taken of this as far as the operation of the loud-speaker is concerned. A reversal of current direction in televisions may replace the image (that is, the part of the photographic plate from which a contact print is made). Since under working conditions these current reversals take place in the wireless set as part of its normal functioning, at the output stage the current direction may be reversed. If this is not so, instead of the plate current of the output valve, say, increasing at any one instant to intensify the neon lamp glow, the current will decrease and reverse. Matters. Luckily it is a relatively easy task to rectify this state of affairs when it occurs, and here are one or two ways of doing it.

If a transformer precedes the last valve, reverse either the primary or secondary connections to the windings. In many cases it is quite sufficient to reverse or interchange the connections on the output terminals of the set, while another series of low-frequency coupling can be added, or a change effected in the method of rectification, that is, angle bend to leaky grid or vice versa.

A Big Future
As an example of a well-made all mains wireless set for the reception of television signals, readers should refer to Fig. 5. This is a three valve of medium range and represents quite good practice for this class of work. No doubt at some future date it will be possible to describe "practical wireless" readers the complete designs of both a television wireless set and also the vision apparatus itself, but in the meantime may I enjoin every one of you to study carefully the facts which I have endeavoured to present to you in this series as succinctly as possible.

No one can gainsay that television has a big future and in this connection the amateur is an important person. He is the man (and in these enlightened days we can justifiably say woman) who studies every new development, and just as in the early days of wireless he contributed his quota which materially assisted progress, so too history can repeat itself as far as the science of television is concerned.

Fig. 5.-A typical example of an all-mains wireless set especially designed for the reception of television signals.

January 28th, 1933
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A FEW WORDS TO THE MANUFACTURER

Little Improvements which are Long Overdue

By W. B. RICHARDSON

Modern Components have Reached a Very High Standard of Performance, but Many Still Suffer from Minor Defects Connected with their Fitting or Operation. The Writer Enumerates Some of These and Suggests How They Might be Remedied.

THERE is no doubt that on the whole home constructors are very well catered for by the trade. There is scarcely a single component or accessory which the amateur is likely to need which cannot be supplied in a variety of makes and styles. However, in spite of this there are still many little grouses to be laid at the feet of manufacturers. These are not grouses about the efficiency of components or their adaptability to modern circuits, for manufacturers have done marvels in these directions, but rather are they complaints which arise from the practical difficulties met with in assembling.

Amateur construction or assembly is, of course, fundamentally different from professional construction. For example, a component used in a factory-made receiver can be designed for the one particular set in which it is to be used. The designer knows beforehand the exact characteristics required, so that there is no need to arrange for alternative values, extra tappings, and so on. Moreover, it can be designed to fit in nicely with the other parts so that there is no wasted space, and the connecting tags can be arranged in just the right position to give short and neat wiring.

With home construction, on the other hand, components have to be adaptable to many different circuits and layouts. This means that the general shape, position of terminals, etc., must be such as to suit average needs. We must not therefore be too ready in condemning the manufacturer if a certain part does not happen to fit in with a particular layout, or is a little difficult to connect up. It may be that in a different set it would be ideal. However, in spite of this acknowledged difficulty in meeting all requirements, we still have, as I say, several legitimate causes for grousing.

Why Not Standard Screw Threads?

Take terminals, for example. Constructors do not complain for fun. Terminals on many coils, valve holders, etc., are really too miserably inadequate for words. They are small and difficult to get at, and have no locking devices, so that when you attempt to tighten them up they merely go round and round. All this has been pointed out before, but there are some other difficulties in connection with terminals which I have not seen mentioned before, but which most constructors must have come across at one time or another.

First of all there seems to be no coordination amongst manufacturers regarding the screw threads used; in fact, many seem to delight in producing a thread which is slightly different from any other. The result is that, if a terminal nut is accidentally lost, it is ten to one against our being able to replace it with one from off an old component. No retailer seems to stock replacement nuts, and so we either have to use one which is of the wrong thread, but can be made to "hold," or else do without one—a very unsatisfactory state of affairs.

I suggest that it would be quite simple to use standard threads and to limit them to two sizes, say 4 B.A. as the general size, with 2 B.A. for special purposes such as large aerial and earth or speaker terminals.

Another difficulty with some terminals is that there is no room under the nut for more than one connecting wire. If two wires are joined to the same terminal it is impossible to get the nut on. Of course it only means making the threaded shank a little longer and the problem would be solved. See Fig. 1.

Soldering Lugs

One thing regarding terminals which has always puzzled me is the little spade connector or soldering lugs which some manufacturers slip on to each terminal before putting on the nut. (See Fig. 2.) I have never quite understood whether these are to be considered merely as spade terminals to be soldered to the end of each connecting wire to save making a loop in the wire itself, or whether they are really intended to take the place of soldering lugs. If they are spade terminals, then there should be more than one under each nut. A common fault is that there has to be only one of these to be considered merely as spade terminals to be soldered to the end of each connecting wire to save making a loop in the wire itself, or whether they are really intended to take the place of soldering lugs. If they are spade terminals, then there should be more than one under each nut. A common fault is that there has to be only one under each nut, and they are often found to be too small to be used in the ordinary sense for connecting wires or valve leads, and it is usual to find these terminals to be too small to be used in the ordinary sense for connecting wires or valve leads. For this reason I suggest that it would be quite simple to use standard threads and to limit them to two sizes, say 4 B.A. as the general size, with 2 B.A. for special purposes such as large aerial and earth or speaker terminals.

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receivers are often not up to the
standard of bought sets is in the
appearance of the panel. Whereas
the professional set usually has a
neat and symmetrical layout with
control knobs to match, one
another, the amateur receiver very
often has an odd assortment of
knobs. One reader pointed this
out in the correspondence columns
of this paper only a short while
ago, and suggested that there
should be greater cooperation be-
tween manufacturers, presumably
to effect some sort of standardiza-
tion.

It seems to me that the solution
to the problem is very simple. Why
not supply components without
knobs and market the knobs
themselves as separate parts? The
idea would be to standardize not
the pattern of the knobs, but the
size of the spindles on which they
fit. In this way a number of knobs
of the same pattern could be fitted
to all the various control spindles on
a receiver. When building a set one
would first purchase the necessary com-
ponents and then choose a number of knobs.
These would be obtainable in a variety of
designs and colours, and all one would have
to do would be to choose a complete set all
the same pattern. This might include,
say, 2 large tuning dials, 2 smaller ones for
volume and reaction controls and 2 knobs
for switches.

Stiff Controls
The question of control knobs reminds
me that many variable condenser controls
are anything but silky in action. This is
particularly noticeable with some ganged
condensers worked with a disc drive. One
would think that any little stiffness in the
condenser itself would be reduced to a
negligible amount through the reduction
gear of the drive; but nevertheless the
control is often very heavy and jerky in
operation.

On examining one or two models which
suffered from this drawback, it appeared that
the trouble was primarily due to the
main spindle being very stiff. This ne-
cessitated the disc drive being very heavily
sprung loaded in order to turn the dial
without slipping. Had the condenser
spindle been easy to turn in the first place,
quite a light drive would have been sufficient,
and so the whole operation would have been
lighter and smoother. The cause of the
stiffness of the condenser spindle was
usually the springs which were used to
ensure good electrical contact between the
spindle and the body of the condenser.

No doubt pigtail connections would solve the
problem. If the ordinary type
were considered unsatisfactory owing to the
possibility of their breaking, scraping
on the plates, or varying their positions
and so upsetting the ganging, I suggest that
pigtauls made like watch springs might
answer the purpose. I had an old wrist
watch spring functioning in this capacity on a
reactive tuning unit for many years and it
worked admirably. Fig. 8 illustrates the
idea as applied to a condenser.

Panel-Mounting Difficulties
When it comes to the mounting of
variable condensers and similar components
on the panels of many home-built receivers
another difficulty often crops up—the panel
is too thick to allow the nut to go on the
threaded bush. See Fig. 5. It seems to be
the exception rather than the rule to find
a component of the one-hole-fixing type
which will fit a panel more than 3/16in. thick,
and many appear only suitable for 3/16in.
panels. The result is that if a thicker
panel is used the fixing nut has to be
recessed in the panel as in Fig. 6. Even
then it is often found that the control knob
cannot be secured in position,
All this could be overcome by supplying
slightly longer bushes and providing spare
washers for use with thin panels. The
washers would, of course, be placed behind
the panel. This is shown in Fig. 7.

Odd Control Knobs
One way in which home-constructed
receivers are often not up to the
standard of bought sets is in the
appearance of the panel. Whereas
the professional set usually has a
neat and symmetrical layout with
control knobs to match, one
another, the amateur receiver very
often has an odd assortment of
knobs. One reader pointed this
out in the correspondence columns
of this paper only a short while
ago, and suggested that there
should be greater cooperation be-
tween manufacturers, presumably
to effect some sort of standardiza-
tion.

It seems to me that the solution
to the problem is very simple. Why
not supply components without
knobs and market the knobs
themselves as separate parts? The
idea would be to standardize not
the pattern of the knobs, but the
size of the spindles on which they
fit. In this way a number of knobs
of the same pattern could be fitted
to all the various control spindles on
a receiver. When building a set one
would first purchase the necessary com-
ponents and then choose a number of knobs.
These would be obtainable in a variety of
designs and colours, and all one would have
to do would be to choose a complete set all
the same pattern. This might include,
say, 2 large tuning dials, 2 smaller ones for
volume and reaction controls and 2 knobs
for switches.

Stiff Controls
The question of control knobs reminds
me that many variable condenser controls
are anything but silky in action. This is
particularly noticeable with some ganged
condensers worked with a disc drive. One
would think that any little stiffness in the
condenser itself would be reduced to a
negligible amount through the reduction
gear of the drive; but nevertheless the
control is often very heavy and jerky in
operation.

On examining one or two models which
suffered from this drawback, it appeared that
the trouble was primarily due to the
main spindle being very stiff. This ne-
cessitated the disc drive being very heavily
sprung loaded in order to turn the dial
without slipping. Had the condenser
spindle been easy to turn in the first place,
quite a light drive would have been sufficient,
and so the whole operation would have been
lighter and smoother. The cause of the
stiffness of the condenser spindle was
usually the springs which were used to
ensure good electrical contact between the
spindle and the body of the condenser.

No doubt pigtail connections would solve the
problem. If the ordinary type
were considered unsatisfactory owing to the
possibility of their breaking, scraping
on the plates, or varying their positions
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the panel. This is shown in Fig. 7.
THE NEW RECEIVER WHICH WILL MAKE RADIO HISTORY.

Free 1'-Blueprint will be given with our Issue Dated Feb. 11th, on Sale Feb. 8th.

LAST week I made an important announcement on page 833 concerning my new four-valve receiver, the "Fury Four." I should like briefly to reiterate for the benefit of those readers who are reading PRACTICAL WIRELESS for the first time that I have specially designed this receiver for the reader of this paper as a result of the hundreds of letters I daily receive covering the drawbacks and the deficiencies of the average home-constructed set. In so far as I of the "Fury Four," that I recommend with every confidence and great enthusiasm, every reader of this paper to make to read. Realizing as I did that this is the season when a reader might be tempted to make up a set which would fail to give him the satisfaction and service he requires, my tests have been so arranged that those who are anxious to make a careful study of the details of the "Fury Four," to realize the great value of this arrangement. You will notice that all components except one H.F. choke are screened. There is really no need to screen this as all risk of interaction is, of course, removed by the screening of the other components. Quite naturally I have adopted such-board wiring. Not only does this make for a matter layout and greatly simplify the wiring, but it also enables the condensers, the tone, the resistances, etc., to be pulled away and hence actually reduces the size of the backboard which otherwise would be necessary. I have considered the reader's pocket by using special main condensers for screen grid decoupling purposes, for they are much cheaper than

Every Reader of this Paper should make up this Amazing Receiver, which will easily receive OVER 100 Stations on the Medium and Long Wave-bands.

The Fury Four

By

J. CAMM

A most remarkable receiver, with a Personal Guarantee of Performance.

It is necessary for the reader to adhere to my building and operating instructions. Let me now proceed to an examination of the circuit which is shown at the right-hand corner of this page. As stated above, a full-size wiring diagram of the Fury Four will be given with our issue dated February 11th.

The Circuit

It will be noted from the circuit diagram on this page that I have made use of two screened grid valves to render foreign reception certain. The pre-set aerial condenser ensures that irrespective of the aerial used, the tuning range of the variable condensers will be fairly ample. A point which the reader will appreciate is that only one H.T. tapping is used. You merely plug in the negative grid-plate into the negative socket and the single positive H.T. lead into maximum H.T. voltage. I have used voltage dropping resistances to ensure that each valve has the correct voltage applied to its plate. The great advantage of this arrangement is that the varying current consumption of each valve does not cause high resistance patches to develop in the H.T. battery, which is the common cause of motor hunting, instability, and poor reception when multiple H.T. tap-offs are used.

MY GUARANTEE!

I give a personal guarantee of satisfaction that the Fury Four will do what I claim for it, and every reader may obtain my personal advice free of charge concerning any difficulties which may arise, until the set works in functions in the same manner to mine.

Full logging charts of the Fury Four will be given in later issues together with independent reports by radio experts. Their reports agree in every manner.

Instead of, as is usually the case, the reader being left to do so, I feel that I should ex-
THE NEW RECEIVER WHICH WILL MAKE RADIO HISTORY.

FIRE 1- Blueprint will be given with our Issue Dated Feb. 11th, on Sale Feb. 8th.

LAST week I made an important announcement on page 835 concerning my new four-valve receiver, the "Fury Four!" I should like briefly to reiterate for the benefit of those readers who are reading this page for the first time that I have specially designed this receiver for the reader of this paper as a result of the hundreds of letters I daily receive concerning the drawbacks and the deficiencies of the average home-constructed set. In no certain am I of the "Fury Four," that I recommend with every confidence and great enthusiasm, every reader of this paper to make to. Realizing as I did that this is the season when a reader might be tempted to make up a set which would fail to give him the satisfaction and service he requires, my tests of the "Fury Four" have been acclimated by the use of aircraft. I do not wish to use valuable space by reiterating in extenso all of the preliminary announcements I made last week, and I will therefore confine my remarks to a set-up of the Fury. They are these: the "Fury Four" is extremely selective; provides ample volume; receives at least one hundred stations on the medium and long waves; it is very simple to operate; cheap to build; free from background; economical to run; it is sturdy; easy to construct; no jamming of stations; most important of all, it is backed by my personal guarantee of satisfaction. Any reader, therefore, who fails to obtain the results of which I know the "Fury Four" to be capable, may avail himself of my personal advice free of charge on any difficulty he may encounter in its construction (exchanging notes relating to alterations to suit reader's own components, which in no case can I answer until the set functions to the satisfaction of the reader. It is necessary for the reader rigidly to adhere to any building and operating instructions. Let me now proceed to an examination of the circuit which is shown at the right-hand corner of this page. As stated above, a full-size wiring diagram of the Fury Four will be given with our issue dated February 11th.

The Circuit

It will be noted from the circuit diagram on this page that I have made use of two screened grid valves to receive foreign reception. The pre-set aerial condenser C1 ensures that irrespective of the aerial used, the tuning range of the variable condensers will be fairly constant. A point which the reader will appreciate is that only one H.T. tapping is used. You merely plug in the negative socket into the negative socket and the single positive H.T. lead into maximum H.T. voltage. I have used voltage dropping resistances to ensure that each valve has the correct voltage applied to its plate. The great advantage of this arrangement is that the varying current consumption of each valve does not cause high resistance patches to develop in the H.T. battery, which is the common cause of motor boiling, instability, and poor reception when multiple H.T. tappings are used.

Full logging charts of the Fury Four will be given in later issues, together with independent reports by radio experts. Their reports agree in most matters.

Instead of, as it is usually the case, the reader being left to do so, I feel that I should explain why I have not used a three-gang condenser in conjunction with the triple-valve coils. The reason is that there is a certain amount of difficulty in accurately balancing three condensers. I have, therefore, avoided the trouble of doing this by turning the detector grid coil by a separate, variable condenser. Therefore, the aerial and first grid current is shed by the serial which is always fairly tuned, an accurate tuning being shown, as is really necessary. In point of fact, this arrangement in the "Fury Four" yields far better results than the triple-gang condensers which I originally tried. I found that it was impossible to facilitate the tuning considerably in this way. It is obvious that the detector grid circuit is damped by the grid-board, therefore this circuit is "flat," and a separate tuning condenser may be used here. You need to operate the "Fury Four" to realize the great value of this arrangement. You will notice that all components except one H.F. choke are screened. There is really no need to screen this as all kinds of interaction is; of course, removed by the screening of the other components. Quite naturally I have adopted sub-board wiring. Not only does this make for a neater layout and greatly simplify the wiring, but also it enables the condensers, the fuse, the resistances, etc., to be hidden away and hence actually reduces the size of the board, which otherwise would be necessary. I have considered the reader's pocket by using special mains condensers for screen grid decoupling purposes, for they are much cheaper than

MY GUARANTEE!

I give a personal guarantee of satisfaction that the Fury Four will do what I claim for it, and every reader may obtain my personal advice free of charge concerning any difficulties which may arise, until the set functions in the same manner in mine.

(Continued on page 90.)
LIST OF COMPONENTS FOR THE FURY FOUR

(See page 897 and below for illustrations of these Components)

One Three Gang LISSEN Coil Assembly (L.N.3162).
One LOTUS Two-gang Condenser with Disc Drive.
One LOTUS .0005 mfd. single Condenser with Disc Drive.
One SOVEREIGN Compression Type Condenser, Type J.
One WEARITE S.G. Choke, Type H.F.P.A.
One BULGIN S.G. Choke, Type H.F.A.
One PETO-SCOTT Screened H.F. Choke.
One READY RADIO I.F. Transformer, Ratio 3 to 1.
One TELSEN Pentode Output Choke, Type W.72.
One TELSEN 2 meg. Grid Leak with Wire Ends.

Three DUBILIER 1 mfd. Fixed Condensers, Type BB.
Two DUBILIER .0003 mfd. Fixed Condensers, Type 665.
One DUBILIER .0002 mfd. Fixed Condensers, Type 665.
Two DUBILIER 1.1-1.3 C mfd. Fixed Condensers, Type BE 31.
Four CLIX Chassis Mounting Valve-holders, Three 4-pin and Four 1,000 ohm. ERIE Resistors, 1 Watt Type.
Two 30,000 ohm. ERIE Resistors, 1 Watt Type.
One 100,000 ohm. ERIE Resistors, 1 Watt Type.
One 5,000 ohm. ERIE Resistor, 1 Watt type.
One LISSEN 2 meg. Grid Leak with Wire Ends.

Three BELLING-LEE Terminal Blocks.

The Lotus single .0005 mfd. Condenser with Disc Drive

The Dubilier Fixed Condensers.

Belling Lee terminal block and terminals

The Eria Resistors.

Buying separate condensers, and possess the additional advantage that they are mounted two in one case, and, therefore, take up much less room. Another advantage which the home-constructor will appreciate is that the special condensers employed are fitted with flexible leads instead of terminals. They are, therefore, more conveniently wired into the circuit. The potentiometer for the screen grid voltage adjustment is disconnected from the H.T. circuit when the set is switched off owing to the use of the three-pole switch, hence there is no drain on the H.T. battery when not using the set, and this control may be left in its usual position—which will, of course, be found in operation. The illustrations on this page show the actual components I have used. Take this list to your dealer to make absolutely certain that the goods supplied agree with the list of components given above.
survived the test valve. The former is now well on its way to becoming obsolete, and valve detection is the only method that need claim our attention.

Another method of "leaky-grid" detection is the presence of grid current owing to the positive bias. This means a load on the tuned circuit, which is reflected as flat tuning and matters can sometimes be improved in this direction by tapping down on the grid as shown in Fig. 2.

"Power-grid" Rectification

The system which seems likely to oust all others in the near future is that known as "power-grid" rectification. The circuit as shown in Fig. 3 bears a close resemblance to "leaky-grid" detection, but it will be seen that a much lower grid-leak value is used, together with a smaller grid condenser. The effect of this is to make the time-constant much shorter. Our treble, therefore, does not receive such rough treatment. Also, a much higher anode voltage is employed, 120-150 volts being quite common. Large inputs may be handled with very little distortion; as a point of fact, it is actually necessary to feed a high input in order to ensure a minimum of distortion. With this method of rectification, the loading on the tuned circuit is rather severe, and tuning is comparatively flat. Once again we may attempt to improve matters by tapping down on the grid coil. It should be noted in passing that sensitivity will thereby be reduced, but there will be an optimum point where the loss of volume is more than outweighed.
The Actual Components Required

The Ready Radio Low-frequency Transformer

Telsen Tapped Pentode Output Choke.

The Wearite Screened H.F. Choke.

The Peto-Scott Screened Choke.

Lewcos Potentiometer.

The Wearite Screened H.F. Choke.

Lewcos Potentiometer.

Telsen .0003 Reaction Condenser

The Lotus Double Gang Condenser with Disc Drive.

The Lotus Double Gang Condenser with Disc Drive.

Ediswan Grid Bias and H.T. Batteries.

Ediswan Grid Bias and H.T. Batteries.

Sovereign Pre-Set Aerial Condenser.

The Ediswan Accumulator.
by the gain in selectivity. These remarks apply more especially to receivers which do not incorporate an H.F. stage as such sets are naturally unsatisfactory, and one cannot afford to overlook any point which may lead to an improvement in this direction. One difference between the circuits in Figs. 2 and 3 is often missed. With "leaky-grid" detection the grid return lead is connected to L.T. positive, but with the "power-grid" arrangement it is returned to cathode (negative end of filament in battery valves), the grid potential is calculated with respect to L.T. positive, but with the cathode (negative). This does not mean, of course, that the grid is biased negatively, as grid voltage is calculated with respect to the cathode (negative). One difference in this direction. One difference between the circuits in Figs. 2 and 3 is often missed. With "leaky-grid" detection the grid return lead is connected to L.T. positive, but with the "power-grid" arrangement it is returned to cathode (negative end of filament in battery valves), the grid potential is calculated with respect to the cathode (negative).

Diode Rectification

The final method of detection to receive our consideration is shown in Fig. 4. It is a very popular one, but fully deserves our consideration is shown in Fig. 4. It is a very popular one, but fully deserves the name "diode rectification." It is absolutely distortion free and is virtually impossible to overload it. Furthermore, there is little or no loading effect on the preceding tuned circuit, and tuning is therefore sharpened. For battery users an added attraction in the new consumption of anode current. We now come to the one snag which has restricted its popularity. Used as a diode we obtain absolutely no amplification from the valve. It is therefore necessary to use an extra L.F. stage. It is possible to incorporate reaction, but the writer thinks that anyone who is sufficiently out for quality to use a diode, will not tolerate this. In the normal triode detector two jobs are combined, rectification and amplification. It must be perfectly obvious that the valve cannot handle both absolutely successfully. This is the great virtue of the diode and we can then follow it by a well-designed L.F. stage. It is true that two valves are necessary to replace the usual one, but the results fully justify the extra complication.

ROUND THE WORLD OF WIRELESS, USEFUL CALIBRATION SIGNALS.

<table>
<thead>
<tr>
<th>Day</th>
<th>Frequency (Metr)</th>
<th>Frequency (Kc/s)</th>
<th>Time (GMT)</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Day</td>
<td>549.4 m., 548 kcs</td>
<td>600.6 m., 553 kcs</td>
<td>05.15-06.20</td>
<td>a (-)</td>
</tr>
<tr>
<td>2nd Day</td>
<td>557.9 m., 556 kcs</td>
<td>600.6 m., 553 kcs</td>
<td>05.15-06.20</td>
<td>b (-)</td>
</tr>
<tr>
<td>3rd Day</td>
<td>557.9 m., 556 kcs</td>
<td>600.6 m., 553 kcs</td>
<td>05.15-06.20</td>
<td>c (-)</td>
</tr>
</tbody>
</table>

Such signals, transmitted from this high power station, will be found very useful for calibrating a wireless receiver by plotting a graph, showing the individual wavelengths with their respective condenser readings.

START RIGHT with your "FURY FOUR" follow the designer—use WEARITE

Here is an opportunity to build a really up-to-date receiver—a real "star" performer. But don't jeopardise its performance by using doubtful parts. The designer has specified the Wearite H.F.P.A. choke—a most important link in the chain that means efficiency. H.F. stability is assured if you follow the designer. He also specifies the Wearite G.W.C. Switch—follow him and be certain.

THE WEARITE H.F.P.A. CHOKE
A smoothly built job with definite "snap" action self-cleaning contacts. Price 4/-

THE WEARITE G.W.C. SWITCH
A smoothly built job with definite "snap" action self-cleaning contacts. Price 1/-
The Editor of 'PRACTICAL WIRELESS' and the Managing Director of DIRECT RADIO PERSONALLY GUARANTEE THE 'FURY FOUR' if built with a DIRECT RADIO guaranteed and tested kit.

So confident are we that the Direct Radio "FURY FOUR" is the ideal set for your Family's entertainment that we give this unconditional Guarantee—Build the 'FURY FOUR' with a Direct Radio Kit and if you find the slightest cause for complaint, e.g., in conjunction with "Practical Wireles," will not consider the project completed until we have made your "FURY FOUR" operate to your absolute satisfaction free of charge.

DONALD P. MARCUS, Managing Director, Direct Radio Ltd.

F. J. GARN, Editor, "Practical Wireless."

AND HERE are the recommended ACCESSORIES for your FURY FOUR.

1. A 1 tests Permanent Magnet Moving Coil Speaker with Input Transformer, or 12 monthly payments £15. 0. 0
2. A 1 tests Permanent Magnet Moving Coil Speaker with Input Transformer, or 12 monthly payments £15. 0. 0
3. A 1 tests Permanent Magnet Moving Coil Speaker with Input Transformer, or 12 monthly payments £15. 0. 0
4. A 1 tests Permanent Magnet Moving Coil Speaker with Input Transformer, or 12 monthly payments £15. 0. 0

COMPLETE CATALOGUE OF ALL SETS, ACCESSORIES AND GADGETS—PRICE 1/- POST FREE.
OTHER PEOPLE'S OPINIONS

"My Kit arrived safely yesterday. I did not expect such quick delivery. I am delighted with the mults." — E. K., Birmingham.

"Please accept my thanks for your prompt attention to my order. Everything arrived in perfect condition." — E. P., Edinburgh.

"May I heartily compliment you on your high quality of all components supplied. You have truly made a demand by the wireless constructing public for something better." — H. S., Carleton, near Blackpool.

"I am very pleased indeed with the kit, which arrived in perfect condition. Wonderful packing." — M. W., Yorks.

"What service! 2 days after order sent Kit received in perfect condition. Your assembling instructions were most helpful." — T. E., Brighton.

(The original unsolicited testimonials may be inspected at our offices.)

THE BEST OF ALL THREE VALVERS—DIRECT RADIO
SELECTONE KIT DESCRIBED IN PRACTICAL WIRELESS, JANUARY 7th & 14th.

Kit 1. £4 2 0 12 monthly payments of 8/-
Kit 2. £5 4 9 12 monthly payments of 10/-
Kit 3. £6 4 9 12 monthly payments of 11/6
Kit 4. £8 7 6 12 monthly payments of 15/6

Wise Spending — Discriminating Set Builders Insist Upon Direct Radio’s Specifications

SENSEATIONAL KIT BARGAINS!

DIRECT RADIO THREE-VALVE, detector, two L.F. circuit, complete kit of components, £3/6. An easily built three-valve receiver, giving huge volume on local stations, and many foreigners.

DIRECT RADIO ALL-WAVE KIT, 23/- A three-valve kit covering ultra-short, medium and long wavebands. Wonderful world reception, with excellent volume and quality.

BRITAIN’S SUPER KIT. Complete kit of all specified components. £6/15/6. A five-valve, super-heterodyne receiver, best superhet ever designed, full instructions and blueprint with each kit.

COSMIC COIL UNIT, comprising dual-range coil and short-wave coil and one base. Suitable for converting any set to all-wave type.

COSMOS THREE-VALVE BATTERY MODEL KITS without valves £1/10/0. Sale Price £1/6/0.

EXTENSOR CONDENSER, 0.000 mfd., slow motion. List price 14/6. Sale Price 7/6.

RADIO FOR THE MILLION BATTERY SETS, £2/10/6. Our Price £2/10/6.

OFFICIAL DEMONSTRATION

The "FURY FOUR," in conjunction with “Practical Wireless,” will be demonstrated daily at 159, Borough High Street, London Bridge, S.E.1. Come and hear the amazing results for yourself.

Why deny your family the pleasure of listening to the World’s Radio programmes until father or the family wireless expert comes home? Let them choose the programmes themselves all day. Give them the Direct Radio Fury Four—simple to build—simple to tune,—no freakish controls. Foreign programmes galore—one at a time without interference or distortion— inexpensive—in fact, the ideal set. Backed by the Editor of “Practical Wireless” and the famous reputation of Direct Radio of the Borough.

Cash, C.O.D., and Easy Payment Order Form


Please dispatch to me at once the following goods:

(a) I enclose
for which (b) I will pay on delivery
(c) I enclose first payment of

Not applicable £.

NAME

ADDRESS

What we Found...

COMMENTS ON COMPONENTS

H.T. supply is short-circuited. The usual method of employing a metal mesh at the end of the flexible lead for connection often leads to this trouble, but the Bel-ling-Lee special connector avoids the difficulty, and also enables the connection to be made very easily.

It consists of two parts, a socket and a plug, all component coated. The socket portion is attached to the side of the S.G. anode terminal, and the socket is attached to the box. All that is necessary to make connection is to fit the socket over the plug. This ingenious and useful accessory only costs 6d., and for those who object to even this expense, a cheaper model is made at 21. This has the socket part screwed under the S.G. terminal and plugs in sideways. The ingenious experimenter will find many other uses for this little component.

CELESTION REETONE SPEAKERS

When it is desired to get a really ideal output, with correctly balanced reproduction of the highest and the lowest notes, the new type of dual speakers will be found invaluable. It is asking rather a lot of one diaphragm to respond to a 30 cycle note, and to reproduce the entire 120 cycle range. In this case, a diaphragm for each can be obtained, and with the addition of the plug and socket arrangement it is possible to get a wonderfully realistic tone. Of course, a couple of each will be necessary, and this should be cut to take the complete assembly, and a larger fretted front may then be attached over the box to hide the rather odd-shaped cut-out. We have found it preferable to use a really heavy signal (of the order of 3 to 4 watts) and the speaker would handle a 30 cycle note with the same accuracy as a 4,000 cycle note.

In addition, a set of sockets and plugs enables varying degrees of tone to be obtained. The small speaker deals with the higher notes in the usual ways, and the larger speaker handles the low notes, and with the addition of the plug and socket arrangement it is possible to get a wonderfully realistic tone. Of course, a couple of each will be necessary, and this should be cut to take the complete assembly, and a larger fretted front may then be attached over the box to hide the rather odd-shaped cut-out. We have found it preferable to use a really heavy signal (of the order of 3 to 4 watts) and the speaker would handle a 30 cycle note with the same accuracy as a 4,000 cycle note.

MEBULANE SWITCHES

The switch illustrated was made by the components manufactured by the Melbourne Radio Supply Company. The illustration shows the internal connections of this rotary switch, from which the outside connections are made.

The outer casing of the switch consists of a socket box with terminals attached to the sides. The end of the terminal inside the box is recessed with a small hollow, and the operating knob of the switch is a solid piece of brass, which just makes a nice fit inside the box. A hole is drilled through this solid piece, and through this is fitted a spring with solid brass pins at each end of the hole. When the assembly is put together, the brass pins are forced against the inner wall of the switch by the spring and are connected by means of the terminals. There is then a definite position for the switch in each position, and this may be felt when rotating the switch knob and a definite click may also be heard. A fan-shaped (indicating plate is provided), and the switch is obtainable in a "On-Off," or "Radio-Gram" lettering.

The On-Off switch costs 1s. 6d., and the Radio-Gram switch costs 1s. 9d., in either black or brown.

OVERHEO SKYHAWK

In a leaflet just to hand from Sovereign Products, Ltd., a blueprint is given of the Sovereign Skyhawk S.G.S., an efficient and economical three-valve (R.O., Detector, and Power valve). The cost of building this useful set, clearly using Sovereign Components is a little over £2, exclusive of valves and batteries. Details on building the set are given in the leaflet, a copy of which can be had free on application to Sovereign Products, Ltd., Sovereign House, Rosebery Avenue, London, E.C.1.

TWO SPLENDID SIXPENNY HANDBOOKS

Readers who wish to obtain a reliable source of information regarding the construction of all types of wireless receivers, from a crystal set upwards, should obtain "Make Your Own Wireless Set," and "How to Build and How to Make Them," each costing 6d. and containing chapters on valves and accessories, diagrams of wiring diagrams and lucid text relating to the construction of the very latest receivers. Full lists of components are given in each case. Both volumes are by F. J. C. Camm, and are obtainable for 7d. each post free from Geo. Newnes, Ltd., 941, Southampton Street, Strand, London, W.C.2.

Are you Collecting our Data Sheets?

Yes? Then you should reserve our Self-Binder. See details on page 884.
EVERYTHING RECEIVED ON THIS SUPER SET MUST PASS THROUGH THE PRE-SET CONDENSER

The first component in the circuit, it is vitally necessary for the pre-set condenser to be the best obtainable, for here inefficiency means poor results throughout. "That is why it had to be accurate, well made, and reliable. That is why it is SOVEREIGN. The Sovereign Pre-set Condenser (Type J) as specified for the 'Fury Four' costs 1/3 was chosen.


A TRIUMPH OF PRECISION

- Gives extremely fine tuning. Similar in construction to the J. B. "NUGANG" Condensers, but the trimmer of front section is operated independently from the receiver panel by means of a second knob concentric with the main tuning knob. Rigid one piece chassis, very robust construction. Trimmer to each stage. Heavy gauge wide spaced aluminum vanes. Special bearings to rotor ensure permanent accuracy. Capacity .0005.

Matched to within ½ mmfd. plus ½ per cent.
Complete with disc drive and bakelite escutcheon plate,
2 gang - 18/6 3 gang - 27.

J.B. UNITUNE

PRECISION INSTRUMENTS

Write for Complete Catalogue.
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The new MANSFIELD MAGNETIC SYSTEM

"Mansfield Senior" PM 4 Chassis 42: complete with tapped transformer. Handsome Cabinet in Oak to suit 25/-.

"MANSFIELD" Permanent Magnet Moving-Coil SPEAKERS

is a momentous thing—it gives greater power from a smaller magnet. It makes possible in a moderate priced moving-coil speaker a performance at least equal to very high priced instruments. It allows the use of a heavy steel framework without magnetic loss; the "Mansfield" magnet cannot lose its magnetism. The magnetic flux is concentrated where the work is done instead of being diffused over the whole system. The magnet is 30 per cent. more efficient than cobalt steel of same weight and 10 per cent. more efficient than chrome steel of three times the weight. Write for leaflets and HEAR it at your dealers; you will be AMAZED.

A revolutionary development


Irish Free State Distributors: Kelly and Shield, Ltd., 47, Fleet Street, Dublin.

TESTING LOUD-SPEAKERS

The majority of beginners usually have a loud-speaker of the moving-iron variety, and there are several quite simple tests which may be carried out to test the frequency response, sensitivity and other features of this type of speaker. The most important feature of any speaker is its frequency response curve, and this can really only be satisfactorily tested by connecting the speaker to a first-class amplifier which is joined to a gramophone pick-up, the whole used in conjunction with constant frequency records. Of course, it is of no use testing the really low notes on this type of speaker, as the radiation falls off appreciably when below 80 cycles.

Faults:

There are two principal faults which can arise in the moving-iron type of speaker, and these are electrical or mechanical. As the operating mechanism of this type of speaker is a magnet and armature, the obvious faults are short-circuits due to the insulation becoming worn away from the connecting leads, or metal filings, or similar material across the input terminals. This will result in complete cessation of signals. Leakage from the coil windings to the frame will result in a greatly decreased output, the strength depending upon the actual leakage. If the windings are only partially shorting, due to faulty insulation, scraping and scratching noises will be heard when the speaker is in operation, and by gripping the unit tightly in the hand this will be decreased. The impedance of the loud-speaker (as distinct from the D.C. resistance) will also vary the strength of the reproduced signals, and this factor should be borne in mind when a speaker is first connected up and fails to give complete satisfaction. Especially is this the case when a pentode is employed in the last stage of the receiver, with no compensating output circuit.

Mechanical Faults

Under this heading there are quite a number of troubles which can mar the reproduction. First and foremost is the rattle caused by loose nuts. The cone attachment in the apex of the cone may work loose after constant use, and this results in a peculiar form of "dither" which stops if the cone is lightly pressed with the finger tips just round the cone attachment. Sometimes the material which surrounds the periphery of the cone becomes distorted, due to atmospheric conditions, and this results in the cone twisting as it is driven backwards and forwards by the armature. The only cure for trouble of this sort is, of course, a new diaphragm surround, and this should preferably be of leather and not rubber. Special thin leather is obtainable for the purpose and this lasts much longer than rubber, and is not so susceptible to rotting.

Cabinet and Baffle Troubles

Very often rattling and other noises may be caused by sources outside the actual speaker. These are due principally to insecure mounting to baffle boards, or loose joints or screws in the speaker cabinet.

January 28th, 1933
Consequent upon the opening of the new Empire Transmitter at Daventry, short-wave reception is becoming increasingly popular. Many amateurs are building short-wave sets, and it is not unlikely that in the near future even domestic receivers will be designed to work on wavelengths down to 15 metres or so. In the past a short-wave set has been looked upon as rather a special instrument intended only for the more advanced experimenter. As a result, sets of this type were made in somewhat "rakish" form and were fitted with numerous "gadgets" and controls which, in themselves, were sufficient to scare the average listener away from short waves. But these things are rapidly changing, and a short-wave receiver is beginning to look more and more like the broadcast set. Partly as a result of this, and partly because the number of S.W. stations giving out interesting programmes is quickly growing, the ordinary constructor is giving more attention to short-wave work. This is all to the good and the change will lead to greater simplicity of design and operation. Already the use of plug-in coils is becoming a thing of the past just as it did in respect to broadcast receivers a few years ago. Thus two or three manufacturers have put on the market dual-and triple-range S.W. tuners which are very efficient, and help to simplify construction very considerably.

Making a Triple-range Short-wave Tuner

Parts Required
The few materials required to make the tuner are:

One, 3½ inch length of six-ribbed ebonite coil former, 1½ ins. diameter.
(The diameter is measured outside the ribs.)
Six, 6 B.A. terminals.
Six feet, 18 gauge enamelled wire.
Six feet, 26 gauge enamelled wire.

Construction
First of all drill six ½ in. holes around one end of the ebonite former and securely fix the terminals into them. Next make a pair of ½ in. holes about 1½ in. away from the terminal end of the former, and anchor one end of the thinner wire in these, leaving a couple of inches of wire projecting inside the tube for later connection. The method of anchoring the wire is to pass the end through one hole, back through the other and back to the inside again through the first. Now wind on four turns, cut off the wire and secure the end by passing it through another pair of holes made in a suitable position.

Leave a space of about 3½ in. and then make another pair of holes (about ½ in. this time) for securing the end of the thicker wire. Fix the end of the 18 gauge wire in these and wind on two turns before making a looped tapping as shown in a detail on Fig. 1. Pass the loop through a ½ in. hole in the former and continue to wind on another three turns; make another loop and then put on the remaining seven turns. Terminate the winding by passing the wire through another pair of holes as at the beginning. It will be seen from Fig. 1 that all the turns of thicker wire are spaced by about the thickness of the wire; the spacing increases the tuner's

(Continued on page 908.)
Only the best is good enough for this epoch-making set, which every enthusiast will build. These fine LOTUS Condensers, the Single Unit and Twin, are specially chosen by the Designer, as LOTUS Guaranteed Components invariably have been chosen by the Leading Set Designers for many years. Make sure of success with LOTUS!

SINGLE UNIT CONDENSER

**SPECIAL FEATURES**

- Freedom from Rotor endplay.
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- Freedom from condenser microphony, due to the great rigidity secured by diecasting.
- High capacity variation, the total variation being 500 m.m.f.
- Precision of vane spacing.
- Low losses due to use of high quality bakelite.

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OTHER LOTUS COMPONENTS
SUITABLE FOR INCLUSION IN THE "FURY 4"


2 GANG CONDENSER

with similar specification to the Single Unit Condenser.

WITH DISC DRIVE
TYPE P.C.2

14'

See the other
43

POST THIS COUPON NOW!

To Lotus Radio, Ltd., Liverpool.

Please send Illustrated List of the 43 LOTUS GUARANTEED COMPONENTS To—

Name

Address

id. stamp only if envelope is mailed.

PR. 28-1-33.
AN enthusiastic listener who lives near me complained recently of the high cost of running his set, a statement I could not understand, as it was an ordinary three valver, S.G., det. L.F., battery operated, and commercially built. The trouble appeared to be in the high tension supply. My friend hadn’t the mains in his house, and it seems he found it necessary to buy a new high tension battery every month or so. Granted he used the set considerably, say, four or more hours every night, but he felt his high tension was costing him too much, and when I went round one evening he happened to be in the act of fitting a new battery. It is true his grid bias battery was not above reproach, and he had no idea that the plug had to be changed to different value according to the state of the H.T., but the real trouble was in the set itself. It was one of those cheap sets sold at barely the price of the parts, and its efficiency by lowering its self capacity. To prevent the turns from slipping, a good tension should be kept on the wire whilst winding. Lastly put on the other portion (seven turns) of the reaction winding, leaving a space of 5/16 in. between it and the lower end of the tuned winding. To fix the turns more securely in position they should be given a coat of shellac varnish.

And now all the tappings must be soldered to their proper terminals. Before doing this cut them to such lengths that they will just reach the terminals, and scrape the ends bare. If it is necessary to cut any wire off the loops make sure that both sides are soldered to the terminal, because if this is not done the continuity of the winding will be broken. The proper terminal connections are shown diagrammatically in Fig. 1 and the relative positions of the terminals are clearly shown in Fig. 2. Notice that the two halves of the reaction winding are joined in series by soldering the end of the upper winding to the beginning of the lower one.

The simplest way to attach the tuner to the baseboard of the set is shown in Fig. 1; a wooden disc is made to fit tightly into the ebonite former and is secured to the baseboard by means of a screw.

Using the Tuner

The tuner is very suitable for use in the aerial circuits of any short-wave set, adaptor or converter, and in each case the connections will be as shown in Fig. 2. Suitable values for the more important components are also shown in the latter figure, and these should be adhered to with fair accuracy. The .0001 mfd. pre-set series aerial condenser is a necessity and prevents damping of the tuned circuit by the aerial load. If it were omitted it would in most cases be impossible to obtain oscillation. Its optimum setting will depend to some extent upon the length and capacity of the aerial employed as well as the wavelength range in use. I do not say that it will have to be adjusted each time a change is made from one wavelength range to another, but very often it will be found that improved reception of certain stations will result from a slight and careful adjustment.

Both wavechange switches are of the normal two-spring push-pull type, but it is important that good ones should be used because if the contacts are not perfect they will give rise to crackling sounds.

When both switch knobs are pushed in the highest wavelength range (30 to 70 metres) is obtained; by pulling out switch "B" the range is from 18 to 38 metres, and when both switches are pulled out the tuner works on the very lowest range. The capacities of tuning and reaction condensers are shown to be .0002 mfd, and .00015 mfd. respectively. These values are most suitable, but they might be increased to .0003 mfd, and .0002 mfd, or reduced to .00015 mfd. and .0001 mfd without affecting efficiency to any marked extent. Both condensers should be good ones designed especially for short-wave work, and it is desirable (from the point of view of easy tuning) that the tuning condenser at least should be provided with a vernier control. The H.F. Choke should, of course, be a special short-wave one and not of the ordinary type intended for a broadcast receiver.

THE NEED FOR DE-COUPLING.

I found that when the old H.T. battery was connected to the set low-frequency instability was taking place and setting up the usual howls due to the back-coupling of the battery which obviously had developed a high internal resistance. On testing with the voltmeter, however, I found that the voltage drop was at the outside not more than 20 per cent, so that my friend had been throwing away more or less good batteries on account of these howls. To cut a long story short I took a small long short I took around a 2 mfd, fixed condenser, and placed this across the H.T. terminals, when the set worked perfectly.

This brings me to what I set out to say, that certain manufacturers who think in terms of price only—and perhaps the customer is partly to blame also—too frequently omit any de-coupling arrangements on battery sets on a price basis. It is as penny-wise-and-pound-foolish as buying H.T. batteries of too small a capacity, and does radio harm through making it a more expensive pursuit than it actually is. A few shillings spent on a fixed condenser or two will often save the set-owner much more than this in battery replacements, and if you know of any non-technical listeners who are in similar difficulties, or at all likely to be on account of the design of their set, I should like you to feel it your duty to help them all you can. Only by people getting the very best results will radio become even more popular, and it is the duty of all of us who have the technical knowledge to help the novices understand and the working of their sets—DETECTORS.
IDENTIFYING THE FOREIGNERS

WAS IT A DUTCHMAN, CZECH, FRENCHMAN

OR SWEDEN?

By J. GODCHAUX ABRAHAMS

In Europe alone to-day there are roughly 230 broadcasting transmitters operating in twenty-eight different countries. You may take it that the average listener, sitting at his receiver, even only a modest three-valver of modern construction—may easily tune in from forty to fifty transmissions in the course of an evening's tour of the ether, and during this period he may hear a dozen different languages—if not more. In the course of a week, I receive a number of inquiries in which correspondents anxious to identify a transmission state very vaguely that "the announcer spoke in French or Spanish; possibly German or Czech." To the British listener who only knows his Mother tongue, all other languages are classed under one heading, namely, foreign—a delightfully vague term. Admittedly, it is not easy to identify your captures unless you have some idea of French, German, Spanish, Danish, Czech, and so on, but the problem is not so difficult to solve as might appear at the outset.

Establishing the Wavelength

Is the mystery station tuned in at a point somewhere between two such known transmitters as, say, above London National and below London Regional, or roughly midway between Midland Regional and Brussels? The reply to such a question will give you to some extent the data required, it will tell you that the station you are trying to identify is operating between so-and-so and so-and-so metres. By this method you have narrowed down your search to a definite portion of the waveband. Another and more accurate way of establishing the wavelength is by plotting a graph; it is quite an easy matter, but space will not permit me to describe the method in this article. Now, for the question of language, interval signal or other peculiarity by which the broadcast may be definitely recognized. You must, however, bear in mind one important point; it is that, in Great Britain, most of the main continental stations relay their programmes to smaller transmitters for local re-broadcast and, consequently, when such an interchange is taking place you may not receive the actual call of the station heard, but that of the main studio which is feeding it. As an example, take Nurnberg (239 m.) from which, at most hours of the day, you will pick up the call of Munich (632 m.) As an example, take Nurnberg (239 m.) from which, at most hours of the day, you will pick up the call of Munich (632 m.) As an example, take Nurnberg (239 m.) from which, at most hours of the day, you will pick up the call of Munich (632 m.)

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DUBILIER

INSIST ON DUBILIER CONDENSERS AND RESISTANCES FOR YOUR FURY FOUR

Yet another triumph for Dubilier! "Practical Wireless" have chosen exclusively eight Dubilier Fixed Condensers for their latest circuit—the Fury Four. Here is remarkable testimony to the overwhelming superiority of Dubilier Products. The reason for this unbiased choice is obvious—"Practical Wireless" know the merit of Dubilier, and know that the quality of the Condensers and Resistances is indisputable. Whenever components of the highest efficiency are required—then Dubilier is the only choice.

The following Dubilier Condensers are Exclusively Specified in the "Fury Four."

Two .1+.1 mfd. Type B.E. 31L ... 3/9 each
Three .1 mfd. Type B.B. ... 2/6 each
Two .0003 mfd. Type 665 ... 6d. each
One .0002 mfd. Type 665 ... 6d.

When you are buying your Resistances for the "Fury Four" specify Dubilier. They are stocked universally by all dealers.

DUBILIER CONDENSER CO. (1925) LTD.,

January 28th, 1933

Was it a Dutchman?
(Continued from page 909.)

class of entertainment heard and its actual origin.

Identifying the Station Calls
It is essential that you should know how the stations work in groups, that is, Milan, Turin, Trieste, Genoa, and Florence frequently radiate the same programme, that Étoile-Supérieure, Paris, feeds a number of provincial stations, that Frankfurt-am-Main and Stuttgart (via Muhleacker) exchange broadcasts throughout the day, and other information of this tenor. In most instances, the actual call will tell you from which studio the transmission emanates, as most of the relays remain connected to the mother station for a long period, and thus between items the original call will be heard. The question of language is a more difficult one to tackle, but here are a few pointers. Without exception all German stations precede the name of the city in the call by the word Achtung! (pronounced: ach-tung). The French and Belgians (with the exception of Brussels No. 2, which announces in Flemish only) by a double-barrelled Allo! The Italians have coined a word sounding like Eh-pah, which represents the initial letters of the Broadcasting Corporation, E.I.A.R., Venice, although speaking the German language, does not use the word Achtung; you will hear Ilallo Radio Vene, the native name of the Austrian capital being Wiener. Beromunster, relay station of Berne, Zurich, and Basle, all cities of the German-speaking districts of Switzerland, uses both Achtung and Hallo. Here, however, it is necessary to explain in conjunction with the calls that the native names of foreign cities unfortunately do not necessarily correspond with those we have given them in English. It is not always merely a question of pronunciation such as Parcs for Paris, but in many instances the difference is much greater. Munich will not advertise itself as Munich, but as Muenchen; from one of the Italian transmitters you may pick up a call which includes Milano, Torino, Genova, Trieste (pronounced: Tree-eh-soy) and Firenze. From it you must understand that you are listening to a programme common to Milan, Turin, Genoa, Trieste, and Florence. Napoli is the true appellation of Naples; Roma needs no translation. When it comes to the Polish studios the differences are still more marked, as Warsaw will be heard as Warszawa, Lodz as Lodz, and Kow-no, as Kos-nosse, Belgrade becomes Bay-o-grad, Berne (Bairn), Copenhagen (Kaj-ch-ch-havn), Algiers (Al-jay), and others too numerous to mention. But you will be surprised how soon you will recognize and mentally translate these sounds into more familiar names after you have heard them from time to time. Most stations have realized that their broadcasts are heard, not only by their local subscribers, but by listeners in foreign lands, and also that the recognition of a transmission with the consequent knowledge of its origin greatly adds to the interest of the broadcast. In consequence, to facilitate this identification they have devised various mechanical means by which distinctive signals can be trans-
January 28th, 1933

Was it a Dutchman?

Metronome Interval Signals

It is a pity that the metronome, as an interval signal, should still be so widely adopted, as obviously nothing is so much like a metronome as another metronome! Some stations have bad the happy thought, when they could not think of a better method, of taking a different number of beats from others. You might make a note of the following which may assist you in logging the actual transmitter:

Belgrade (60 beats per minute), Berlin and Kiel (210 beats), Breslau (240 beats), Bucarest (160 beats), Frankfurt-am-Main (190 beats), Kowoil and Kiel (280 beats), Koeln (260 beats), Vienna (270 beats), Zagreb (100 beats).

Apart from the frequency of the ticking, it is possible to notice differences in tone or pitch of the signal which will soon differentiate between the metallic ping of Radio Maroc and the dual Tock-tok of, say, Vienna. Stations such as Strasbourg and Toulouse are already known to most listeners in the British Isles, the former with its imperative bell, and the latter with its series of deep booming notes. But bells in some form or other have been adopted by many stations, either singly or in groups of three or more, and also in short musical phrases of which the melodies are associated with the individual countries.

Of single bells the following should be noted: Istanbul and Tallinn (60 per minute), Stockholm (about 80), Radio Strasbourg (about 16); at the following studios bell-like notes produced by oscillating valves are used: Heilbronn (Konigseberg and Danzig), just two notes (D flat and A flat), Leipzig, four notes (B A C D), Stuttgart (heard through Mülhacker and Frankfurt), 3 notes (C D G). From Langenberg you will hear chimes (6 notes).

In the matter of short musical-box melodies, there is a wider selection, and this permits a highly distinctive signal. You will pick up different tunes from Copenhagen (D O O), Munich, Budapest, Warsaw, Bern, with distinctive phrases allotted to Berne, Basel or Zurich, according to which city's electrical stop is relayed); Madrid, Naples, etc.

The new 20,000 organ which is being built for the British Broadcasting Corporation will be ready for use early in February. It has 190 pipes divided into 31 tones. It has been built by the John Compton Organ Co., Harlesden, London, N.W. The photo shows an expert adjusting the drawstop action on the new organ.
BUILD
your own A.C. Mains Unit

The ALL-METAL WAY 1933

HOW TO BUILD
BATTERY ELIMINATORS & BATTERY CHARGERS

WITH
METAL RECTIFIERS

This booklet tells you how!

Wireless constructors with A.C. Mains available need this booklet. Containing 44 pages of valuable information, it tells you how to convert your present set to A.C. Mains operation; how to build trickle chargers; or how to run a moving coil loud-speaker from the A.C. supply. It is packed with useful hints, and plainly describes how to secure all the advantages offered by A.C. Mains by the simplest, safest and most efficient method—ALL-METAL RECTIFICATION.

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Please send me a copy of "THB ALL METAL WAY, 1933."
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For all low-frequency Amplification Stages fit the Benjamin Transfeeda, costing £1.6d., in place of a transformer and secure that rich quality and volume from your speaker which you can otherwise only obtain by the use of the most expensive components.

If your Dealer is out of stock may we send you a copy of Leaflet 2929, telling you all about the Transfeeda and showing circuits in which it can be used?

The famous Benjamin Vibrolder, with its sprung contacts, is still the Constructor’s most popular valve-holder. Price 10d.

A good push-pull switch is an asset to every set constructor. The Benjamin, one of the earliest and best, costs 9d.

Send for it on 7 days’ trial. This Pick-Up has been designed on the soundest technical lines to avoid the shortcomings of the average small moving-coil speaker. By employing a new principle of "MATCHED RESPONSE" it gives a natural effect not before obtainable. Moreover, the frequency response is from 25 to 6,000 cycles and it faithfully reproduces the entire range of the musical scale.

The Volume Control situated in the base and operated by a knob on top of the pivot, is of log-law type giving equal increase or decrease. Being wire wound it will, unlike the usual carbon or composition type, differentiate.

Send only 2s. 6d. for 7 days’ trial, if satisfied pay further 2s. 6d. at once, then complete purchase by 7 monthly payments of 2s. 6d. (Cash, 35s.) Illustrated folder with full technical details, post free.

The British Made WATER UNIVERSAL METER is a very popular precision instrument tested manufacturer as well as on the stage and in all effects and all components. It reads on one dial.

SEND 1/6
for 7 days’ trial, if satisfied complete purchase by 7 monthly payments of 2/6 (Cash: 2/6). The Corner House of E. J. Heraud, Ltd., on the simplest monthly terms.

Send for it on 7 days’ trial. This Pick-Up is standard in many first-class Radiograms, is now offered by the famous Mail Order House of E. J. Heraud, Ltd., on the simplest monthly terms.

The Bowyer-Lowe Mark III Pick-Up, as standard in many first-class Radiograms, is now offered by the Bowyer-Lowe House of E. J. Heraud, Ltd. on the simplest monthly terms. The Volume Control situated in the base and operated by a knob on top of the pivot, is of log-law type giving equal increase or decrease. Being wire wound it will, unlike the usual carbon or composition type, differentiate.

Send only 2s. 6d. for 7 days’ trial, if satisfied pay further 2s. 6d. at once, then complete purchase by 7 monthly payments of 2s. 6d. (Cash, 35s.) Illustrated folder with full technical details post free.
January 28th, 1933

PRACTICAL WIRELESS

JOTTINGS FROM MY NOTEBOOK
By "DETECTOR"

The Uses of Rubber

Metal versus Wood Panels

In radio, as in most other things, fashion changes rapidly and there is a tendency for the order of things to repeat itself occasionally, causing this to occur yet another day when handling a set with a wooden panel and wooden knobs. Was not our very first ventures in the world of wireless covered by tales of a wooden panel which we sometimes shellaced and sometimes didn't? Then we tried ebonite, rough, dirty stuff that had to be sandpapered before use to remove the particles of tin-foil which adhered to the surface as a resisting form. Often manufacturing...

Do you remember this old set?-and do you remember the result after some 30 minutes hard scrubbing with sand-paper and the subsequent light coating of oil that we were instructed to rub in? Well, I do, and also remember parting with a small fortune the other day when handling a set with a wooden panel and wooden knobs. Occasionally.

For the order of things to repeat itself in these days of super efficiency.

Do you remember doing this?—and do you remember the result after some 30 minutes hard scrubbing with sand-paper and the subsequent light coating of oil that we were instructed to rub in? Well, I do, and also remember parting with a small fortune the other day when handling a set with a wooden panel and wooden knobs. Occasionally.

For the order of things to repeat itself in these days of super efficiency. Why then is it again being used.

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For the order of things to repeat itself in these days of super efficiency. Why then is it again being used.

Now we come back to the beginning, January 28th, 1933.

Before the advent of ebonite, polished, or other dark stuff, the amateur's use of figured ebonite. Then came a rage for aluminium panels, and some did not, and it is

Mahogany-colored ebonite found favour for a while and some really beautiful panels resulted, but quite a few panels with their peculiar mottled surfaces. Soon after this came a rage for aluminium panels, and their peculiar mottled surfaces. They tarnished quickly, however, despite generous coats of lacquer that were applied, and many a valve met an untimely end when it became moist quite an appreciable loss can be traced to surface leakage. Why then is it again being used in these days of super efficiency? Well, I think the reason is that it is cheap, easily worked, and as most sets are now constructed on the unit system—that is, built on to a chassis with all the components firmly secured thereon—the holes in the panel are really only clearance holes and are not in actual contact with the one or two spindles that pass through.

IN radio, as in most other things, fashion changes rapidly and there is a tendency for the order of things to repeat itself occasionally, causing this to occur yet another day when handling a set with a wooden panel and wooden knobs. Was not our very first ventures in the world of wireless covered by tales of a wooden panel which we sometimes shellaced and sometimes didn't? Then we tried ebonite, rough, dirty stuff that had to be sandpapered before use to remove the particles of tin-foil which adhered to the surface as a resisting form. Often manufacturing...

Do you remember this old set?-and do you remember the result after some 30 minutes hard scrubbing with sand-paper and the subsequent light coating of oil that we were instructed to rub in? Well, I do, and also remember parting with a small fortune the other day when handling a set with a wooden panel and wooden knobs. Occasionally.

For the order of things to repeat itself in these days of super efficiency. Why then is it again being used.

Metal versus Wood Panels

In radio, as in most other things, fashion changes rapidly and there is a tendency for the order of things to repeat itself occasionally, causing this to occur yet another day when handling a set with a wooden panel and wooden knobs. Was not our very first ventures in the world of wireless covered by tales of a wooden panel which we sometimes shellaced and sometimes didn't? Then we tried ebonite, rough, dirty stuff that had to be sandpapered before use to remove the particles of tin-foil which adhered to the surface as a resisting form. Often manufacturing...

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For the very first time — sound reproduced Naturally

The Celestion Dual Speaker illustrated consists of two units as coupled that the treble is accepted by the treble unit, and the bass accepted by the bass unit. The performance of the combination was heard as it was appreciated. The illustration shows Model S 29. Price £6.0.0. Other models available.

Wireless for Air Liners

TKWLYE fine new aeroplanes have been ordered by Imperial Airways for the London-Cairo-Cape town air route, and the six type 1 needs like a fairy tale. They found plants from which latex, the sap-like substance from which rubber is made, is exuded, but in such quantities as to make the industry unprofitable. They also found that by enlisting the aid of some little caterpillars the percentage of rubber could be increased. These grubs feed on the roots of the plants, and construct around their bodies a tube of condensed latex, which forms a kind of home for them. Only roots that are infested give nourishment to the grubs, so that the plants are artificially infested in order to rear the small insects on them. In some cases as many as thirty tubes, each containing a grub, has been found on a single plant, and as each tube is rich in latex, or un-refined rubber, it is expected that the industry will soon be profitable enough to warrant expansion. Surely the wonders of radio are not all terrestrial!

Connecting a Super-Het, S.-W. Adapter

The accompanying circuit diagram shows a method of switching suitable for connecting a short-wave adaptor of the super-het. type to the ordinary broadcast receiver. The diagram is drawn for the usual four or five temporary connections which have to be made. The components required are four terminals and a threepole, double-throw switch. The writer uses a Wearite switch, which answers admirably. The switch may be mounted on the terminal strip of the broadcast receiver, in close proximity to the aerial terminal in order to keep the wiring as short as possible, and the four additional terminals may be mounted on a short strip above the existing one, or, if there is room, on the existing strip adjoining the switch. From these new terminals it is only necessary to take short leads to the adaptor, which can be left connected permanently. The wiring is as follows:

To change the aerial from the broadcast receiver to the adaptor, and to connect the output of the adaptor to the aerial terminal of the set, connect aerial terminal of set to first centre contact on switch, one outside contact on switch to aerial terminal of adaptor, which can be connected to second centre contact and on to aerial series condenser or appropriate terminal of set. The second outside contact opposite the second centre contact is left free, and the other connected to the output terminal of the adaptor. The L.T.— and E are connected to the adaptor by extending this wire in the set to the third centre contact on the switch, one outside contact being left free, the other being connected to the L.T.— terminal of the adaptor. The L.T.— connections are, of course, required for the short-wave adaptor. — E. A. Coates (Leek).
SLADE RADIO

Anyone interested in wireless is cordially invited to attend the meetings of the above Society which are held every Thursday at 8.15 p.m. The appointed programme gives a good idea of the interesting nature of the lectures which are regularly given. Full particulars are obtainable on request from the Hon. Sec., 316, Hilliard Road, Gravetye Hill, Bromley.

Programme: February 1st to March 31st, 1933.

Feb. 2nd Members Night.


16th Lecture and Demonstration by Mr. Yeates, B.Sc., A.C.G.I., A.M.I.E.E., of the Standard Battery Co., Ltd.

23rd "Fun Fete.

DENNISTOUN TRAMWAY DEPOT RADIO CLUB

The above Club, membership of which is confined to Depot Employees, meets every Wednesday at 8 p.m. in Deep Hall. Although recently founded, an attractive series of lectures, demonstrations, and visits have been arranged. On Wednesday, February 3rd, J. L. Hunter will give an insight into the manufacture of batteries and accumulators, assisted by a slide of a Model Working Plant. The first Club outing takes place on April 30th, 1933, and it is hoped to arrange a series of lectures in the near future, also demonstrations. Televisions and short-wave talkie talkies, Radio circuits, and the like, will be described. Lecturers, demonstrations, etc., are invited to communicate with the Secretary, members' night.

LECRED-Demonstration on Loud-Speakers

A very interesting and instructive lecture-demonstration was recently given by Mr. F. H. Foster, Secretary of the Gladstone Development Co., Ltd., 2nd February. He discussed the theory of moderate coupling and gave a comprehensive demonstration on many types of the speakers that are made by his firm.

Commander Brewster.

A. Stephens.

Member.

3rd Debate: "Output Circuits: Mr. G. Lee.

28th Pick-up Tests.

28th Pick-up Tests.

28th Output Cresidget: Mr. G. Lee.

Feb. 16th L. E. Coupling: Mr. H. L. Rayner.

Feb. 14th B. F. Coupling: Mr. A. Stephens.

24th Output Cresidget: Mr. G. Lee.

NEW BOWSPRING WANDER PLUG

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BULGIN HANDY RADIO ADAPTORS

In a Class Alone.

Listed on this page will find a number of ingenious adaptors, which keen constructors will note with interest. They were evolved by Bulgin for instant use in any receiver, without cutting or altering existing wiring.

List No. Filament Adaptor Price

V.T. 7 provides a simple method of continuity of valve filaments.

G.R. 1 Pick-up Adaptor for use with any receiver using four-pin valves.

G.R. 2 Dito for five-pin valves.

A.7 Split Anode Adaptor for inserting milliammeter in series with anode of four-pin valves, or screen of 6-D valves.

A.8 Ditto for five-pin valves.

A.9. Split Grid Adaptor 2/6

A.10. Pentode Adaptor for adapting four-pin Pentodes with side terminals to fit five-pin centre-contact valve-holders.

Send for 80 page Catalogue "N." Emistol 2d. postage.

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January 28th, 1933

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gives a good idea of the interesting nature of the lectures which are regularly given. Full particulars are obtainable on request from the Hon. Sec., 110, Binaries Road, Gravelly Hill, Birmingham. In the club should make application to Secretary or

Manufacturers and dealers, etc., who are willing to arrange a series of lantern lectures in the near future, at Westerglen. Broadcasting Station " at Westerglen.

SLADE RADIO

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A SIMPLE VOLUME CONTROL DEVICE

By H. A. JONES

Many listeners have relatives or friends who are unfortunately just too deaf to appreciate the programmes from a loud-speaker, and the necessary control of volume in a pair of earphones is not usually a simple method. This is primarily the use of the unit I am about to describe, and those dwellers in flats who are not permitted to have their sets going late at night can connect one or more pairs of 'phones and listen comfortably to a late programme. Lastly, the unit is invaluable to listeners to distant stations, as it is possible to select a moderately loud station on the 'phones, and with a snap of the switch transfer it to your loud-speaker.

To L.S. +

I. Many units have terminals, tightly screwed-down joints will be quite as serviceable. A glance at the circuit diagram Fig. 2 will explain the principle of the unit, and it will be noted that one wire only has to be disconnected in the set. This is the lead from the anode of the last valve, which normally goes to the L.S. negative terminal. This lead is disconnected and taken to the negative phone terminal on the unit, and from there onwards the wiring is quite simple. Note that one terminal on the potentiometer is left free. The back of the unit, showing the wiring connections, is given in Fig. 3. The front of the panel (Fig. 1) shows the potentiometer centrally situated, with the switches above, and the phone terminals below. The top left-hand switch is for the 'phones, and the one on the right is for the loud-speaker. The positive 'phone terminal is the left-hand one. In operation, the potentiometer knob will give a fine control of volume to the 'phones from a whisper to quite good volume. Both switches can be on at once (which in the case of this unit is IN) when both 'phones and speaker are in circuit, or alternatively, either 'phones or speaker may be used by pushing in the necessary switch.

Finally, the whole unit can be let into the side of the cabinet—used as a sub-panel—or even wired into the circuit of the existing panel if a little extra trouble is taken. Constructors will find the unit has possibilities in addition to the already mentioned.

Fig. 1.—A front view of the unit.

Fig. 2.—The circuit diagram.

Fig. 3.—Rear view of the unit.
 indexing to "practical wireless"" in response to the request of many readers for an index and binding case, we have pleasure in announcing that we shall issue a semi-annual index and binding case for a nominal sum. the first volume will be completed with no. 29 issue dated march 18th, 1933. a further announcement will be made later.

Sr.,—In acknowledging, with thanks, the safe receipt of my "Wireless Constructor's Encyclopedia," may I take the opportunity of congratulating you upon the production of such a fine work of reference? when entering upon this gift scheme, I confess I had some misgivings, but I must say, however, that the book you have sent me is far beyond my expectations, and I am thoroughly satisfied with the same. the binding is perfect, the paper good, the printing flawless, and altogether it is a magnificent volume, of which I shall feel justly proud to be the owner. I sincerely hope that your paper will continue to supply the long-felt want of wireless "fans" for a journal which is really practical, and I would wish you every success for the year upon which we have just entered.—V. f. foster (earl shilton).

Sr.,—I thank you for your Encyclopaedia, which I have just received. I have had a glance through it, and you are to be complimented on producing such a valuable work. it is well illustrated, and the circuit diagrams are, I think, a good addition to the book.—E. W. sewell (sheffield).

Sr.,—I am delighted with the "Wireless Constructor's Encyclopaedia." it is a splendid book, full of information for everybody interested in wireless, and owing to its lack of padding, a boon to busy people. I have only been in possession of my first copy for a few months and the book is specially valuable to me. many thanks for sending me the best new year's gift I have received this year.—William j. grindlay (glasgow).

Articles on one and two valve sets wanted

Sr.,—I wish to congratulate you for the finest wireless magazine I have yet come across. in no. 13 issue j. sheppard, of taunton, wrote on a point I should also like to bring to your notice. Why can't we have more articles on small sets, such as one and two valves, with home-made coils? as I write, costly sets are all right for those who can afford them. once again thanking you for your splendid paper and wishing you every success in the future.—A. cross (tyseley).

congratulations and a suggestion

Sr.,—Having purchased your paper, practical wireless, for the seventeenth time I feel I must congratulate you and wish you every success. Such a paper deserves the whole-hearted support of every wireless amateur in the country. I read with interest the weekly correspondence page, and have noticed of late two letters suggesting articles on studios and artists. Will these readers please understand that a practical wireless paper of necessity deals exclusively with the practical aspects of the art, and construction of wireless instruments. and not a suggestion. since some readers desire articles of special interest why not a few on the modern electric theory of matter? such articles dealing with the electromagnetic nature of matter would make entertaining reading, and at the same time be of vital importance to wireless amateurs, besides being of educational value.—A. p. west (liverpool).

(continued on page 918.)
PRACTICAL WIRELESS

PRACTICAL LETTERS
(Continued from page 917.)

"Practical Experiments with Cone Diaphragms"

Sir,—May I draw your attention to a printing error in connection with the reproductions of my diagrams on page 816 of the January 14th issue? The printer has inadvertently transposed two of the blocks, so that the figure number and caption placed under the first diagram actually refers to the fourth one on the page, and vice versa. Most of your readers, of course, will guess what has occurred, on referring to the text of the article; but I thought it best to draw your attention to the mistake in case any beginner is confused by the transposition.—RADIOMAN

(Wandsworth Common).

[It really is too bad, but we do try.—Ed.]

A Reader's Requirements Supplied

Sir,—As an enthusiastic wireless amateur, what I personally require is plain instruction at each step, and I am pleased to say that I am finding almost all I require in your paper. I hope you will continue to publish such articles as will help those, like myself, whose means are strictly limited, and whose knowledge of "wireless" is also scanty.—J. Browis (Liverpool).

Another Plea for Plug-in Coils

Sir,—As an enthusiastic wireless amateur, and a reader of your fine wireless journal, I would like to mention that in my opinion the fixed coil is not made yet that will beat the plug-in coil set. I agree with your reader, Mr. Collins, of Birmingham. If one is interested, coil changing is not a big job. I have a set consisting of 20, 35, 45, 50CT, D1X, T0X, T6CT, and a 100CT. These, I think you will agree, will not miss many stations on the medium-band with careful tuning, of course. The long wave coils consist of a 250X, 100, and 100. The only thrill I have not had is a search around on the short waves. Here again I have just got a set of coils from two turns up to twenty turns, and am waiting for PRACTICAL WIRELESS to give us a suitable circuit. If Mr. Collins would care to write to me, c/o the Editor, I shall be pleased to give him a circuit that only employs eight valve-holders; on the panel there are only three controls, an on-and-off switch, reaction, and tuning condenser. I assure you I don't miss many stations when conditions are good. The components are the best I could agree,—F. Anastorid (London, S.W.).

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**DATA SHEET No. 19**

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**INDOOR AERIAL**

- Your receiver is operated from a thin, flexible wire arrangement run over the upper part of your walls, and unfortunately there is only one place where it can be put. This runs very close to a lead which connects an electric bell and indicating board operated from the current in your house. Whenever one of the bells is rung there is a terrible rattle from the loud-speaker, and I should much appreciate your advice as to how this may be avoided. If it is not possible to effect a complete elimination, some reduction in the interference would be useful.** *(F. T. B., Kensington.)*

**DIAL MARKINGS**

- It is there any reason for the difference in some dial scales? For example, many receivers are made with a Mains Three. I quite appreciate that the scale of a receiver depends upon the receiver itself, and in my case I am using, but I could give you some starting-points.** *(R. W., Twickenham.)*

A detailed article appears in this issue. S.G. and this gives in addition to certain circuit considerations, some definite data which will no doubt be of good use to you. The values given in the circuit should be applicable to your own receiver, but you will not doubt able to modify these if any modification is necessary. **(P. H., Bath, S.)**

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PRACTICAL WIRELESS
January 28th, 1933

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London, W.1, lies 1038 (Herne Bay): Yes, W.1, 1038.

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