

Practical and Amateur Wireless

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EVERY
WEDNESDAY

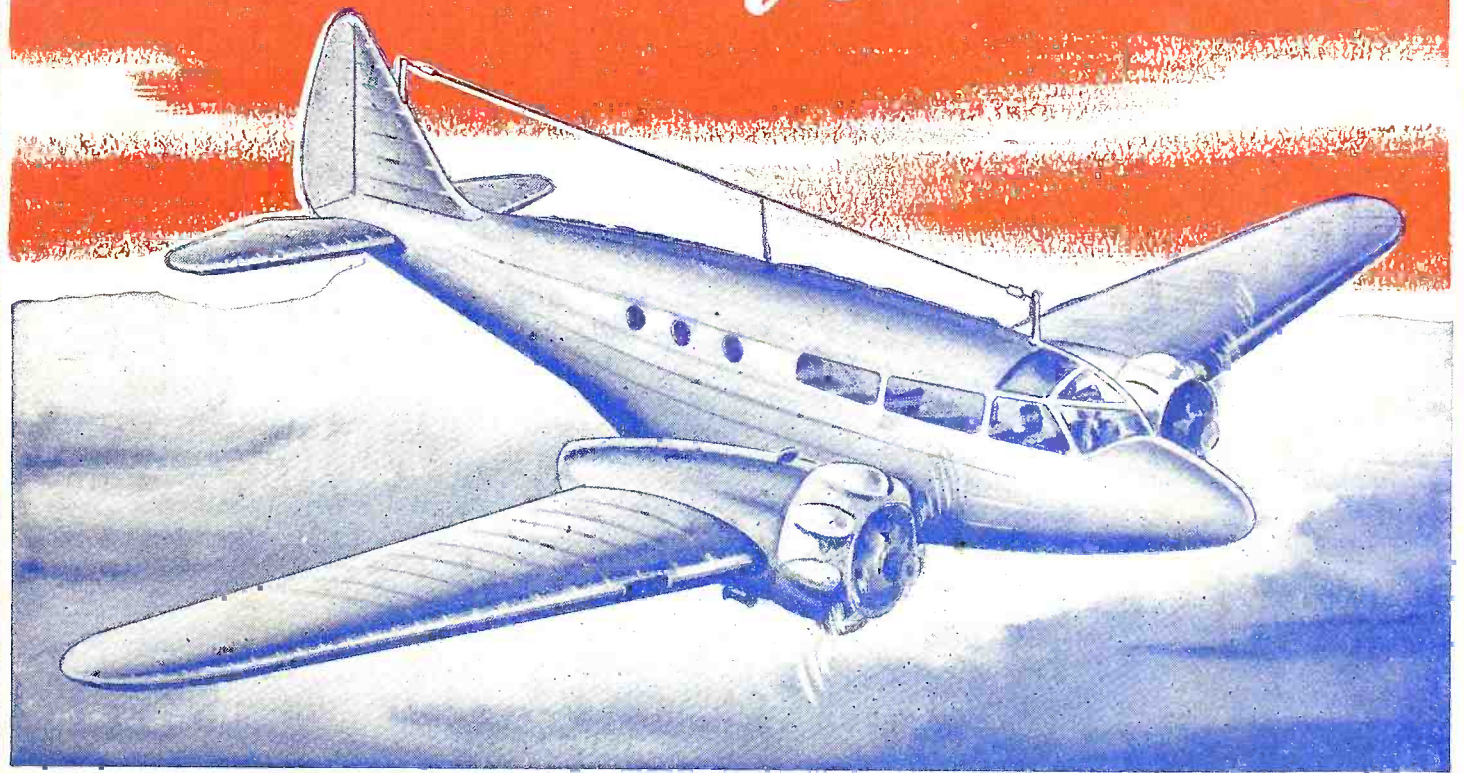
Edited by F.J. CAMM

GEORGE
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Publication

Vol. 14. No. 344.
April 22nd, 1939.

AND PRACTICAL TELEVISION

RADIO in Aviation



YOU WILL FIND HOURS OF INTEREST . . . IN THE EDDYSTONE SHORT WAVE MANUAL

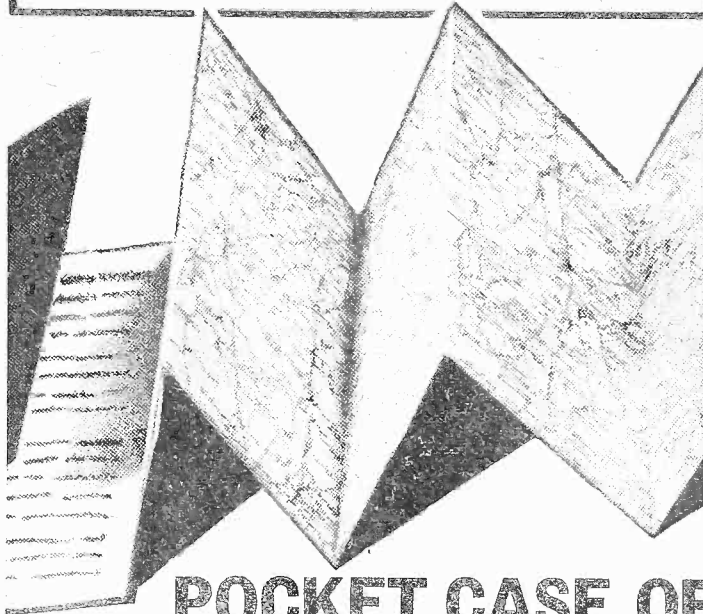
Did you respond to our last announcement in this space—and get a copy of the EDDYSTONE SHORT-WAVE MAGAZINE? If not, get a copy to-day—you'll find it one of the best shillingsworth you ever bought. It goes thoroughly into the matter of modern Short-Wave Practice, providing intensely interesting constructional explanations of how to build various Short-Wave Receivers, low and medium Power Transmitters, Amateur Communication Pre-selector, Cathode-Ray Oscilloscope, etc., etc., etc. Illustrated with 30 photographs and nearly three dozen diagrams. Alive and exceedingly informative—just the book to have at your elbow. If you haven't already got a copy—don't forget this time—act now!

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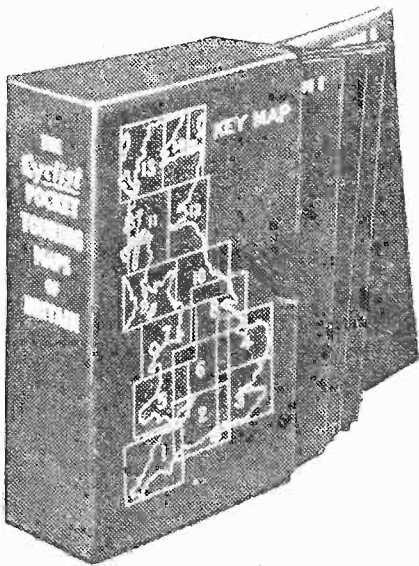
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REVIEW OF COMMUNI-RECEIVERS

See Page 130



Practical and Amateur Wireless

Edited by **F. J. CAMM**

Technical Staff:
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Vol. XIV. No. 344 April 22nd, 1939.

ROUND *the* WORLD of WIRELESS

Radio in Aviation

THE use of radio in aircraft has now risen to a high stage of perfection, but there are many difficulties which have to be overcome, not only in transmission, but in reception. Apart from the design of the actual apparatus there is the important question of the aerial, which must be protected against ice formation and interference from the electrical system of the engine, and, in time of war, must be given some protection from stray shots. For telephony the mike must be masked so that it will not pick up engine noises; for landing in fogs directional equipment must be called into use. The various phases of radio design were, however, recently discussed in a paper read before the Institution of Electrical Engineers by N. F. S. Hecht, and although this had particular application to the Royal Air Force it explained some of the points very fully. We are of the opinion that the various details of design will be of interest to our readers and accordingly we are publishing extracts from the paper, commencing in this issue. Particular stress is given to those conditions not usually met with in other applications of radio communication and particularly to the sources of interference to reception and of danger to the aircraft and its occupants. While no attempt is made to describe the equipment itself, the fundamental principles on which the construction is based are briefly given.

Blood Transfusion

THE Belfast Blood Transfusion Service is anxious to increase the number of voluntary blood donors in Belfast and district with a view to providing an adequate supply of tested and graded blood donors to be of use in a national emergency. The work of the Blood Transfusion Service and their requirements in the way of voluntary donors will be explained in a talk to be broadcast from the Northern Ireland station on April 27th.

SOS Rebroadcasts

IN future all telegraphic and telephonic distress calls received by the Danish Authorities from ships are to be rebroadcast during the normal programmes, even if this may mean an interruption of the normal broadcasts. This suggestion has been made as it is thought that small vessels which have only a broadcast

receiver aboard may be able to hear the message and thereby proceed to effect a rescue which would otherwise be delayed.

Outside Broadcasts

MANY difficulties in the way of efficient outside broadcasts may be smoothed away if experiments at present being carried out by the B.B.C. prove effective. It is proposed to use a very small knapsack transmitter for the use of the commentator, the range being just sufficient to enable the

themselves on the screen, on similar lines to the demonstrations held at Radiolympia last year. This will be in addition to standard demonstrations of new television receivers. It is also announced that the television transmitter on the top of the Empire State Building is being rebuilt and will probably be working by the end of the month.

St. George's Day

ON April 23rd the North Regional will have a considerable hand in the broadcast which will be Britain's greeting to the New York World Fair. D. G. Bridson, feature programme producer for North Regional, is arranging and will produce "Calling New York," which, besides being on the National and Empire wavelengths, will also be broadcast in the United States. At the close of this programme Lord Halifax is to speak.

Jam On It—Second Helping

SOME weeks ago the B.B.C. broadcast a special "Jam Session" from New York in which ace swing players took part. The B.B.C. will repeat the broadcast on May 6th (Regional), this programme being a recorded version of the broadcast. The records were made in New York and have been sent over to Broadcasting House.

Royal Academy Banquet

THE speech of the President of the Royal Academy and the reply by the chief guest at the R.A. banquet have been broadcast yearly by the B.B.C. with only three exceptions since 1925. This yearly tradition will be observed on April 27th, when the President, Sir Edwin Lutyens, is to be heard by listeners in the National programme. It is anticipated that the guest of honour will be a member of the Royal Family.

Old-time Dance Music

THE late night dance music on April 26th will be broadcast from the Palais de Danse, Nottingham, in the Midland programme, when Billy Merrin and his Commanders will play old-time numbers.

Variety from Bristol

IN the series entitled "Theatres of Variety," a programme will be broadcast from the stage of the Hippodrome Bristol, on April 27th. The artistes will include, "Hutch" (Leslie Hutchinson) and Ken Harvey.

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signals to be picked up by an O.B. van placed in a suitable position, and the signals may then be retransmitted from the van to be picked up by the B.B.C. for the usual relay.

Sponsored Programmes

IT is announced by the Minister of Posts and Telegraphs in Dublin that as a result of the sponsored programmes broadcast from Radio-Eireann the State will collect £35,000 from "advertising and other receipts."

Television in America

AT the Golden Gate Exposition at San Francisco the authorities are arranging for television demonstrations whereby visitors will be able to see

ROUND the WORLD of WIRELESS (Continued)

Another Meeting of European Broadcasters

IT is reported that a further session of the U.I.R. (*Union Internationale de Radio-diffusion*) will take place at St. Moritz, Switzerland, during the period June 14th to 24th next.

France's New National Station

PARIS radio journals state that the initial tests of "France-National," the 500-kilowatt transmitter now under course of erection at Allouis, will take place between May 15th to 30th.

Germany's Radio Channels

WITH the absorption of Austria, the Sudetenland, Bohemia, and Moravia, the German Reich has added a number of radio channels to its broadcasting network both on the medium and short wavebands. At present, Germany disposes, for the purpose of propaganda, of twenty exclusive wavelengths and seven channels shared with other transmitters. The former Czech station Moravska-Ostrava is now relaying the Breslau programmes daily.

A 2,000-year-old Battery?

FOLLOWING recent excavations made in the neighbourhood of Baghdad (Iraq) curiously-shaped hollow copper cylinders have been discovered amongst fragments of pottery dating back to 250 or 300 years before the Christian era. When brought to light it was found that the inner surfaces of these tubes were coated with a species of bitumen. The tubes were sealed with a stopper through the middle of which could be seen a small iron bar. The entire construction of the alleged instrument recalls the primitive voltaic battery, and it is therefore considered a probability that electricity was known to the ancients.

General Listening Barometer

THE first stage of one of the most ambitious schemes hitherto undertaken by the B.B.C.'s Listener Research Section has just come to an end. Known as the "General Listening Barometer," the present scheme has tackled the problem of supplying broadcasting with a "box office" return.

Since December, 1938, over 4,000 representative English listeners in every walk of life have completed a total of nearly 70,000 log sheets, covering something like 5,000 programmes, each log sheet showing what broadcasts each log-keeper listened to.

INTERESTING and TOPICAL NEWS and NOTES

The results have, of course, still to be fully analysed, but the success of the scheme may be gauged from the fact that the proportion of log-keepers returning forms has never fallen below 80 per cent. The B.B.C. is most grateful to these 4,000 log-keepers for their voluntary co-operation in this scheme.



Tens of thousands of children all over the country recently heard a familiar voice on the radio saying "Hello, children." "Uncle Mac" (Captain Derek McCulloch) of the B.B.C., is back in "Children's Hour" after ten weeks' absence, following a further operation when his left leg was amputated. Our illustration shows "Uncle Mac" back at the B.B.C., being greeted by young auto-graph hunters.

Some Spark Gap

THE apparatus which provides the ten million volt discharge which is used to herald the transmissions from Schenectady (N.Y.) will be on view in the Steinmetz Hall during the World's Fair at New York. This spark generator of one million volts is capable of throwing a ten million volt flash over a gap of thirty feet; this takes place within barely fifteen seconds of the moment the lever is pulled to set the machine in operation.

Dramatic Publicity for Car Radio

A CAR radio receiver, hitherto regarded primarily by its owner as a pleasurable and entertaining companion on his motoring journeys, has suddenly manifested its value in an altogether unexpected direction. Mr. Cecil Puttock, of Tankerton, Kent, recently heard an S O S for himself on the

car radio asking him to go to the Hospital for Sick Children, Great Ormond Street, W.C., where his daughter, Shirley, was dangerously ill. He hurried there, and saw her before she underwent an operation.

Commenting on this event, an official of Philips, the well-known radio firm, pointed out that they have often stressed the utilitarian aspect of their MotoRadio, of which the present case is an extreme, and happily rare, example. There are, however, many other directions in which MotoRadio, by maintaining continuous contact with the outside world, can be of inestimable value to motorists, over and above the undoubted pleasure and comfort which it adds to motoring.

Torquay Municipal Orchestra

THE Torquay Municipal Orchestra, led by Harold F. Petts and conducted by Ernest W. Goss, will broadcast a concert from the Pavilion, Torquay, on April 23rd. The solo artist will be Olive Goff (soprano).

Variety from Hanley

VARIETY on April 25th will be broadcast from the Theatre Royal, Hanley, from which there have been a number of broadcasts in the last three years. Regional as well as Midland listeners will hear the programme.

Seaside Bands Broadcast

NORTHERN listeners will hear, on April 27th, music played by two seaside orchestras, one on the West coast and the other on the East. Norman Newman and his band will be heard from the Tower Ballroom at Blackpool; and, later in the evening, Reginald Stead and his Orchestra will broadcast from the Spa at Scarborough.

SOLVE THIS!

PROBLEM No. 344

Wheeler made a three-valve battery receiver employing H.F., detector and output stages. When tested out, there was considerable instability, and he found it impossible to receive a station. He disconnected the aerial and began various tests to try to cure the trouble. He eventually found that by connecting a 2 mfd. fixed condenser between the anode of the H.F. valve and earth the instability ceased, but when he rejoined the aerial he could not obtain any signals. Why was this? Three books will be awarded for the first three correct solutions opened. Entries should be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 344 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, April 24th, 1939.

Solution to Problem No. 343

When Allen joined the other side of the pick-up lead to the decoupling condenser he connected it on the H.T. side and thus prevented the valve from functioning by applying positive bias to the grid. He should have connected the pick-up lead to the earthed side of the condenser.

The following three readers successfully solved Problem No. 342 and books have accordingly been forwarded to them: J. C. Payne, "Craigwell," Doniford Rd., Watchet, Somerset; A. Carter, 8, Reiford Street, Shoreditch, N.1; F. T. Connor, 31, Windlesham Street, Lower Ince, nr. Wigan, Lancs.

AN EXPERIMENTAL ALL-WAVE TUNER

An Effective Though Simple Tuner Built from a Number of Separate, Small, Home-made Coils By "The Experimenters"

THERE are plenty of all-wave tuners on the market, but most of them are fairly expensive, and many are not easily adaptable to individual requirements. Quite apart from that, the real constructor gains far more pleasure from making his own components than from buying them ready for use. It should be made clear right away that there are

and a few square separating screens. It is not suggested that this layout gives complete screening, but it does allow the coils to be screened sufficiently well for most purposes. If two tuners were to be used they could be placed so that the vertical sides of the screens face each other, the coils being arranged so that those for corresponding wavebands were at right angles to each other. Thus, if the long-wave coil of one tuner were upright, that in the other tuner would be horizontal.

Rotary Switches

In Fig. 1 we show only four coils, but it will be evident that more could be added if desired, provided that rotary switches with the necessary number of contacts were used. With four or five coils the standard five-position rotary switches are suitable. One convenient type of switch is the Bulgin type S.166, in which there are actually two five-way switches in one. In each case one tap is connected to a rotating arm which makes contact with each of five other tags in turn as the switch knob is rotated. Another equally satisfactory switch is the Bulgin S.159, where there are two sets of ten terminals, rotating arms cross-connecting pairs of these as shown in Fig. 2. If two tuners were used, two of these double-contact switch units would be required, and they would be operated by a single ganging spindle. It will be seen from Fig. 2 that only four of the five available switch positions are used, but it will also be clear that the fifth could be used if an additional coil were used in the unit to give five wavelength ranges.

In wiring the switches, especially when a pair of tuners is used, care must be taken that the corresponding windings are brought into circuit at each position. Thus, the first position would bring into circuit the aerial and grid windings of the lowest-wave coil in the first position and the long-wave windings in the last position.

For Intervalve Tuning

In Fig. 2 a tuner is shown in use as the aerial-grid tuner for the input circuit; it should be mentioned, therefore, that the

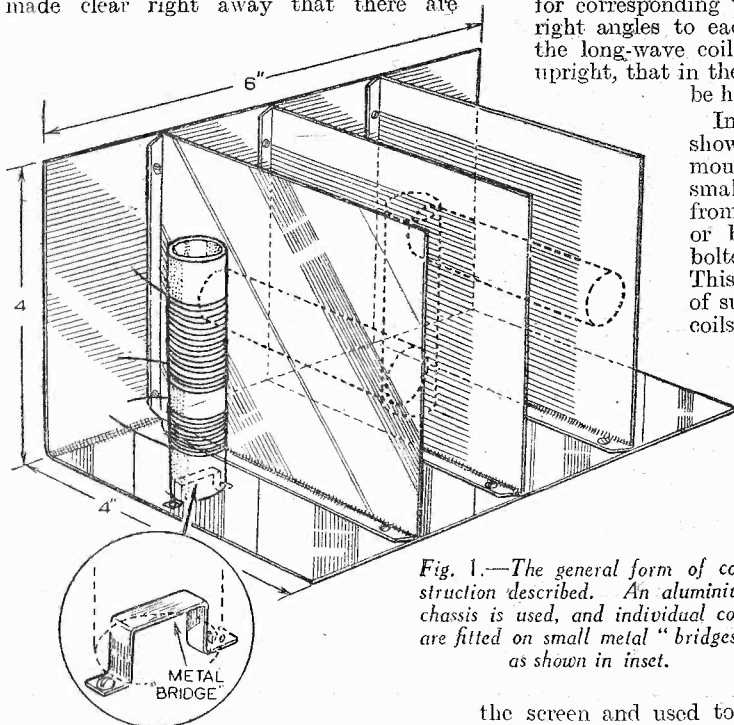


Fig. 1.—The general form of construction described. An aluminium chassis is used, and individual coils are fitted on small metal "bridges" as shown in inset.

definite limitations to the home construction of a tuner of this type, although these are seldom of a serious nature unless a series of tuners is required for use in a receiver with a gang-tuning condenser. In that case, the accuracy of matching necessary cannot very well be guaranteed by the methods which are generally available to the amateur.

Nevertheless, the form of construction which is to be described lends itself to convenient experimental adjustment of the individual coils so that it is possible, for instance, to match two sets of coils for use in a "straight" circuit without very great difficulty.

Separate Coils

The main feature of the tuner is that it is composed of a number (any number can be used) of separate coils, each of which is designed and arranged to cover a certain waveband. Thus there is no need to compromise nor to have the technical disadvantage of dead-end losses or losses due to damping by nearby earthed windings.

Fig. 1 shows the general scheme, which is to place a set of coils on an aluminium chassis, built from a sheet of about 20-gauge aluminium measuring 8ins. by 6ins.,

the screen and used to make direct connection with the other components.

A Matched Pair

In using a pair of tuners the gang condenser can be placed between them, whilst the rotary switches which will serve for wavechanging can be mounted behind the condenser with the operating spindle at right angles to the line of the condenser; this gives a good layout well suited to most "straight" circuits. It will be noted, incidentally, that we have not referred to superhet working. The reason for this is that we do not consider that many constructors would have the necessary apparatus or skill to match aerial and oscillator coils.

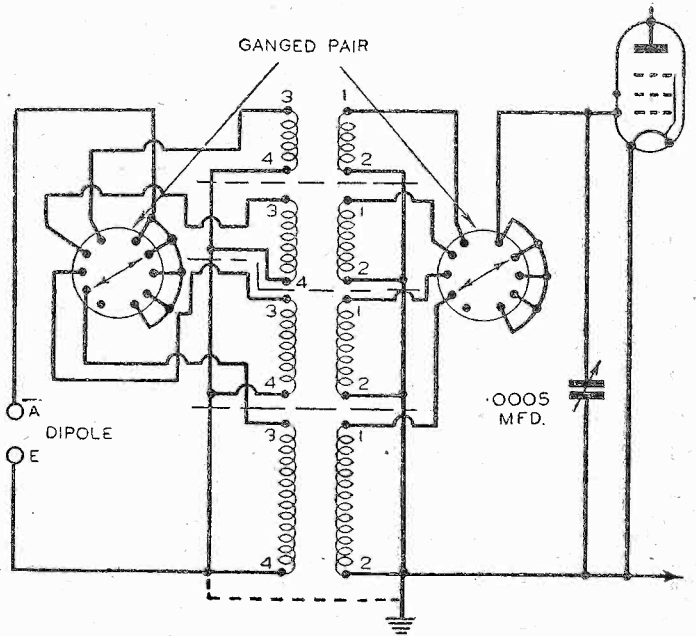


Fig. 2.—This circuit shows how a four-range tuner can be used with a double-pole five-way rotary switch. Connections are shown for a dipole aerial, but an ordinary aerial earth system can be used by making the connection shown by the broken line.

(Continued overleaf)

AN EXPERIMENTAL ALL-WAVE TUNER

(Continued from previous page.)

grid windings could be used for tuned-anode or tuned-grid coupling between an H.F. valve and the detector, and that the windings used for aperiodic aerial coupling could be used for reaction.

S.W. and M.W. Coils

With regard to the coils themselves, these can conveniently be made on paxolin or shellacked-cardboard tubes, $\frac{3}{8}$ in. in diameter and 3 in. long. Other sizes could, of course, be used, but if the tubes were any larger the tuner would become rather unwieldy. Fig. 3 shows the general form of construction for the short- and medium-wave coils.

In the case of the short-wave coils it is suggested that the grid turns be spaced by about the diameter of the wire used for winding; the aerial or reaction winding can be wound with the turns side by side. As an example of suitable windings, a coil to tune up to about 35 metres from about 20 metres should have a grid winding consisting of 8 turns of 18-gauge enamelled wire. The second winding should consist of 6 turns of 24-gauge enamelled or d.c.c. For this coil the space between the two windings should be about $\frac{1}{4}$ in.

In making a coil to tune up to about 60 metres, the grid winding would have 15 turns and the other one would have 12 turns. In this case the grid winding should be carried out with 22-gauge wire, 24-gauge being used for the second winding as before. The different gauge of wire is suggested so that the winding lengths would be roughly similar. For higher ranges the correct number of turns should be approximately in proportion, and the spacing between windings should remain $\frac{1}{4}$ in. until 100 metres is reached; from 100 metres to 200 metres leave $\frac{3}{8}$ in. spacing, and for all other coils space $\frac{1}{4}$ in.

A coil for the lower broadcast band should have a grid winding consisting of 110 turns of 36-gauge enamelled wire, and the second winding should have 90 turns of the same gauge. In this case all turns should be placed side by side; this will

give a winding length of about 1 in. for the grid coil.

For Long Waves

In making a long-wave coil it will be necessary to pile wind in order to accommodate the necessary number of turns on the former. This is best arranged by fitting a number of thin paxolin washers on the tube, as shown in Fig. 4. These should be made to fit tightly, and the whole former

that the turns of the two windings be run in opposite directions. With the short-wave coils it is a good plan to apply a coat of thin shellac after winding to prevent the turns from slipping. Another point that is rather important if the coils are to withstand the fairly heavy handling which they will receive during experimental work is that the lengths of thin rubber-covered flex for the connections should be soldered to the end of the windings, and used for anchoring the wire in the pair of holes made in the former. This is of greatest importance when dealing with the medium- and long-wave coils, since these are made from fine-gauge wire.

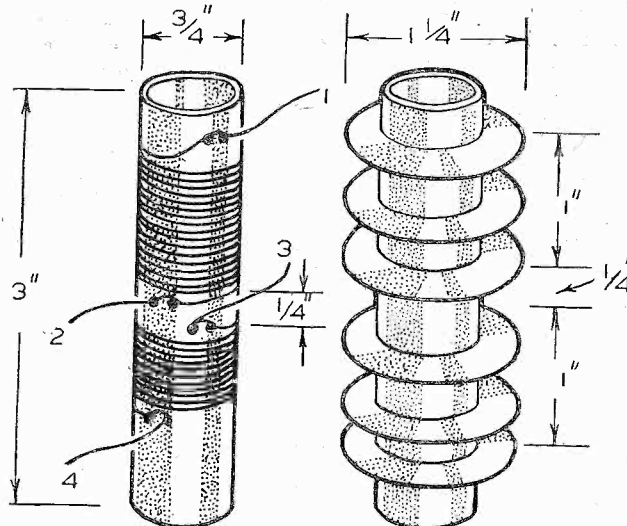


Fig. 3.—Main constructional details of a short-wave coil. Note that the windings are in opposite directions.

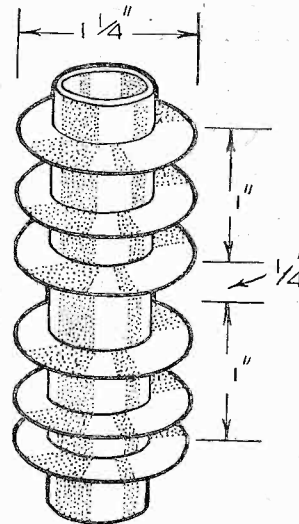


Fig. 4.—The long-wave coil is wound on a tube similar to those for short- and medium-wave coils, but spacing washers are used to accommodate pile windings.

should be given a coat of shellac to secure the washers. The grid winding should have a total of 400 turns of 38-gauge enamelled wire, 150 turns of the same wire being used for the second winding. Wind the wire as neatly as possible and in even layers, placing 200 turns in each of the divisions.

General Coil Data

In the case of all coils it is important

One simple method of ensuring this is to wind on two lengths of wire, one of them being left free and later unwound; its purpose is simply to give even spacing.

It need not be emphasised that it is important to make a good earth connection to the chassis-screen, for the screening would be ineffective if the connection were poor or omitted altogether.

Matching

One of the advantages of the form of tuner construction described is that any coil can quickly be removed for alteration. It is necessary only to disconnect the leads and pull them through the holes in the aluminium chassis and then lift the coil off its mounting "bridge." At the same time, if a pair of tuners is being made, it will save a good deal of time if coils are wound in pairs, taking care to make them as nearly identical as possible. As far as the short-wave coils are concerned, this implies that care should be taken that the turns of corresponding coils are similarly spaced.

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)

Wednesday, April 19th.—Visit of the B.B.C. Symphony Orchestra to Wolverhampton: Concert in the Civic Hall.

Thursday, April 20th.—Lucky Dip, Thirteenth edition; a weekly magazine programme.

Friday, April 21st.—The Vortex, a play by Noel Coward.

Saturday, April 22nd.—Soccer: Scottish Cup Final and Amateur Cup Final.

REGIONAL (342.1 m.)

Wednesday, April 19th.—Concert Party programme.

Thursday, April 20th.—Gipsy Love, an operetta.

Friday, April 21st.—Gentlemen, you may Smoke (No. 2), a microphone menu for men.

Saturday, April 22nd.—The Wreckers, Acts I and II, from Sadlers Wells.

MIDLAND (297.2 m.)

Wednesday, April 19th.—Midland Composers Concert—3.

Thursday, April 20th.—Ten Years and

All That, 1929-1939; musical memories.

Friday, April 21st.—Concert relayed from Poland.

Saturday, April 22nd.—Organ recital from the Civic Hall, Wolverhampton.

WEST OF ENGLAND (285.7 m.)

Wednesday, April 19th.—Light music from the Palace Hotel, Torquay.

Thursday, April 20th.—Choral and Orchestral Concert, from the Colston Hall, Bristol.

Friday, April 21st.—For Amusement Only: competitions.

Saturday, April 22nd.—Squire's Party.

WELSH (373.1 m.)

Wednesday, April 19th.—Olym yr Awr: Radio newsreel.

Thursday, April 20th.—Gwymyrr Arall: Another Fall, a radio play, by G. D. Gwynallt Evans.

Friday, April 21st.—Doniau'r Encilion: County Talent—authors reading their own works.

Saturday, April 22nd.—Orchestral concert.

NORTHERN (449.1 m.)

Wednesday, April 19th.—Concert Party programme, from the Palace Theatre, Burnley.

Thursday, April 20th.—Sibelius: Instrumental programme.

Friday, April 21st.—Orchestral programme.

Saturday, April 22nd.—Spotlight on Sport: My job as a Pigeon conveyer, by Ben Helliwell.

SCOTTISH (391.1 m.)

Wednesday, April 19th.—Tunes for Everybody: orchestral programme.

Thursday, April 20th.—Aberdeen University Students present their Eve-of-Charities-Day Variety.

Friday, April 21st.—La Traviata, Act I (Verdi), performed by the Royal Carl Rosa Opera Company, from the King's Theatre, Glasgow.

Saturday, April 22nd.—Scottish Dance Music: orchestral programme.

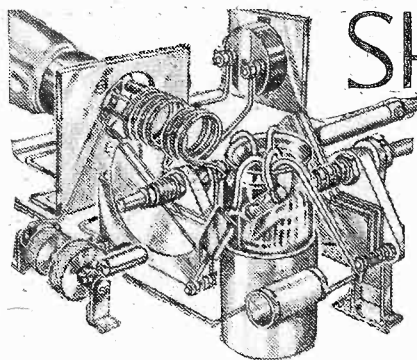
NORTHERN IRELAND (307.1 m.)

Wednesday, April 19th.—Band concert.

Thursday, April 20th.—Chamber music.

Friday, April 21st.—Choral programme.

Saturday, April 22nd.—Band concert.



SHORT-WAVE SECTION

IMPROVED S.-W. APPARATUS

How to Make Up Condensers and other Components for Short-wave Receivers, either for Experimental or Permanent Use.

By W. J. Delaney

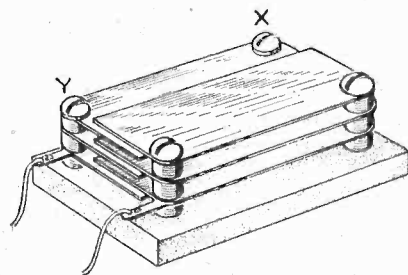


Fig. 2.—A fixed or pre-set condenser made up from odd plates from a dismantled variable condenser.

It is often stressed that short waves call for high-quality apparatus specially designed for use on the high frequencies, and accordingly many readers fail to embark on short-wave listening owing to the fact that they do not possess suitable components or that funds do not permit of the purchase of them. It must be remembered, however, that really reliable parts may be made at home and will be capable of the highest performance, provided that they are employed in suitable positions and that they are made up on suitable lines. It is not possible to deal fully with every aspect of component making for short waves, but the following data studied in conjunction with a standard one-valve short-wave circuit should give some idea of the lines to be followed, and should enable many readers to take up short-wave work.

If a one-valver is made the subject of the first trials, some idea of the performance and handling of short-wave apparatus will be obtained, and this may be used to modify the set, either by addition of L.F. stages or an H.F. stage. The circuit in Fig. 1 may be taken as fairly representative of a standard one-valver, and the part of the circuit on the right of the vertical line is the L.F. stage which may be added if desired.

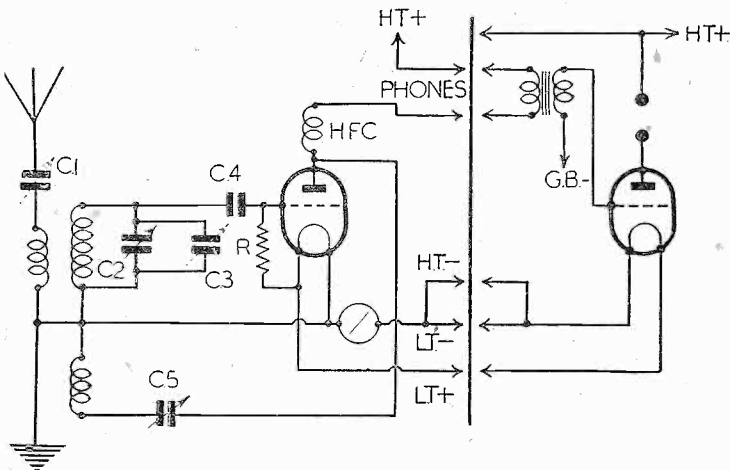


Fig. 1.—A standard short-wave circuit, showing how an L.F. stage may be added.

critical component and any good type of condenser such as is used on broadcast apparatus may be used there. A maximum capacity of .0003 mfd. should be suitable in most cases. C4 is the grid condenser and may be of any value from .0001 mfd. to .0003 mfd.—a standard component being again perfectly suitable here. This means that there are only C1, C2, and C3 to worry about from the point of short-wave efficiency and values.

which separates them. The plates themselves may be made from any non-ferrous material—brass, copper, aluminium, etc. If the small condenser suggested is required in variable form, the corners marked X may be bolted together with a short bolt, not entering the base, and that set of plates may then be turned on the pivot formed by the bolt Y, this being locked fairly tightly to prevent movement after adjustment.

Condenser C2 must have a low minimum and maximum capacity, the latter preferably not being greater than .0002 mfd. Again an old variable condenser may be called into use. In this case it may be remembered that each moving and fixed plate acts as a small condenser, and therefore in its maximum capacity position an ordinary variable condenser may be regarded as a number of fixed condensers in parallel. It is possible to modify the capacity by removing plates from both sections, but again it is not possible to give any exact data concerning modified capacities owing to the fact that one or more of the factors previously mentioned may be altered. By direct proportion, removal of half of the plates from each section will reduce the capacity by half, and reduction in capacity may be regarded as directly proportionate to the number of plates. Altering the spacing, by using two spacing washers in place of one, will decrease the minimum capacity as well as the maximum, and this is often worth while, although it is difficult to arrive at an idea of the total capacity when some vanes are removed and the spacing is increased.

For condenser C3, however, two fixed plates and one moving, reassembled with double spacing, will be found very good, although if a very old model variable condenser is dismantled and reassembled with double spacing it may be desirable to use two moving plates and three fixed to obtain the necessary coverage. With both this condenser and C2, if brass or copper plates and spacing washers are employed, it is a good plan to run solder down one side so as to make the sections solid and avoid H.F. losses. In any case, all the parts should be thoroughly cleaned when dismantled and before assembling.

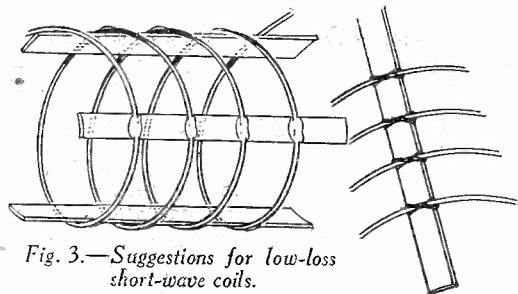


Fig. 3.—Suggestions for low-loss short-wave coils.

It is often suggested that a twisted flex, or similar lead be employed for a series aerial condenser. For this purpose about 18 in. or so of ordinary single flex lead (complete with rubber and the cotton covering) is attached to the aerial terminal of the receiver, and seven or eight inches of the aerial lead-in are then wrapped round this flex, twisting the two exactly as in the case of standard twisted lighting flex. It will be appreciated that the capacity is dependent upon the thickness of insulating material which is left round the wire, in addition to the number of twists which are made, and therefore no indication as to the capacity which may be obtained can be given. In use the amount of twist is varied until the desired effects are obtained.

Using Old Vanes

A much more efficient component may be built up from pieces of metal—either discs or any other shape—mounted on an insulating base and with air spacing between the plates. For this purpose the fixed vanes taken from an old variable condenser may be used with perfect results, retaining the spacing washers to give the necessary space and so mounting them that they alternate as shown in Fig. 2. The capacity of a condenser depends upon the amount of the overlapping area and the distance separating the plates, as well as upon the material

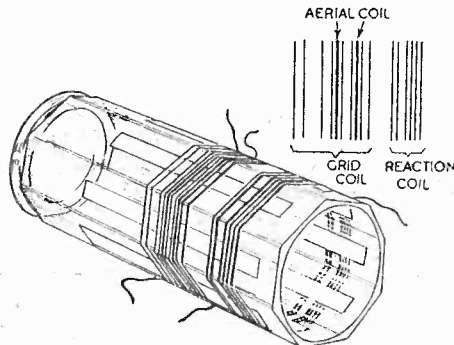


Fig. 4.—A novel method of making a low-loss self-supporting coil with 3 windings.

Condensers

It will be seen from the circuit that five condensers are called for: one fixed, one semi-variable, and the others variable. C1 is a semi-variable included in the aerial circuit in order to adjust the damping effect of the aerial-earth system and prevent "deadspots" and other similar effects. C2 is the main tuning condenser, across which is a much smaller variable used as a fine tuning or band-spreading condenser, whilst C5 is a reaction condenser. The latter is not a

SHORT-WAVE SECTION

(Continued from previous page)

The Coil

For either a temporary or permanent tuning coil there are many possibilities. The standard bare tinned copper wire used for connecting-up purposes is ideal for a short-wave tuning coil. This may be wound either on the standard short-wave coil former, or on any home-made former of similar dimensions. Alternatively, the coil may be made self-supporting. The wire should not be stretched until it gives, but should be carefully pulled out straight to avoid kinks and awkward bends. If this type of wire is wound tightly round a large diameter former—the turns being pushed up against each other after a few have been placed in position—and tension on the winding end is released, the wire on the former will spring out to a slightly larger diameter and the turns will separate. This is an ideal type of coil for wavelengths below 15 metres, but the wire has to be supported so that the turns will not short-circuit, and so that variations in inductance will not take place due to vibration. A very simple method of ensuring this is to slip strips of celluloid or other low-loss material across the inside of the turns and to cement each turn to the strip by a good cellulose adhesive. A simpler plan is to use ordinary matchsticks placed across the coil at two or three points and to tie the turns in

position with cotton. This is not such a workman-like job but is quite effective.

The three coils required should be wound all in the same direction, and one of the most effective schemes is to interwind the aerial at the lower part of the secondary, with the reaction winding at that end, using a slightly thinner wire for the aerial coil. This is shown in Fig. 4 which, incidentally,

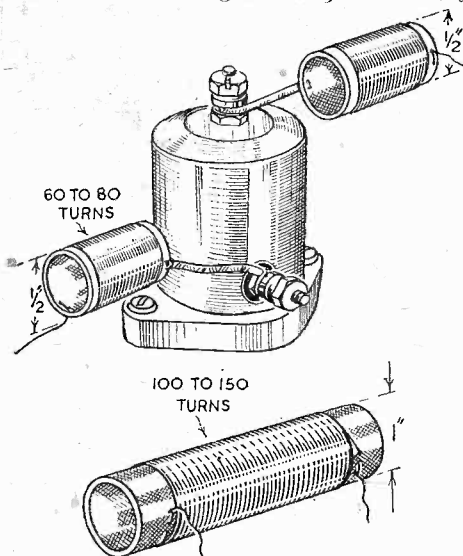


Fig. 5.—A simple but efficient home-made S.W. choke and a suggestion for improving an old choke.

suggests a scheme which enables a really first-class coil to be made up capable of giving the highest results. A pickle bottle of the six or eight-sided type should be obtained, and strips of thin celluloid attached along each side, sticking only the ends to the bottle with adhesive. The coils are now wound in position over the strips and adhesive placed across the wire and strips. Leave everything to set. When perfectly dry the bottle is smashed by a sharp blow from a hammer above the coil. The glass should smash away from beneath the coil, the strips of celluloid may then be cut up close to the end turns, and you will have a rigid self-supporting coil of really high efficiency. The overall diameter should be about 2½ in. or 3 in. A suitable mount for the coil may easily be constructed, either to hold the coil as a permanent fixture or so that it may be removed and other coils inserted.

H.F. Choke

The only remaining component calling for special details is the H.F. choke. For use up to 40 metres or so a simple solenoid winding of any thin wire, with 100 or 150 turns on a 1 in. diameter former of any good insulating material may be used. An alternative, which often proves good, is to make two small diameter coils, ½ in. in diameter with 60 or 80 turns of very fine wire, and connect these two coils in series at each end of a standard good quality choke.

Leaves from a Short-wave Log

Melbourne Adopts The Kookaburra

VLR3, Melbourne (previously known as the Lyndhurst transmitter), is now well heard on 25.25 m. (11.88 mc/s) from G.M.T. 09.00-12.00. Although only advertising broadcasts on weekdays it has also recently been logged on a Sunday. Time signal is given by means of the conventional "six pips" at G.M.T. 21.00. The studio has adopted the laughing call of the Kookaburra made so popular by the Sydney VK2ME transmitter.

Don't be Misled

SOME confusion is caused by the fact that one may hear Italian broadcasts on two neighbouring channels, namely, 31.02 m. (9.67 mc/s), and on 31.09 m. (9.65 mc/s). These are two entirely different stations, the former being Rome (Prato Smeraldo) 12R09, and the latter IAB, Addis Ababa (Abyssinia). Wait for the call to confirm identification as both possess a woman announcer, thus complicating the puzzle.

That Illicit West African Station

THE Nazi operated "mystery" station in South West Africa, to which reference was recently made in these columns, now works daily between G.M.T. 02.00-04.00 on 42.02 m. (7.14 mc/s); 33 m. (9.09 mc/s) or 28.01 m. (10.71 mc/s). It has been logged by listeners on these three channels at various times.

New Venezuelan Transmitter

YV4RQ, Puerto Cabello (Venezuela) is a new 2-kilowatt station now operating nightly from G.M.T. 23.00 on 59.76 m. (5.02 mc/s). The call is given out every quarter of an hour, and is followed by a short military march.

Radio Romania on Short Waves

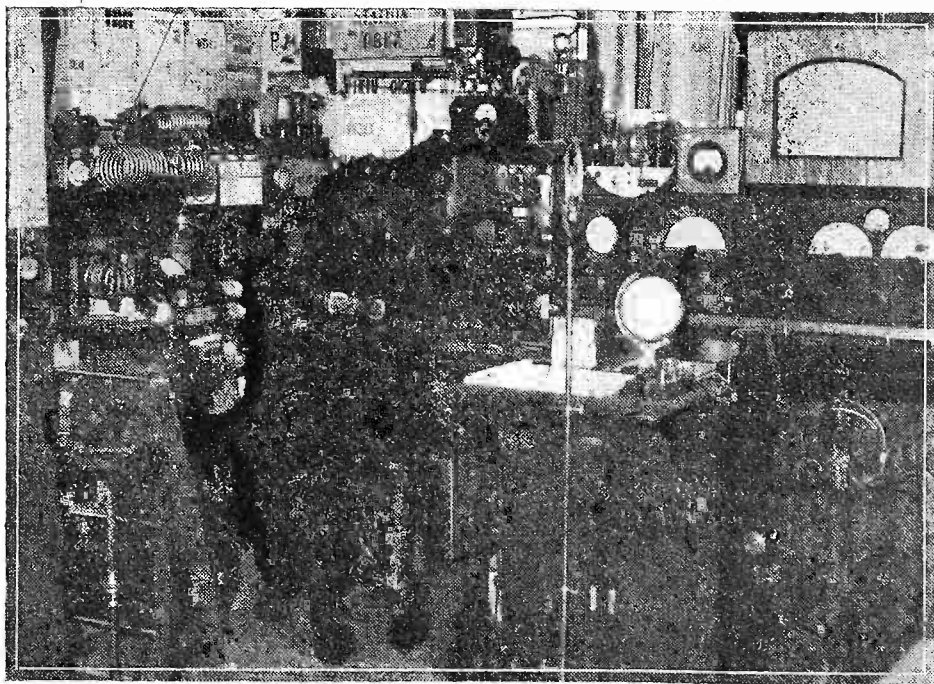
IN an unusual section of the waveband, namely, 32.61 m. (9.2 mc/s), listeners report a broadcast emanating from Bucarest (Romania) with the call: *Radio Romania*, given out by male and female announcers. News bulletins are transmitted in various European languages from G.M.T. 21.00 onwards, the English broadcast starting at G.M.T. 21.45.

Guadeloupe Changes Its Wavelength

AFTER trying out various channels FG8AA, Pointe-à-Pitre, Guadeloupe (French West Indies), now announces its frequency as 7.445 mc/s or 40.3 m., as against its former wavelength of 42.5 m. (7.058 mc/s). Transmissions are now made daily from G.M.T. 22.00-00.30. Address: Poste de Radiodiffusion FG8AA, Boîte Postale, Pointe-a-Pitre.

Radio Teheran Calling

TESTS are being carried out by the 20-kilowatt Teheran (Iran) transmitter EQB, on 48.74 m. (6.155 mc/s). Other channels to be used by this transmitter are EQC, 30.99 m. (9.68 mc/s) and EQA, 33.52 m. (8.95 mc/s).



Amateur transmitter, G8KZ, of London, W.10, talks to radio "hams" all over the world from his transmitting station seen in the illustration. Also in the picture is "Bobby," a big black Labrador retriever, who sometimes "talks" to dogs in far away Chile and the Dutch West Indies.

ON YOUR WAVELENGTH



National Television Push

PROVINCIAL wireless traders, sensing that there may be big business afoot in the television market, appointed a special deputation representative of the whole country which met manufacturers in London recently, so that jointly they could hammer out some campaign to their mutual advantage. In the end a joint committee of dealers and manufacturers was set up under the title of the Television Extension Committee. Its terms of reference are that it must bring home to the authorities the need for a speed-up and the extension of television into the provinces, because of the importance of the new industry at home, its export capabilities, and because it is essential that Britain should maintain the lead which it at present enjoys over all other countries.

Provincial Service

NOW, it is nearly three years ago since the high-definition system was inaugurated in this country, and since that time the provincial fans have been insisting on a local service. It was agreed that the first station should be erected at Birmingham, as this district would serve three and a half million people and thus would increase employment, as well as sales in that district. The bargaining point seems to be that the Prime Minister is a Birmingham man. This may be flattering to the Prime Minister, but personally I do not think that this is any advantage to the country as a whole from the point of view of television.

Birmingham the First?

CERTAINLY Birmingham has no particular claim for the first television station on the score that this country is controlled by a Birmingham Prime Minister. Has he done anything yet to warrant such a signal honour? Mr. C. O. Stanley, Chairman of the R.M.A. Television Development Sub-Committee, expressed the view that as the Post Office has already ordered a television radio link to cover an extension as far as Daventry, the additional expenditure required to link up Birmingham would not be more than £70,000, which sum would cover the construction of a

By *Thermion*

relay station equivalent to Alexandra Palace. So certain are the manufacturers concerning the relative merits of cable and radio links that they are prepared, if the Government will proceed with the building of a Birmingham television station without delay, to stand the loss if it should not be a success.

I am certain that manufacturers will wish to lend all the support they can to a campaign for an immediate extension for television in the provinces. Arrangements have already been made to send deputations to see the Postmaster-General, the Board of Trade, the Department of Overseas Trade, and the Minister of Labour.

Will England Lead?

WHILST Alexandra Palace remains the only television transmitter in the country the public will regard it as experimental. The construction of a provincial television station would, it is thought, encourage the population to feel that television had progressed beyond the experimental stage.

More important, of course, is that England should retain its hold on the television industry, and not allow it to pass into the hands of Americans as it has done with the film industry.

Mr. F. W. Ogilvie, the Director-General of the B.B.C., recently said at Liverpool: "We have been hard at it for two years, and we have now come to a critical landmark in television work. We have developed the resources not merely with a view to the benefit of a thirty or forty-mile radius around London, but as a nucleus of a national system. We want to take further steps to make television a national system at the earliest opportunity.

"The speed at which we can go

forward depends on the result of technical experience as to the means of transmission—it is hoped these results will be known before long, although certainly not this year—and the question of finance, because the B.B.C. does not get the whole of the 10s. paid for wireless licences.

"We hope that this view will prevail that the 10s. is something for services rendered and that it will enable us, when a technical problem has been solved, to make television available throughout the country."

Some months ago I asked the question, "What is holding television back?" With all this good will and effort I once again ask that question.

The Radiolympia Poster Competition

THE results of the competition held by the R.M.A. Exhibition Sub-Committee for suggestions from members of the trade for the poster and slogan to be used for advertising Radiolympia, has resulted, after a large number of entries had been judged, in the decision to use part of four suggestions, and to award prizes as follows: A Marconiphone representative sent in a design and the slogan, "Let's all go to the Radio Show," and is awarded 10 guineas; while a Philips representative suggested a design for which he is also awarded 10 guineas.

An Ekco representative forwarded an idea for the creation of two Radiolympia personalities and is awarded 10 guineas; while a prize of five guineas goes to a Philips representative who gave a suggestion for a slogan.

"SEEING IN"

Pity the television fan
Attempting to see-in,
Recording Angel, turn deaf ears
Write not his language "Sin"
When to the pearly gates he comes
Oh, give him speedy clearance,
'Twould spoil the temper of a saint,
This constant "interference,"
His definition marred and blurred
By passing motoring mugs
Whose engines give a hefty spark
From all their many plugs;
When Mrs. Brown (who lives next door)
Her Turkey carpet sweeps,
The would-be televisor groans,
In frantic rage he leaps,
When lovely Lulu, Glamour Girl,
Who lives at number ten,
Is busy drying her shampoo

Then it makes him leap again.
 A gouty gent across the road
 Is using violet rays;
 'Twould give him something worse than
 gout,
 What televisor says.
 And then that beastly butcher,
 At the bottom of the street,
 Who switches on so frequently
 To make more sausage meat.
 Or the diathermic institute,
 Oh, when he thinks of that,
 And "bong-pong" beauties going there
 To melt superfluous fat!
 So all day long, and everyday,
 They're twiddling with their switches,
 Until with homicidal rage
 Poor televisor twitches.
 With life preserver firmly grasped,
 To beat their bone-thick knob?
 The law says "No"—What can he do?
 Put Thermion on the job!!

Listening With a Purpose

I AM glad to note that on the subject of "Listening with a Purpose," a conference of group and other listeners in Northumberland, Durham, Cumberland, and Westmorland will be held on Saturday, April 29th, in the Old Assembly Rooms, Westgate Road, Newcastle-on-Tyne. The conference is organised by the B.B.C. and the North-Eastern and North-Western Area Councils for Group-Listening. It will aim to consider how broadcasting can and does help the serious listener.

Principal speakers will examine the direct educational contribution of school broadcasts and of talks designed for discussion groups, and the broader potentialities of music, drama, talks and other programmes.

The Deputy Director-General of the B.B.C., Sir Cecil G. Graves, will take the chair; and the opening speaker in the first session will be Mr. H. M. Spink, Director of Education for Northumberland; the second session will be opened by Sir Charles Trevelyan (H.M. Lieutenant for Northumberland and a former President of the Board of Education). The first session will be at 2.30 p.m. and the second at 5 p.m. Members of the conference will be present by invitation; and interesting discussions in which keen listeners and keen critics will take part may be expected.

Invitations are being sent to many people in the Region's four northernmost counties who are already interested in group-listening or schools broadcasting. As the conference also covers the generally informative uses of regular broadcasts, however—and though numbers will be limited—the Newcastle Director of the B.B.C. (Broadcasting House, 54, New Bridge Street, Newcastle-on-Tyne) will be pleased to hear from any listener who has a special interest in the cultural

Notes from the Test Bench

Adapting Tools

THERE are certain instruments and tools used in various industries which may be modified for use in radio construction and servicing. A glance through a general catalogue will often reveal items which, after a little thought, may be modified or adapted for radio use, but it is obviously impossible to give a complete index here of the many items which may be so used. An illustration may, however, be given to show the lines of thought which are indicated. In plumbing, a curved double clamp is often employed to hold two lengths of piping together whilst the joint is "wiped," and by using the ends from draughtsman's drawing pens, suitably mounted, two wires or two wire-ended components may be similarly held for soldering purposes. Inspection mirrors, special measuring rules or conversion measures may also be found to offer interesting scope in a similar direction.

Control Knobs

A DIFFICULTY which often confronts the newcomer to radio construction is the neatness of the panel appearance of a home-made receiver. Components are often supplied complete with control knobs and these differ not only in design but also in colour. If these are used, therefore, the finished receiver will present a rather amateurish appearance, but this may be avoided by obtaining a set of control knobs of standard design. Messrs. Bulgin, for instance, specialise in the supply of control knobs in various designs and for different spindles, and thus the panel layout may be kept uniform. It is often found, also, that where an odd number of controls are used the symmetry of the panel may be maintained by mounting a dummy knob, connecting it to a disused component, or merely screwing it to the panel.

Rubber Mounting

THE rubber kneeling pads which are now available quite cheaply offer very useful lines of insulation or mounting in a modern receiver. They may be cut easily with a wetted knife, and pieces may be placed beneath a chassis to avoid microphony; blocks may be placed beneath a speaker when screwing it to a baffle; a variable condenser may be mounted on long bolts with discs of the material used on each side of the chassis to ensure that the condenser floats and thereby avoids erratic tuning effects; pieces may be affixed to a microphonic condenser with adhesive tape to avoid microphony; and cabinets may be stood upon it to avoid resonance effects through a floor, etc.

aspects of broadcasting, and who would like to have an opportunity of attending the conference.

A.R.P. Shelters at Ekco Works

I WAS interested to hear that five acres of land at the Ekco works have been devoted to A.R.P. shelters and accommodation for more than 2,000 has already been provided. The total cost so far is approximately £3,000. The shelters have been laid out in a series of rectangles, with communicating corridors and at least two means of exit from any point.

Entrance is by way of gradually sloping ramps (gradient 1 : 7), designed to obviate slipping, tripping or crushing. Additional exits are provided for emergency use.

The details of construction are interesting. A form of mass-production was used for walling the trenches. Boarding and uprights were prepared entirely above ground, working to a jig, and lowered in 50-foot sections into the trenches. Cross-struts at top and bottom, each butting on to opposite members, were then placed in position, and any small gaps behind the walls were filled with rubble.

This proved to be a particularly satisfactory form of construction, being capable of swift completion and producing galleries of regular shape and section.

Walled, Roofed and Floor-boarded

THE shelters are boarded throughout with creosoted timber, and the roof is of treated corrugated iron under a mound of sandbags and earth, 3ft. 6in. deep. Floorboards are laid on creosoted cross-bearers bedded in dry gravel.

Drainage sumps at the base of each entrance and exit ramp protect the shelters from flooding. The trenches remained clean and dry throughout the recent spell of bad weather.

Gas locks and light locks are provided at each entrance and exit, in the form of twin layers of blanket material.

I wonder if any other radio firms have made similar arrangements?

TO FIND THAT FAULT!

THE WIRELESS CONSTRUCTOR'S ENCYCLOPÆDIA

5/- or 5/6 by post from

George Newnes, Ltd., Tower House, Southampton St., Strand, London, W.C.2.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

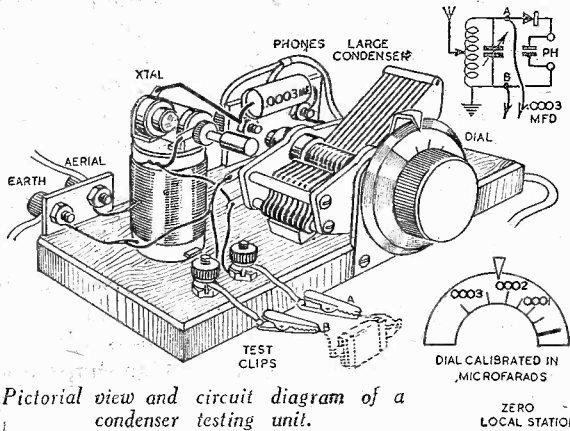
THE HALF-GUINEA PAGE

THAT DODGE OF YOURS!

Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every motion sent in must be original. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.

A Condenser Testing Unit

TO determine the capacity of home-built condensers I devised the unit shown in the accompanying sketch. An "S" type crystal receiver was used as this arrangement gives sharper tuning. It is best to use as large a variable condenser for tuning as possible. The coil is wound so that the local station is received when the tuner is turned to its highest capacity. To graduate the scale, first mark the point where the local is received as zero. By



Pictorial view and circuit diagram of a condenser testing unit.

clipping condensers of known capacity to the test points, and marking the point to which the tuner is turned, to lower the capacity, and again bring the local into tune to correspond with the condenser connected. When the dial has been calibrated in this manner you have a useful instrument which can be used to test home-made condensers having capacities less than the maximum capacity of the tuner.—A. BARTHOLOMEW (Kirkcaldy, Fife).

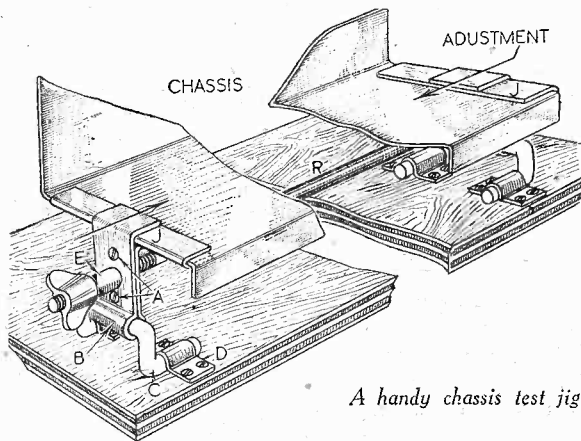
A Neat Chassis Test Jig

THE accompanying sketch illustrates a chassis test-jig which I have constructed for an experimental hook-up chassis that I use when compiling short-wave circuit data, whilst the length and limits of adjustment serve very well for any other similar type of chassis not having side flanges but of about the same measurements.

The end hinge movements are identical, and are adjusted by a steel rod "R" which, passing through the centre of each hinge shank and having threaded ends, permits a wing nut to be used for clamping with the other end secured by lock nuts.

The shanks "B" were shaped from a length of soft steel strip, and the hinging was obtained by heating and forming over a piece of steel rod.

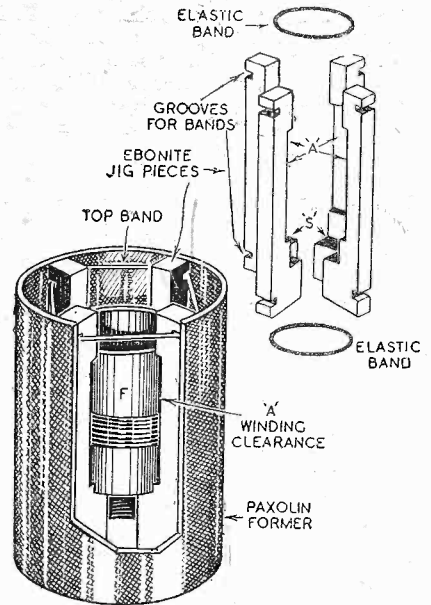
Two lengths of soft steel rod "C" were likewise heated and bent to the form



A handy chassis test jig.

An Inductance Coupling Jig

THE method I have devised for centralising aperiodic coils takes the form of three or four ebonite (wood will do quite as well) supports cut to support almost any reasonable size and type of centre former "F" shown in the illustration. To give winding clearance, sections were cut away as depicted by "A," whilst protruding steps "S" provided seating for the "F" former. The pictorial illustration shows how the centre coil former is secured between the jig supports by

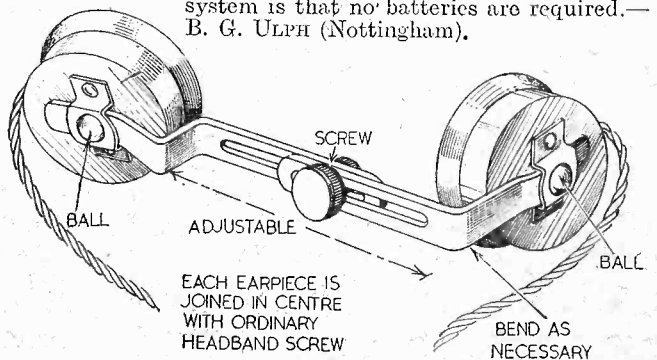


A method of centralising aperiodic coils.

depicted, these in turn being clamped to a suitable thick plywood baseboard by brass clamping pieces "D." The 4 BA brass screws "A" clamped the shanks securely, and clearance holes were drilled in these shanks for the steel-adjusting rod. To permit ease of adjustment with the wing nut, a brass bush "E" was slipped over the rod between the nut and the hinge shank. The jaws "J" are separate, and are shaped from some 16 S.W.G. aluminium which was handy at the time.—W. L. DEWTON (Alnwick).

A Simple 'Phone Conversion

AS the prices for house telephone sets are rather high I devised a simple method of making one. I took a pair of headphones and detached the headband, as shown in the accompanying sketch. I then bent the one which was to serve as an earpiece slightly inwards, and joined the two earpieces by the screw and cap which originally joined the headband and earpiece together. The length can be adjusted as in the ordinary headphone, and the actual earpieces themselves can be adjusted to the most convenient position. I have found this idea very satisfactory, and the appearance is not displeasing. The advantage of this system is that no batteries are required.—B. G. ULPH (Nottingham).



A simple method of converting headphones for use as a house telephone.

A REVIEW OF COMMUNI-

A Description of Some of the More Popular American Receivers Various English Firms. Further Details of these Receivers may be either to the Firms or to this Office

THE receiver illustrated immediately below is the new Howard Model 450A. This is a 12-valve 6-band model with a frequency range from 65 mc/s to 540 kc/s. The valve combination is H.F. stage, mixer, oscillator, two I.F. stages, second detector, L.F., phase inverter, push-pull output, R-meter amplifier and

A separate speaker to match is available, and is also shown below. The price of this model is £31 10s.

National Radio

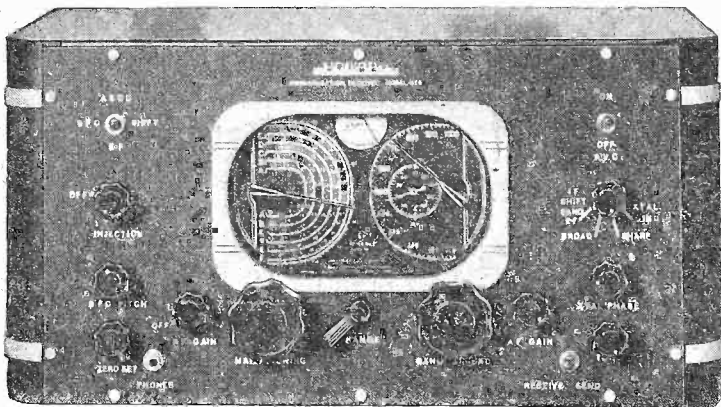
There are a number of interesting models in the National range, and on these pages we illustrate two of the more popular—

namely models NC-100 (below) and NC-80X (on the right). The NC-100 is the latest product of the National company and uses the latest metal valves, twelve in all. The tuning range is from 30 mc/s to 540 kc/s, divided into five ranges. On all ranges there is an H.F. stage, mixer and separate oscillator, two I.F.'s, second detector, A.V.C., push-pull output, B.F.O., and

is thus able to tune continuously from 0 to 500, and this spreads out signals and greatly facilitates tuning operations. The dial readings increase with frequency.

Controls

In addition to the main tuning control is a range selector knob, a combined switch giving A.V.C., manual or B.F.O., and for the latter there is a separate switch with six positions. A separate phasing control is provided for the crystal gate, and there are two gain controls—one for H.F. and one for L.F. There are two further controls, one providing a 10-position setting for tone control and a further one for the power supply, offering an off position, an on position, and a stand-by setting—with H.T. cut off. A pilot light is mounted near the tuning indicator, and when the receiver is switched on the pilot is alight, but when the switch is turned to the stand-by position the indicator goes out, leaving the pilot alight as a warning that the A.C. supply is connected. With speaker this model costs £34 15s. A modified version, model NC-100X, possessing additional refinements, is available at £41 10s.

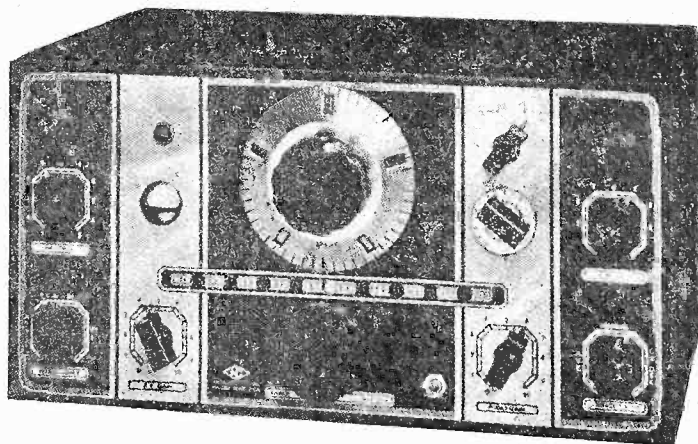


The Howard Model 450A. Note the novel tuning dials with band-spread device.

beat-frequency oscillator. Electrical band-spread tuning is employed, and a novel dual dial with special bandspread logging scale is provided. This provides a total tuning scale length of 47in. divided into 1,000 divisions and thus tuning is greatly simplified. The tuning controls have flywheel balances so that rapid adjustments may be made, and a further novel feature is the inclusion of a B.F.O. shift switch which transfers the oscillator to each of the I.F. circuits, these being of 1,560 kc/s and 465 kc/s. The H.F. stage is in circuit on all except the 5-metre band. The coil system is coaxially designed with the band-switch, and special arrangements are made to eliminate all coil secondary leads to avoid losses. The switch and coil assembly is shown below.

The output of this model is 9½ watts, and among the many novel features are separate 5-metre aerial connection, relay connection for break-in work, copper-plated chassis, and alternative output connections for 5,500 ohms and headphones. The cabinet is finished in brushed silver and black, and measures 11in. high by 20in. wide and 12in. deep, the overall weight being 56lb.

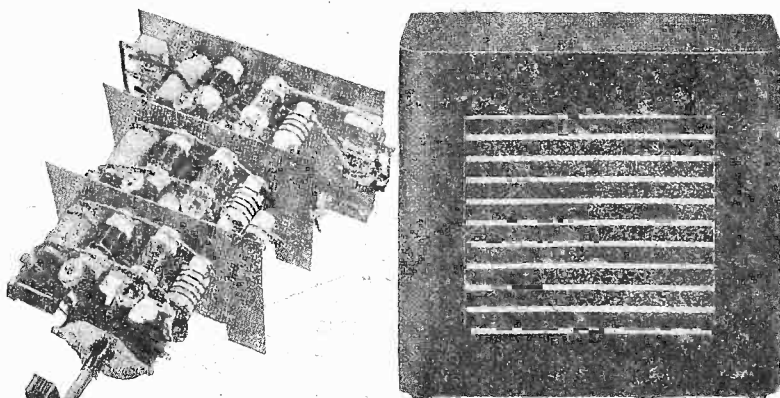
a visual tuning indicator ray type. The aerial permit either the doublet or single-wire type of aerial to be used, and the makers suggest that for use below 50 metres an earth connection may be undesirable. The output connections are taken to a 4-prong socket for connection to a speaker which is supplied with the receiver. A headphone jack is mounted on the panel and is wired so that the speaker is silenced when phones are in use. The main tuning control operates a 3-gang condenser through a multi-revolution type drive, and in tuning across any one-coil range the dial makes ten complete revolutions, and since the diameter is 4in. the scale is thus equivalent to a length of 12ft. There are fifty divisions round the scale about ¼in. apart, and the index numbers are changed automatically as the dial is rotated by means of an epicyclic gear, so that the calibration is numbered consecutively from 0 to 500. The operator



In the National NC-100 receiver there is a cathode-ray tuning indicator, as well as a pilot light to indicate that the set is switched on.

Model NC-80X

The large tuning scale is a feature of Model 80X, which is a slightly less expensive model, employing ten valves covering the same range (30 mc/s to 540 kc/s). Model 81X employs the same circuit but has a special tuning condenser and coils to provide full bandspread on the 10, 20, 40, 80 and 160-metre bands; frequencies between these bands cannot be covered. The circuit is first det., mixer and oscillator, three stages of I.F., second detector, and R.C. coupled power output stage. A separate valve is employed for amplified and delayed A.V.C., and a separate B.F.O. coupled to the second detector. The controls are for main tuning, operating a pointer on the dial which has four full-length scales calibrated in megacycles. The scale in use is indicated by a pointer at the right-hand side, which is moved with the range selector switch. There is a B.F.O. switch, an oscillator vernier



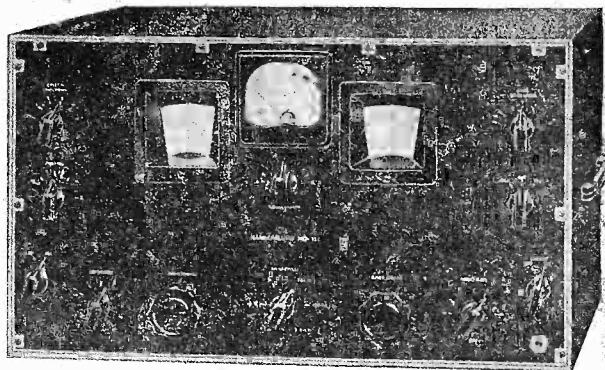
Here are the Howard coil unit and the cabinet speaker as used with the Howard receivers.

RECEIVERS

which are Obtainable from
Obtained on Application

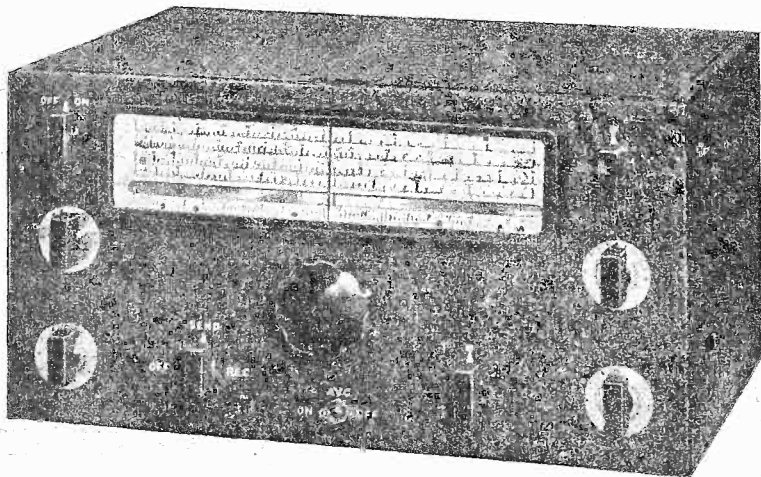
tuning control, varying the beat frequency over about 20 kc/s; an A.V.C. on/off switch, an audio-gain control which also opens the H.T. supply when turned to the zero position and thus acts as a stand-by switch. An H.F. gain control modifies the bias on the three I.F. valves and also operates in the signal-meter circuit. This control, at zero setting, switches off the receiver. Phasing and selectivity controls are also provided. Connections are provided for the inclusion of a 0 to 1 m/A meter for signal strength indications, a bridge circuit being used for this purpose. An important point regarding these two models is that they are designed for A.C.-D.C. use, and battery versions are available. The price of either NC-80X or NC-81X is £26.

of the 330 degree scale. To one side of this dial is a new signal meter, calibrated in both S units and decibels, and - this is balanced on the other side of the tuning dial by a frequency range indicator. Both these dials are indirectly illuminated. A crystal gate is provided, with a separate phasing control, and a combined control gives various degrees of selectivity, A.V.C., on and off and stand-by switching. There are the usual H.F. and L.F. gain controls, a tone control and a pitch control, with a socket for 'phone connection. The I.F. used is 455 kc/s, and the I.F. transformers are of the iron-core type. The total weight of this model is 56lb., and the price is



A special signal meter of the valve-voltmeter type is a novel inclusion in this new Hammarlund HQ120 receiver.

£33 10s. A suitable speaker for the receiver may be obtained for £4.



A full-vision dial is fitted to the National NC-80X receiver, and this has four scales on it. A pointer shows which scale is in use.

RME-69 and RME-70

In the RME-69, which is a 9-valve receiver, including rectifier, there is an H.F. stage of special design. The range of this receiver is from 32 mc/s to 550 kc/s and the intermediate frequency is 455 kc/s.

No additional separate control knob is provided for operating this device, but by pulling out the A.V.C. control knob it snaps into a new position and this brings the monitor into circuit. A linear rectifier is included in the circuit to demodulate the strong signal of the transmitter which will no doubt be near the receiver. Rotation of the A.V.C. control knob then adjusts the volume level of the monitor. The switch at the same time removes H.T. from the stages in front of the second detector. A separate terminal is placed at the rear of the chassis so that suitable energy may be fed into the monitor.

In the RME-70 similar novelties may be found, including a relay control and break-in, by means of which the receiver may be used as a standby circuit for remote control of the transmitter. There is also a special automatic noise suppressor allowing the L.F. side of the receiver to operate with full quality up to 100 per cent. modulation and yet reducing noise peaks to almost an inaudible level. The I.F. in this model is 465 kc/s and a new type of iron-core transformer is employed. A special control known as a Resonator enables the H.F. alignment of the two tuned circuits preceding the first detector to be adjusted from the panel to give maximum gain and maximum selectivity at any time. It is, in effect, a vernier tuning device. The large tuning scales are of the full-vision type to facilitate rapid tuning adjustments, and to avoid eye-strain when the receiver is being used for long periods the scales are fully illuminated in green. The RME-69 costs £38 and the RME-70 is £36 15s. A special suitable speaker costs £5 10s. Slightly modified models are available at increased prices, and an Image Rejector and Preselector in cabinet to line up with the RME-69 is available at £12 10s.

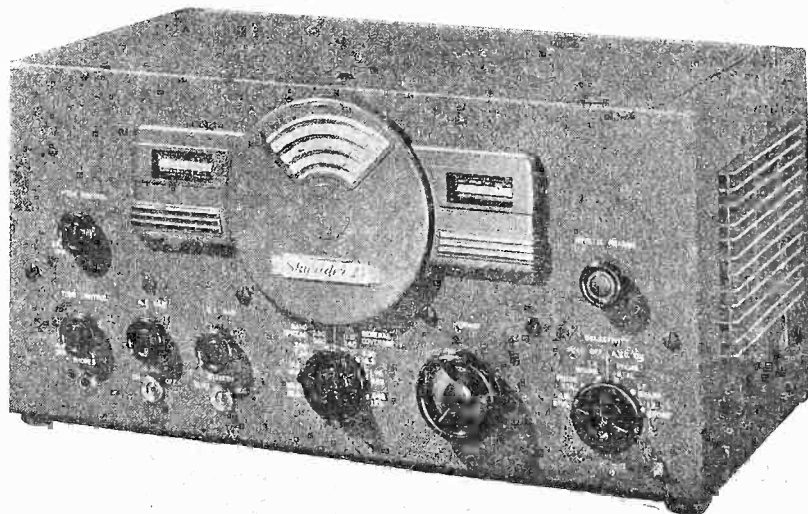
Hammarlund

In the Hammarlund range a new model is the HQ120, seen at the top of this page. It is a 12-valve model covering from 31 mc/s to 540 kc/s and has a new crystal filter circuit. This has six ranges of selectivity from broad to "single signal" and it is now possible to use the crystal whilst receiving good quality musical broadcasts. There are three stages of I.F. and a special H.F. circuit with an aerial compensator enabling various types of aerial to be used. A novelty in this model is the provision of a valve-voltmeter circuit for the signal strength meter, which is calibrated in S units up to S-9, and also up to 40 db above S-9. A noise limiting circuit is provided, and the model costs £38 10s.

Skyrider 23

In the Hallicrafter range of receivers, which include the Sky Buddy, Sky Chief and Sky Challenger, there is now a new model, the Skyrider 23, illustrated at the foot of this page. This has 11 valves, including the rectifier, arranged as H.F., mixer and oscillator, two I.F.'s, second detector and 1st L.F., A.V.C. amplifier, power output, B.F.O., and noise limiter. The range covered is from 32 mc/s to 540 kc/s divided into eight wavebands—four for general use and four for band-spreading the amateur bands. These latter bands are spread out over the major portion

There is a band-spread dial in addition to the main tuning dial, and these are balanced with a signal strength meter which indicates the amplitude of the received carrier. It is arbitrarily calibrated in R units and also in decibels. A novel additional feature in this receiver is the inclusion of a modulation monitor for the purpose of judging quality of L.F. equipment in a 'phone transmitter.



A new Skyrider model—11 valves, 8 wavebands, amateur band-spreading, and two I.F. stages.

RADIO IN

Details of the Equipment Receiving Radio

TO-DAY radio plays an important part in aerial navigation, and due to the fact that space is limited, and that specialised apparatus is called for, there are many interesting points in design which prove of interest to the radio student. At the Institution of Electrical Engineers recently a paper was read by N. F. S. Hecht, which gave a very good insight into these problems, and the following details are reprinted in view of their interest.

Aerials

In the early days of radio-communication in aviation, aircraft were relatively slow, and it was possible to pay out a considerable length of wire, suitably weighted at its end, and ensure that the effective height was a relatively high proportion of the available length. Wire, usually made of copper, but sometimes of bronze and similar alloys, and nowadays frequently made of stainless

be referred to later. The aerial wire was originally let through the floor of the fuselage through a fairlead of insulating material, the weight in the wound-in position being flush with its lower end.

The form taken by the aerial on an aeroplane in flight is shown in Fig. 3, from which it will be seen that the angle of trail of a wire increases as the length is reduced. The general shape of the curved portion is the same for all lengths and depends upon the diameter and smoothness of the wire, its weight, and the drag and weight of the terminal bob. Thus shorter aerials have a greater effective-height factor than long

aerial weight is usually not extended in a straight line, but more as shown in Fig. 3, each bead is decelerated in turn, thus considerably reducing the snatch on the wire. This form of aerial has been found very much more satisfactory.

A derivative of this type of weight was recently introduced in the United States, where it was given the form shown in Fig. 4. The beads are here replaced by a continuous

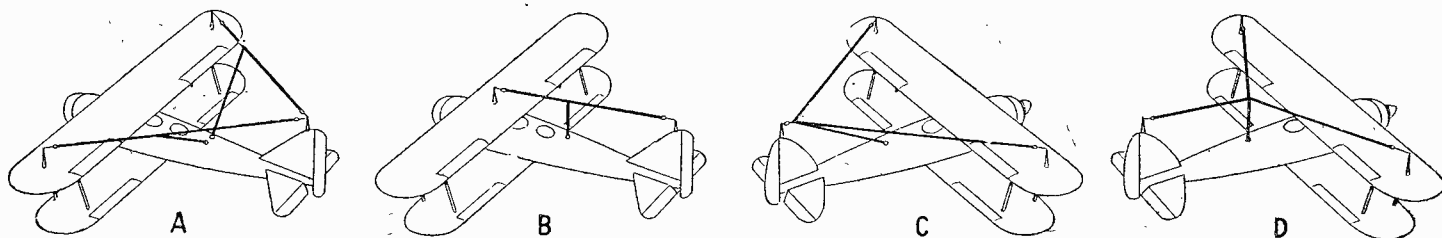


Fig. 1.—Four types of aerial as used on aircraft. The merits and demerits are discussed in this article.

steel, was let out by means of a reel fitted in the fuselage at a convenient distance from the operator's hand. Lengths of 200 to 300ft. were commonly employed and were terminated by lead weights of the order of 1lb. for ordinary aircraft and of 2 to 3lb. for flying boats, with substantially increased wire diameter. (The latter has been discontinued and the normal size is now fitted.) It was a reasonably easy matter to pay out the aerial or to reel it in. For this purpose the reel was designed to be operated by means of a handle which could be in one of three states: Locked for use, free on a ratchet for winding in, and free but with adjustable braking action for control during paying out. This class of winch is still in use and is fitted with a clamp, usually spring-loaded, whereby the wire can be held securely, thus providing a good contact, an essential point during reception.

The types of weight used for the terminal bob varied in different countries and included solid weights secured on a spring, finned weights to increase downward pull on the aerial, and distributed weights to reduce a snatching action which will

ones. Now, from the fact that the wire trails at a small angle to the horizontal, it will be appreciated that a considerable side load is applied to the end of the fairlead. This condition would cause serious wear at the end of the fairlead as the wire was paid out or reeled in and also during its oscillations in flight; consequently it has been usual to fit to the end of the fairlead a hardened-steel flare or ring and so reduce wear. Now, owing to turbulent motion of the air in the neighbourhood of the wire, generated by the propeller and by the aircraft in general, the aerial does not hang steadily along the ideal curve. It oscillates both in the vertical plane and in the horizontal direction; also, for some reason, which, as far as the author is aware, has not been completely determined, the weight spins more or less continuously on its axis and not infrequently this tendency to spin is more marked in a left-handed screw direction than in the reverse sense. Since stranded wires are usually laid in right-handed fashion the result was that the wires were frequently twisted more and more tightly. This effect, combined with kinks due to the oscillations of the bob, caused frequent breakages of the aerial, such breakages being usually localised near the weight. In order to overcome this defect it has been common practice to mount the weight or bob on a swivel, thus giving it complete freedom of rotation.

Nevertheless, fractures were still frequent. Investigations made by means of a cine-camera showed that the bob frequently made deep dives and lurches, ending with a sharp snatch on the wire when it reached its extreme position. The kinetic energy of the bob suddenly dissipated in the wire was apparently the cause of the fractures experienced. One way of overcoming this effect was to break up the weight into a number of small units strung in a chain on a steel cable. The movement of this "bead" aerial, as it has been called, is not essentially different from that of the single weight, but, owing to the fact that the complete

length of pliable rubber gradually tapering towards the end, which acts partly as a weight and partly as a stabiliser.

A type of aerial weight which appears to have met with some success in America and in Germany is the finned stream-lined weight, sometimes known as a "fish." The idea is that the weight shall fly under the stabilising influence of the fins. It has also been proposed to give the horizontal fins such a shape as to cause a downward pressure in flight, thus adding to the effective weight of the bob without increasing its drag. It is found, however, that this class of weight is not entirely satisfactory in flight and occasionally swoops dangerously in the vertical plane. At any rate, the author's experience of it has been disappointing and it is thought that at high aircraft speeds the device is a positive danger in all but perfectly level and smooth flying.

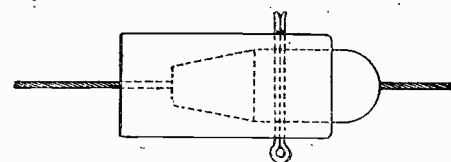


Fig. 5.—A standard insulator.

In view of the fractures of the aerial wire which are liable to occur, fairlead designs have been modified to allow of the slipping-out of a complete aerial and weight through the fairlead.

In general, fairleads are permanent fixtures in the aircraft where they are installed with a slight trail to reduce stresses in the material. It would seem at first sight that the trail angle of the fairlead should be equal to that of the aerial in normal flight, but this condition is not permissible on account of the difficulty of paying out when the weight is within the fairlead and therefore out of the slip-stream. This difficulty is intensified when long lead-down tubes are used, as is often the case in large aircraft.



Fig. 2.—The early form of aerial with weighted end.

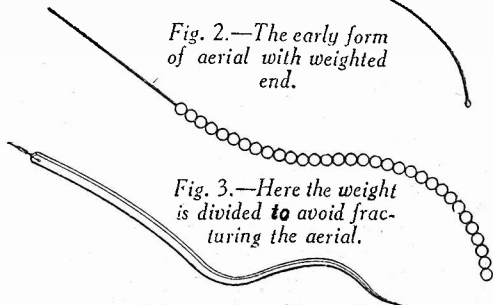


Fig. 3.—Here the weight is divided to avoid fracturing the aerial.

Fig. 4.—An American suggestion for weighting the aerial.

AVIATION

ed for Transmitting and nals from Aircraft

In the case of flying boats the fairlead becomes a particularly difficult item of design and installation, since it has to be of rather greater length than usual and must be watertight for use on the water. The general practice is to provide a tube inside the hull with its lower end rendered watertight where it joins the hull. Before landing, the aerial and fairlead are withdrawn from the protective tube, which is then sealed at its upper end to prevent the ingress of water.

The insulation of the fairlead from the structure of the aircraft is a matter which calls for special care. Adequate leakage path has to be provided between the tube and the metallic "dope" or metal skin of the aircraft. In addition to the substantial insulator used it is usual to leave a patch, about 1 sq. ft. in area, free from metallic dope in order to avoid causing severe stress on the surrounding coating, which is a semi-conductor of high-frequency currents.

The process of winding-in the aerial becomes a matter of pronounced physical exertion in the case of high-speed aircraft, and especially so when the operator has remained at high altitudes for some time and has required the use of oxygen. It frequently takes as long as five or six minutes for the operator to wind in 250ft. of wire with occasional intervals for rest. Designers have, therefore, been busy for years devising automatic power-driven winches, but it can hardly be said that these have been received with favour. There are no very substantial reasons for this failure, but perhaps the weight involved and the power consumption, derived from the aircraft's accumulator, are the chief obstacles. Wind-driven winches have also been suggested and tried out, but as

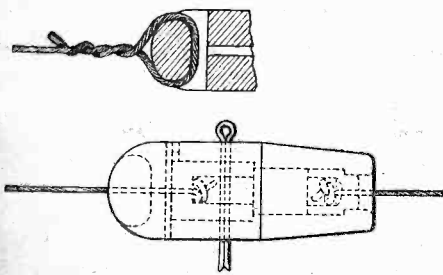


Fig. 6.—A "skirt" to eliminate formation of ice on the insulator.

With the high-speed aircraft of the present day the trailing aerial has become a very serious problem both to the designer of the aircraft and to the radio engineer. Trail angles have become extremely small, thus causing a risk of fouling the aircraft structure and causing also a very serious reduction of range of communication.

Short Waves

This has driven the radio engineer more and more towards the use of fixed aeriels. With these it is impracticable to provide an effective height of more than a few feet or so, except in very large transport aircraft; in the case of small aircraft the effective height is limited to little more than 18 to 24ins. Under these conditions it will be appreciated that long or even medium waves are no longer utilisable with any useful degree of efficiency. Nevertheless, on larger aircraft a fixed aerial above the aeroplane is employed even for long and medium-wave communication over short distances, and in the case of flying boats, when the aircraft is down on the water. On account of the small electric capacitance of these fixed aeriels the radio apparatus has to be

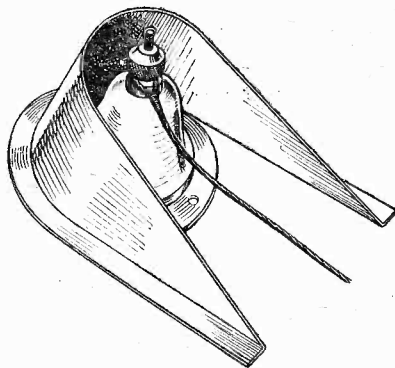


Fig. 7.—A lead-in bush, protected from ice formation.

loaded with inductance or capacitance, both of which cause a serious reduction of aerial current and hence of range.

The fixed aerial is a problem in itself, whether it is located below or above the fuselage. It becomes a particularly difficult one in the case of military aircraft. In the upper position it is liable to be in the line of gunfire, and in the underneath position it has to be clear of bomb racks and torpedoes and of retractable undercarriages. Both types have been employed, and in the case of the underneath aerial it has usually been found necessary to provide retractable gear to allow the aircraft to run along the ground, possibly in long grass, without risk of the aerial being torn away. As regards aeriels in the upper position, it has always been a matter of compromise between the radio requirements and the aeronautical design.

The most general forms employed are shown in Fig. 1, where A represents a wing-tip-to-tail aerial, B a fore-and-aft single wire, C the broad-arrow type, and D the Y type. Each has its particular points. For instance, the wing-tip-to-tail type is a better radiator but it suffers from drag at high speeds and instability in the

slip-stream; it is also a hazard when, in emergency, the occupants of the aircraft have to have recourse to their parachutes. It is also liable to be shot away by the gun, when it constitutes a further hazard should it become entangled in the tail and rudder or in the elevator. The fore-and-aft type is more stable but is less efficient. It is perhaps a little less liable to be shot away, causes less drag, and is less dangerous from the point of view of parachute descents. The broad-arrow type is inefficient owing to the close proximity of its lower member to the metal structure of the aircraft. It is safer, however, from the point of view of gunfire since the joint is in a position through which the gun is not permitted to fire. The Y type is more efficient owing to its direct vertical limb, but its electric capacitance is small. It has the advantage of electrical symmetry, which improves conditions for direction-finding purposes.

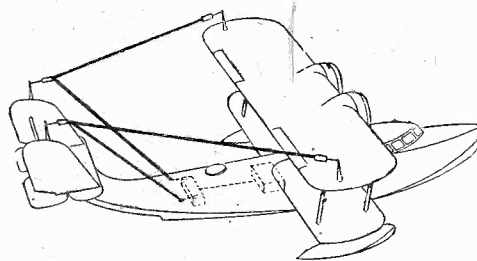


Fig. 8.—This type of aerial has several advantages.

In recent years the demand that flying boats should have greater reliability over long distances has given rise to an improved technique in short-wave fixed-aerial design. Whereas it had been the practice to tune the aerial as part of the transmitter or receiver circuit, the increasing size of aircraft and the attendant installation difficulties occasioned heavy current losses in the feeder. Modern practice utilises elevated dipoles joined to a transmission line through a matching transformer and another matching transformer at the apparatus end. This practice should ensure a much improved aerial and set efficiency, but it is too early to give any figure for the improvement in terms of range and reliability. It will be observed that this technique, new for aircraft installations, seriously curtails the flexibility of the system. It is necessary to provide separate transformers or transformer taps for different wavebands, and to provide remote control for the outer transformer, which is located as near to the aerial as possible.

A typical arrangement is shown in Fig. 8. This aerial system can be used on medium waves with fair efficiency by connecting the dipoles as the two limbs of a T aerial, the feeders being then parallel vertical radiators. On short waves the dipoles radiate horizontally-polarised waves, and since long-range transmission involves ionised-layer reflections the radiators are effective even when the aircraft flies at right angles to the great circle of the ground station and aircraft.

Aeriels require to be carefully insulated from the structure of the aircraft, and must also be resiliently mounted. The usual practice is to terminate the upper wires with a length of shock absorber fastened at one end to the structure and at the other to the aerial wire through an insulator. In order that drag shall not be excessive the insulator has to be reduced to the smallest dimensions compatible with ade-

(Continued on page 142)

far as the author is aware they have not been applied in practice.

It is important that as great a vertical component as possible should be given to the aerial wire, in order that the intensity of the vertically polarised field shall be as great as possible. Horizontal polarisation causes restriction of communication in certain directions, notably when the aeroplane is tail-on to the ground station. But there is a further reason for keeping the trail angle as large as possible with respect to the horizontal, and that is the needs of direction-finding.

METAL RECTIFIERS

In Response to Many Requests, Practical Circuit Details are Given in this Article of Five of the Most Popular Applications of Metal Rectifiers
By The Technical Staff

MANY constructors, when designing their own mains-operated receivers, are often faced with the problem of deciding which system of rectification they should use, and, judging by the number of letters received, asking "Which is the better, valve or metal rectifiers?" it would appear that quite a large percentage of the amateur designers leave it to our Query Service to solve the problem for them.

It is not always possible, however, to deal with such matters in detail in a letter, especially when the subject is made more complicated by the mention of certain components on hand, the restriction of

to the "voltage-doubler" circuit, it is possible for the input voltage to be *actually below* that obtainable from the rectified output. To quote one example, the type H.T. 14 rectifier with an A.C. input of 80 volts is capable of giving an output of 120 volts D.C.

Another very important consideration is the construction of the rectifier. In spite of the very robust construction of a modern valve it cannot be expected to withstand the same handling as the metal units, so one can add to the list of advantages the fact that the risk of damage is much less with metal rectifiers.

It must be appreciated that the outputs shown in Fig. 1 are not suitable for direct connection to the anodes of the valves in the receiver as, although they are of a direct current nature they are still pulsating and such would produce a pronounced hum in the apparatus.

To smooth out the pulsating characteristic and to remove all traces of ripple, it is necessary to embody the smoothing arrangements shown in the second section of Fig. 2. It will be seen that this consists of an L.F. choke and an additional fixed condenser. The choke should be of reliable manufacture and capable of carrying the

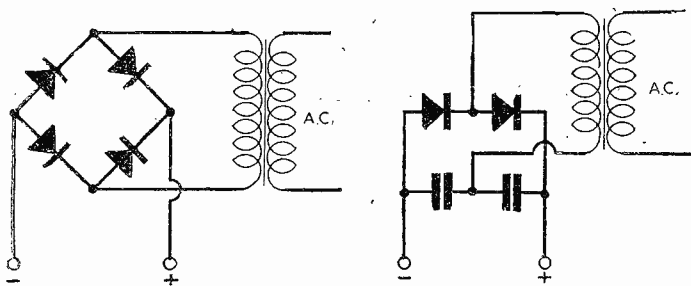


Fig. 1.—The Bridge circuit on the left and the Voltage-doubler on the right. Both give full-wave rectification.

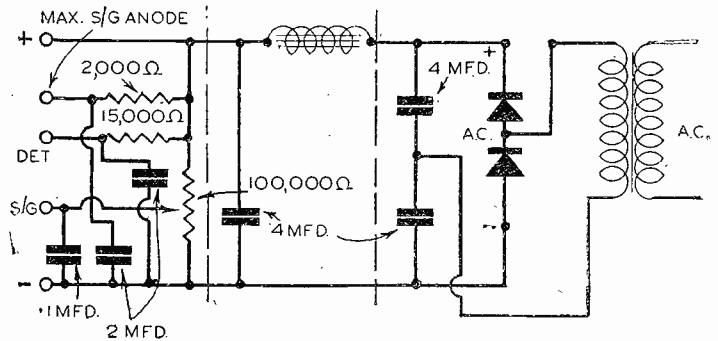


Fig. 2.—The basic circuit of an H.T. eliminator. The three sections are described in the text.

further expenditure or unusual circuit specifications. Therefore it is hoped that this article will help to simplify matters by giving details of the general applications of the metal rectifiers, so far as the average constructor is concerned.

Advantages

Although it is not intended that this article should take the form of comparing the advantages or disadvantages of either system, it is only fair, as it is concerned with metal rectifiers, to give the outstanding features of these components. For example, the first point which is likely to be raised is the question of price.

Starting from the initial outlay, a metal rectifier will cost slightly more than a valve giving the same rectified output, but against this it must be remembered that the associated mains transformer should cost less for the metal rectifier and, what is even more important, the valve—by most makers' terms, is only guaranteed for ninety days whilst its metal counterpart is covered for a full twelve months.

With a full-wave valve rectifying circuit, it is necessary to employ a mains transformer having a winding for the filament heating, and a centre-tapped winding for the supply to the anodes, and it should be noted that the latter, in the case of a 350-0-350 volt type of rectifier, has the rather high voltage of 700 volts across its extremes. This not only calls for very good insulation of leads and winding, but additional care when dealing with such high voltages, from the point of view of safety.

With a metal rectifier, centre-tapped secondaries are not required and, owing

Circuits

Half- or full-wave rectification can be obtained according to the circuit and type of metal rectifier used but, as the former is not now often employed, except in the case of A.C./D.C. receivers or apparatus, it will be assumed that full-wave rectification is required for all H.T. purposes. There are two distinct arrangements which can be used, and their circuits are shown in Fig. 1. They are known as the "Bridge" circuit and the "Voltage-doubler" circuit.

One of the most popular applications of

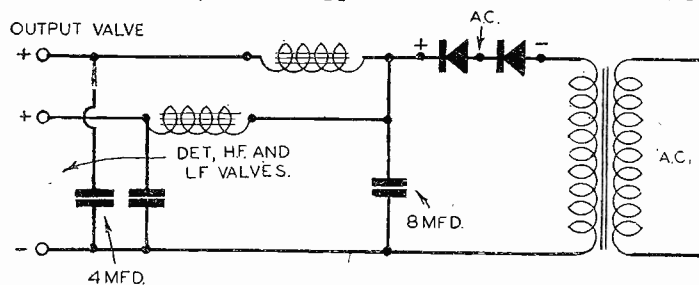


Fig. 3.—A half-wave rectifier suitable for receivers employing Class B or Q.P.P. output.

the metal rectifier is their use in H.T. eliminators when it is required to obtain a reliable source of direct current from A.C. mains. A typical circuit of an eliminator suitable for use with a receiver having a total current consumption of less than 20 milliamps is shown in Fig. 2. It will be noted that the circuit is divided into three distinct sections, the one on the right being the mains transformer and rectifier, the next the smoothing equipment, and, finally, the arrangement of resistances and condensers which are usually required to provide suitable voltage tappings together with normal decoupling precautions.

total current output of the rectifier without any fear of saturation. It is also essential to obtain a component which will provide an inductance of, say, 25 to 30 henries at the maximum current rating.

The capacities of the condensers are very important; it is advisable to adhere to the values specified by the makers of the rectifier for each particular type, otherwise there is a risk of damaging the unit if the capacity is increased, or reducing the output voltage if the capacity used is lower than that recommended.

The third or left-hand section of Fig. 2 shows the voltage-dropping resistances and decoupling condensers, but as the values of the resistances will depend on the currents flowing in the various circuits and the output voltages required, the values shown can only be taken as a guide for average receiver requirements.

Q.P.P. and Class B Circuits

When these forms of output are employed in a receiver or amplifier the total current consumption varies over a wide range and the normal eliminator arrangements

(Continued on facing page)

are not, therefore, satisfactory. This is due to the fact that if a sudden demand for current is made above the usual output the voltage will decrease correspondingly.

An eliminator circuit recommended by the makers of the Westinghouse Metal

By use of suitable metal rectifiers, it is possible to construct simple rectifying units which will enable him to continue using his D.C. eliminator or set on the A.C. supplies. Two circuits recommended for such purposes are shown in Fig. 4. The values given

can be constructed around one of the L.T. type of Westinghouse rectifiers, and a glance at the circuit shown in Fig. 5 will reveal that very little apparatus is required. In the arrangement depicted, a tapped input transformer has been used to enable

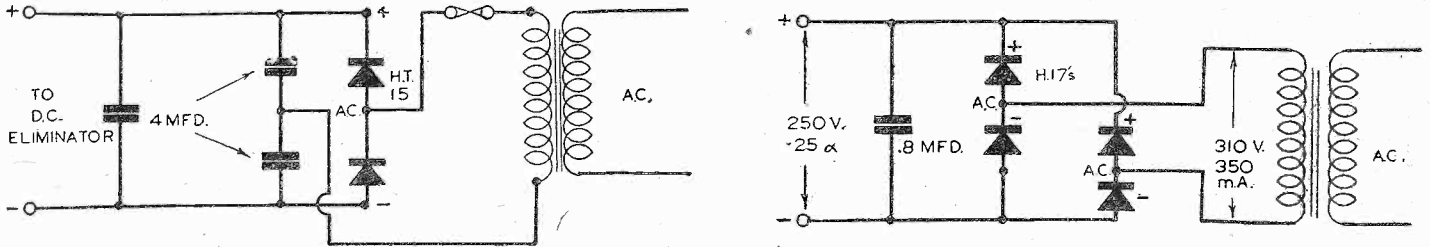


Fig. 4.—The circuit on the left is recommended for supplying D.C. eliminators with a rectified supply from A.C. mains. On the right is shown a rectifying arrangement for use with D.C. receivers on A.C. supplies.

rectifier, for use when the above output valves are employed, is shown in Fig. 3. The H.T.17 rectifier, in a half-wave circuit, is advised providing the output valve is fed through a separate L.F. choke as indicated. This choke must be capable of carrying at least 30 mA and have a very low resistance. The other choke, which smooths the supply for the remainder of the valves, need not have a high current rating as the demand is only likely to be in the neighbourhood of 8 to 10 mA from that section.

Conversion of D.C. Apparatus

When the owner of D.C. operated apparatus has his mains supply changed to A.C. or moves to a district where A.C. is in use, he is faced with the problem of attempting to adapt his set or eliminator to the new conditions or purchasing new equipment.

are only suitable if the output of the D.C. eliminator does not exceed 40 mA and the total consumption of the receiver is not above 60 watts.

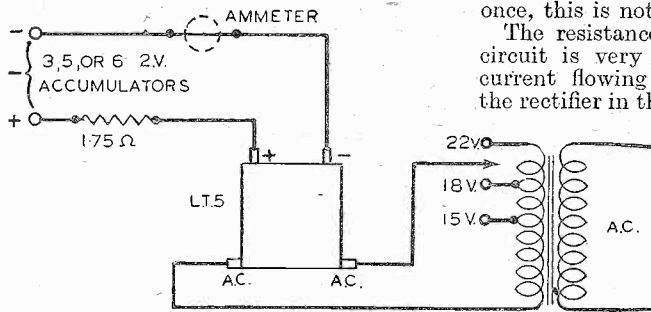


Fig. 5.—One example of a simple but efficient L.T. battery charger.

Battery Charging

One of the most simple forms of low-tension accumulator charging equipment

the output to be adjusted according to the number of accumulators under charge, but in small installations, where it is not required to charge more than one cell at once, this is not essential.

The resistance in the D.C. side of the circuit is very essential as it limits the current flowing and prevents damage to the rectifier in the event of the accumulator

being connected the wrong way round. A tapped resistance can be used in place of the tappings on the transformer.

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SHORT-WAVE BARGAINS
Tour the World on 9-200 Metres.

YOURS FOR 2/6 DOWN VALVES GIVEN FREE

N.T.S. Battery Bandspread Short-Wave Kits include only first-class component parts and are supplied absolutely complete with all coils for 12-24 metres—matched and tested valves GIVEN FREE.

3-Valve BANDSPREAD. Amazingly efficient 3-valve Pentode output model. All-World 'phone and loudspeaker reception. Complete kit with FREE VALVES. List value 87/6. BARGAIN, 42/- or 2/6 down and 12 monthly payments of 3/9. 4-Valve S.G. BANDSPREAD. Powerful S.G. Det., L.F. and Pentode output receiver. Bandspreading ensures all-band reception. Complete kit with 4 FREE VALVES. List value 89/6. BARGAIN, 49/6 or 2/6 down and 12 monthly payments of 4/3.

1-VALVE SHORT-WAVE. A marvellous single valve receiver providing wide-world short-wave results on 12/24 metres. Complete with all coils, pair of lightweight 'phones and free matched valve. List value 55/-. BARGAIN, £17/6 or 2/6 down and 11 monthly payments of 2/6.

FREE Matched Speakers
ALL-WAVE CHASSIS. 4-valve A.C. band-pass model. Wonderful performance on 18-2,000 metres. Station dial. 3-watts output. Pick-up sockets. List value £6/10/0. BARGAIN 89/6 or 5/- down and 15 monthly payments of 6/9. Fully tested. SPEAKER FREE.

BATTERY 3-valve pentode output model. Efficient S.G. circuit. 14-2,000 metres. Station dial. BARGAIN 77/- and 16 monthly payments of 5/8. Fully tested. SPEAKER FREE.

NEW RECEIVER and CHASSIS LIST now available, post FREE. N.T.S. terms are easiest on A.V.O. GARRARD and all other proprietary lines. Quotations by return.

32 USEFUL PARTS 5/9 Add 9d. for part postage.

N.T.S. Bargain Parcels always represent amazing value for money—5/9 (plus 9d. for special packing and postage) secures 1 each 2 and 3-gang condensers, 1 screened coil, 1 audio transformer, 3 valve-holders, 6 fixed condensers, 6 fixed resistances, 12 knobs and a brand new universally filled cadmium-plated chassis. List value 45/-. You Pay 5/9.

5/6 secures 3 Matched Valves plus 3 valve-holders, data and diagrams. Valves comprise 2 S.G.s and Pentode output, U.S.A. standard 2-volt types. Offered to you brand new at a fraction only of manufacturing cost. List value 35/-. BARGAIN 5/6.

£9:19:6 VALUE for £6:6:0

New Purchase AC/DC All-Wave 6-Valve CHASSIS With Valves and MATCHED SPEAKER.

ALL WAVES 16-2,000 metres. Station-name illuminated dial. Amazingly efficient 6-stage circuit. Over 3 watts undistorted output. A.V.C. and volume control. Chassis size 11ins. wide, 7½ins. deep, 8½ins. high. Supplied complete with specially matched speaker with 5in. cone, giving wonderfully natural reproduction right up to the full output. Despatched with all valves and knobs. Fully tested for A.C. or D.C. supplies 200-250 volts, 5/- secures, balance in 18 monthly payments of 7/11. GUARANTEED 12 MONTHS.

WORLD 3 All-Waves 9-2,000 Metres. VALVES FREE 29/6 Cash or C.O.D.

Still a triumph in receiver design. Two S.G. and Pentode Output stages for maximum efficiency and those extra stations on the Short, Medium and Long Waves. 3 Short-wave ranges. Slow-motion Tuning. Complete Kit for Battery use with Steel Chassis Twin-gang Condenser. Slow-motion Tuning. Station-name dial. Transformer, Resistances, etc., and assembling in fractions, less coils, 29/6 only Cash or C.O.D., or 2/6 down and 12 monthly payments of 2/10.

WORLD S.G.4. As 3-valver, but with Pro H.P. S.G., Det. S.G. audio and Pentode output. All components supplied extra to 3-valve version including station-name dial, 4 valves given FREE. Cash or C.O.D., 42/- or 2/6 down and 12 monthly payments of 3/9.

WHILE THEY LAST. Complete set of 10 coils for 9-2,000 metres, list 27/-. BARGAIN 17/6, or add 1/6 to deposit and payments.

"Gives a very creditable performance," states Mr. Cann writing about the World All-Wave.

BAR-TYPE 2-GANG CONDENSERS. .0005 mfd. each section. Brightly plated size 3in. x 2½in. x 2½in. New, worth 12/- BARGAIN 2/3.

SPECIAL OFFER CLASS "B" 4-Valve CHASSIS: Powerful new model, giving volume equal to a mains set. Amazing range and sensitivity. Full-vision scale calibrated 200-2,000 metres. Steel chassis and screened coils. Complete with all valves. Fully tested. List value 5 gns. BARGAIN 59/6, or 5/- down and 12 monthly payments of 5/8. (Order type 60410)

NEW TIMES SALES CO., 56 (P.W.36) Ludgate Hill, London, E.C.4. Tel.: City 5516

Practical Television

April 22nd, 1939.

Vol. 4.

No. 148.

operating the switches and knobs provided. By removing the cabinet side the student undergoing training is able to familiarise himself with all the adjustments that may be necessary in order to set up a magnetically-operated cathode-ray tube.

broadcasting is not economically possible in that country at the moment. Every encouragement is being given to television research, but the C.B.C. intends to prevent exploitation by the premature sale of receiving sets. When a service does materialise in the Dominion of Canada it will be under the exclusive control of the C.B.C. as a public monopoly. One of the biggest problems to be solved is that of range due to the vast areas of the country which are sparsely populated. Coming now to France it would appear that big-screen television has not made very vast strides at the moment. From details furnished of the Barthelemy apparatus it does not appear that progress has gone beyond a 3ft. picture. This was obtained by cathode-ray tube projection using an anode potential of 40,000 volts, which is about the same figure used in the Baird equipment for a 15ft. picture. The transmission signals were derived from films, while the line definition was one of 440 lines. In France it has been stated that nearly twice this definition would be required to obtain adequate cinema quality, but it is felt that this opinion is based on results already shown which are well below those featured in this country.

The L.C.C. and Television

IN connection with its Jubilee celebrations the London County Council staged a most interesting educational exhibition at the County Hall, Westminster, from March 21st to April 4th. Opened by Queen Mary, it provided a valuable cross section through the many types of training given by the schools and technical institutes which come under the jurisdiction of the council. It is generally admitted that one of the finest displays is that which exemplifies a modern development, namely, the technical training provided in the subject of television. The arrangements for this were left in the hands of the Norwood Technical Institute, as this was the first London school to give a two-year evening course of instruction in the subject. The classes are in charge of Mr. H. J. Barton-Chapple, and the accompanying illustrations show quite clearly some of the equipment used in this work. A general view of the exhibit is given in the picture and on the left is a screened section where during B.B.C. television transmission hours a Baird receiver was operated. Not only can all the controls be demonstrated, but by means of a cathode-ray oscillograph the exact wave form of the vision signal radiated from Alexandra Palace was featured. In this way the student can study the effects of control mal-adjustment and make checks on servicing work. On the roof of the cubicle are examples of disc and mirror-drum receivers to exemplify the changes made during the last few years and also to illustrate the principles of scanning. Apart from examples of receiver chassis, another built-up piece of equipment demonstrates photo-electric cell response to light changes. Coupled with this are forms of multiplier photo-electric cells, together with a model illustrating the electronic multiplication at each grid stage of the device. This is seen on the top shelf, and immediately below this is a display of the effect of a cathode-ray beam on different combinations of fluorescent powders. To the right of this is a simple form of time-base generator, constructed with the object of showing how the beam deflecting pulses are produced and the frequency of generation altered. Immediately below this is a most interesting piece of educational apparatus marketed by the Baird Company to show the whole action of cathode-ray tube working and servicing adjustments. Electron beam generation, focusing, line and frame scan generation, line and frame speeds, and scanning field brilliance are readily seen by

Television Activities Abroad

FROM time to time reports reach this country concerning television activities in both the continents of Europe and America. Readers will no doubt be familiar with the Hays organisation in relation to films, and it is now learned that this same body has inaugurated a committee in order that the picture industry can watch television development in America. This same office made a survey several years ago, but this latest inquiry is to investigate the most recent developments. In America it is reported that 17 licences to operate television stations have been granted, while six more transmitters are in course of erection, but so far none of the licensees have sought powers for the purpose of selling time to advertisers. In Canada the chairman of the Canadian Broadcasting Corporation has declared that in his opinion television



A general view of the television educational exhibit at the L.C.C. Jubilee Exhibition.

The price of silence



How easily the morning paper can come between man and wife. For men must read and women must chat! The solution is to hand over the cigarettes. Wills's Gold Flake, of course, for that's the cigarette women are smoking nowadays. They appreciate the flavour of the really fine Virginia tobaccos of which Gold Flake are made. As the fragrant smoke ascends contentment reigns. Speech may be silver, but silence is Gold Flake.

WILLS'S

GOLD FLAKE

is the man's cigarette that women like

Ten for 6d. Twenty for 1/- and, for the week-end, Flat Fifty box 2/5d.
PLAIN OR CORK-TIPPED

TROPHY'S

The World's Best Selling Short-Wave Receivers

★ SEND NOW for free lists covering our complete range of apparatus

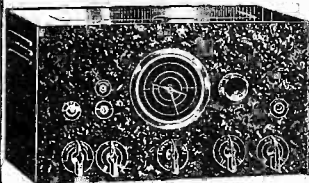
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The Peto-Scott way to £££'s Saving Modern Radio

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Unbeatable value.



TROPHY 8 A.C. Communication Model

- 8 Valves.
- 5 Bands, 7-550 metres. Complete coverage.
- Continuous Band-spread Dial.
- R.F. on all bands. A.V.C. and B.F.O. switches.
- Stand-by switch.
- Separate pitch control.
- Output sockets for separate P.M. speaker.
- Headphone jack.

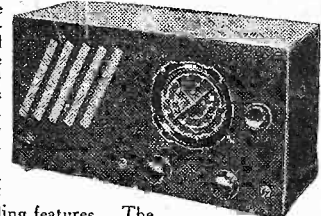
The TROPHY 8-valver for A.C. mains represents the most amazing value ever offered in communication-type receivers. A testimonial just received (available for inspection at our head office) states: "... I would bathe the TROPHY 8 against any American similar types costing much more in this country." Cash price, 12 gns., or 15/6 down and 18 monthly payments of 75/6.

15/6 DOWN

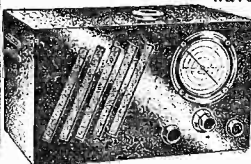
TROPHY 5

- 5 Valves
- Wavrange 10-550 metres
- Bandsread tuning
- B.F.O. for C.W.
- B.F.O. and A.V.C. on-off switches
- Provision for doublet aerial
- Built-in speaker
- 'Phone jack

This new 5-valve A.C. junior communication model incorporates all the essential refinements for serious short-wave work. Extremely moderate in price. The improved method of bandsread tuning is only one of the many outstanding features. The scale for the TROPHY 5 is available calibrated alternatively in metres or kilocycles. For A.C. mains only 200/250 volts. Fully guaranteed. TERMS: 10/9 with order and 18 monthly payments of 10/9. ALL-WORLD THRILLS AT LOW COST. £9



TROPHY 3



Available with all coils for 6-550 metres for only 16/9 extra or add 1/- to deposit and payments.

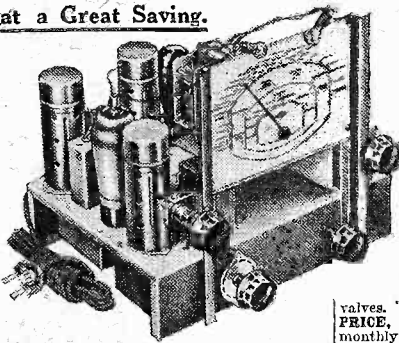
Has sold more consistently to short-wave new-comers than any other receiver. 3-valve battery and A.C. models. Effective wavrange 6.2 to 550 metres. Amazing sensitivity. Improved slow-motion tuning, metre calibrated scale. Built-in speaker. Supplied complete in cabinet with self-locating inductors for 12-52 metres.

A.C. MODEL Cash or C.O.D. 6gns., or 7/6 down and 18 monthly payments of 7/9. £6:6:0
BATTERY Cash or C.O.D. £5/15, or 7/- down and 18 monthly payments of 7/-. £5:15:0

7/- DOWN

THESE 1939 ALL-WAVE CHASSIS

at a Great Saving.



- Costs much less than a complete set.
- Ready for immediate use.
- Special 12 Months' Guarantee, includes valves.

ALL-WAVES 8-Stage S/HET A.C. Model 909. This advanced 8-stage 6-valve chassis represents wonderful value for the connoisseur. Wavrange 10-2,000 metres. A.V.C. Station and metre calibrated scale. 6-station press-button tuning. Pick-up sockets. 3 watts output. Complete with 6 valves. Normal list value £10/10/0. OUR PRICE, £7/19/6, or 9/9 down and 18 monthly payments of 9/0. We Save You £2/10/6.

ALL-WAVE 7-Stage S/HET Battery Model 903. Modern 4-valve circuit arrangement. 18-2,000 metres. Pentode output, sensitive and selective. Hand-tuning and 6-station press-button tuning. Complete with 4 valves. Normal list value, 7 gns. OUR PRICE, £5/12/6, or 5/- down and 18 monthly payments of 6/10. We Save You £1/14/6. Size 11 1/2" w., 9 1/2" d., 9" h.

A.C. PRESS-BUTTON Model 905. 6 stages, 4 valves. All-waves, 19 to 2,000 metres. Powerful superhet circuit, A.V.C. Station dial. 3 watts output. All-world reception by hand tuning and 6-station medium and long-wave automatic press-button tuning, size as above. Complete with valves, knobs and press-button esentcheon. Usual list value £8/19/6. OUR PRICE, £6/19/6, or 8/6 down and 18 monthly payments of 8/7. We Save You £2. Ready for fixing.

ALL-WAVE MODEL 909 M.T. (Illustrated.) Exactly as Model 909, but for those who prefer hand tuning only. List value £9/19/6. OUR PRICE £8/19/6 or 8/9 down and 18 monthly payments of 8/9. We Save You £2. ALL MODELS EMPLOY DIAL ILLUSTRATED.

ALL-WAVE BATTERY S.G.S. MODEL 901. Powerful All-wave 8-valve S.G. circuit with Harries distortionless output pentode. Station-named dial. Wavrange 18-2,100 metres. Balanced broadband and screened short-wave coils. Volume control. Very low H.T. consumption. Size 11 1/2 in. wide, 9 in. deep, 9 1/2 in. high. Complete with 3 British valves and knobs. VALUE 5 gns. OUR PRICE 72/6, or 5/- down and 12 monthly payments of 6/2. We Save You £2/6.

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TELEVIEWS

Mechanical Systems in America

ALTHOUGH the majority of the television receivers it is proposed to put on the market when American service transmissions take the air at the World's Fair in New York are of the cathode-ray tube type, certain companies are still conducting experiments with mechanical reproducers. Perhaps the most important of these is William Preiss, who was formerly chief engineer for Lee De Forrest. The outstanding advantage of the Preiss device is the cheap cost of the scanning unit. It embodies a tuned vibratory mirror system and only half a watt is said to be required to supply the driving force at high vibratory speeds. This has been made possible by using a special resonant mounting idea so that the natural period of vibration coincides with the line scanning frequency at which the mirror has to work. Small mercury vapour lamp beams modulated by a Kerr Cell provide the modulation and Mr. Preiss has declared that his unit can be produced for a sum not exceeding five dollars. It is even suggested applying the idea to the transmitter to act as a light spot scanner, and plans are being considered for trying out the whole idea in a selected city so that it can be compared side by side with cathode-ray tube sets. It would appear also that America does not intend to neglect the home constructor market. Two kit sets are already scheduled, and although the picture size is only about 4in. by 3in., it is claimed that this is sufficient for the home experimenter, who is not so programme-conscious as the ordinary home viewer. It is anticipated that these kit sets will represent a financial saving to the purchaser of from £12 to £15 when compared with the price of the finished article, and this is, of course, a very material factor in their favour.

An Exhibition Difficulty

FROM the public point of view there is no doubt that at the present time television is being featured in a manner which cannot help but impress on everyone that the results leave no doubt as to the technical efficiency of the sets, coupled with the high entertainment standard of the programmes radiated. In many stores, exhibitions are being staged so that a range of receiver types can be featured, and since these are all operative at the same time, everyone has an opportunity of comparing results under the same standard conditions of reception. There is always a difficulty that the one or more demonstrators, however, find it awkward to adjust each set to its optimum position when several sets are used at once. Furthermore, unless care is taken, stray lighting may tend to upset the brightness and contrast of what is otherwise quite a satisfactory picture. It is for this reason that the staff conducting the exhibition must be adequate to meet all possible contingencies. In a well-known West End store this condition seems to be met very satisfactorily in spite of a daily public attendance in the neighbourhood of 10,000. Apparatus dating back to 1925 can be seen almost side by side with modern efforts. There is no doubt that enterprise such as this cannot fail to expedite the growth of the television industry, and since the present plans are for a long-period exhibition, the public will have a unique

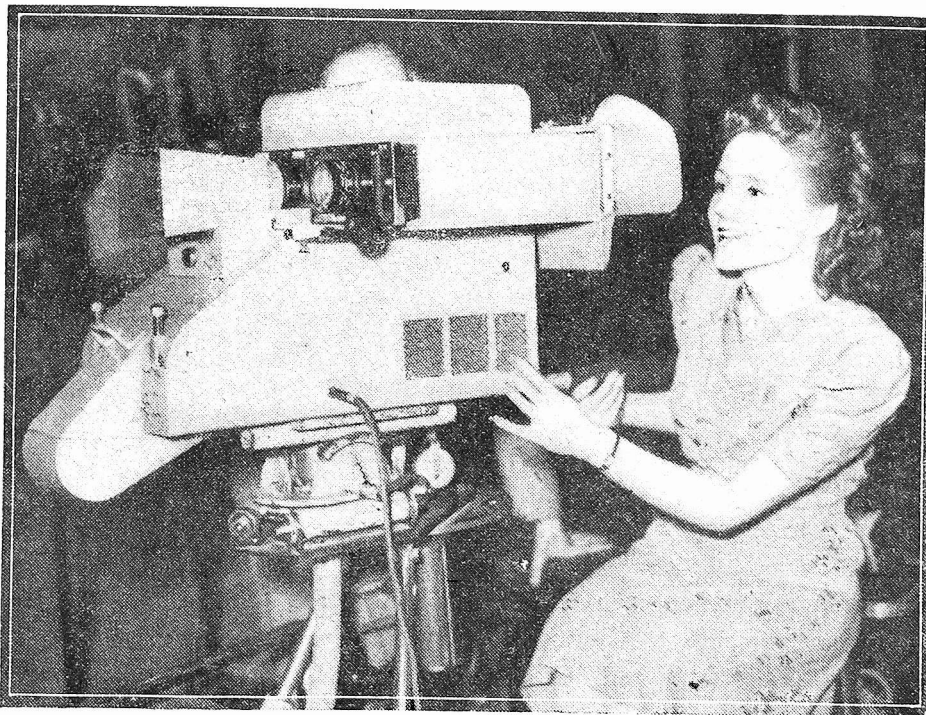
opportunity of comparing the individual performance of sets on a scale which has not been attempted before.

Television Film Flicker

REFERRING to the subject of flicker, readers may have noticed that when the B.B.C. are radiating televised film pictures a very marked flicker becomes apparent on occasions. For some time now the B.B.C. have been using Mechau projectors of the continuous motion type instead of the intermittent movement machines. This has had the effect of reducing very considerably the unpleasant picture flare which evidenced itself with sudden changes of picture light value, but the flicker defect referred to has crept into

Airing a Grievance

ONE of the most popular items of the B.B.C.'s Sunday television programmes is the play which is usually featured in the evening transmission. Sometimes it is a special script written for television, while on many occasions the whole cast of a play running in a London or provincial theatre has performed in front of the camera and brought pleasure to viewers. This action has, however, raised a grievance among theatrical managers generally. They point out that while cinemas can open, and plays be televised on Sundays, the theatres have up to the present had to keep their doors closed. While realising that the players themselves need one day's rest, they are suggesting that the theatre should be allowed to open on six days of the week, such days to be of their own choosing, and to include Sundays if so desired. It is felt that there should be no discrimination in the entertainment industry as a whole, and it is certain that now the issue has been raised the matter will be investigated so



Miss Eileen Bennett, the pretty 19-year-old blonde, who deputises for Miss Jasmine Bligh, is here seen with a television camera at Alexandra Palace.

the transmission. In the film machine itself the film is passed through the gate at a steady rate, and by means of a very ingenious arrangement of rotating and cam-operated mirrors, the separate film frame images are faded one into the other, so that the camera mosaic has projected on to it an uninterrupted moving picture. The successive picture frames move at a rate of 24 per second to conform to modern practice with sound on film recording, but the success of the scheme is very largely dependent on the alignment of the mirrors which produce the frame fading of the film images. If the alternate frames are of unequal brightness then flicker will be very noticeable, and this is what has actually occurred in practice. A very small amount of mirror deviation is sufficient to produce the defect, but it is understood that steps are being taken to prevent a recurrence of the trouble, for it mars what would otherwise be a satisfactory transmission as well as giving a set user the impression that the receiver is out of adjustment, whereas the fault is located all the time at the transmitting end.

that any grievance, either real or imaginary, can have full redress.

Routine Tests

EVERY day the Alexandra Palace television equipment is subjected to a routine test so as to eliminate as far as possible the likelihood of faults arising during the course of the day's run. The cameras have a special test of their own so as to grade them according to sensitivity, and also learn whether the colour response characteristics of the mosaic signal plate has changed in any way. The make-up experts are provided with a colour response chart so that they can vary the tone which has to be applied to the artist's features to produce the best effect. This mood of the camera, as it is often referred to, is known among the more regular of the television artists, and even the dresses to be worn come under the same category. Very often the colour of a frock has to be broken up by the judicious use of a scarf or sash, so that the best pictorial effect can be given to the picture and retain good contrast values.



Impressions on the Wax

A REVIEW OF THE LATEST GRAMOPHONE RECORDS

ELISABETH SCHUMANN returns to *Lieder* for her record this month. She has chosen a tuneful song by Liszt, "Oh! quand je dors," and one of Wagner's few songs, a lullaby, "Schlaf ein, holdes kind" that has not been recorded before—*H.M.V. DB 3654*.

Opera lovers will be interested in the excerpts from "Daphne," Richard Strauss's latest. It was produced at Dresden on November 18th, 1938, and was dedicated to Karl Bohm, who conducted the first performance. The records were made by the original artists (Margarete Teschemacher and Torsten Ralf) with the Dresden State Opera Orchestra, Karl Bohm conducting. *H.M.V. DB 4627* contains "Verwandlung der Daphne" and *H.M.V. DB 4628* "O wie gerne bleib ich bei dir," and a duet, "Götter! Bruder im hohen Olympos."

Operas in English

TO their recent series of records of opera in English, *H.M.V.* now add a first class version of the famous quartet from "Rigoletto," and the trio from the Prison Scene of "Faust." The quartet, which reveals Gilda's disillusionment as she overhears the Duke making love to another girl, is sung by Webster Booth, Noel Eadie, Eric Coates and Arnold Matters. The "Faust" trio (which occurs when Mephistopheles and Faust visit Marguerita in prison) is sung by Webster Booth, Joan Cross, Norman Walker and the Sadler's Wells chorus.

Recorded on both sides of *H.M.V. C 3086*, it is wonderful value for 4s.

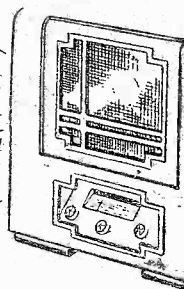
Doris Arnold's arrangements of popular ballads for the Kentucky Minstrels have become very popular. The latest record gives Teresa de Riego's "Homing" and Harry S. Pepper's "Carry me back to Green Pastures." This last is in the style of a negro spiritual—*H.M.V. C 3085*.

When listening to a medley of popular tunes I can never decide whether the medleys make the tunes or the tunes make the medleys. Sometimes when the titles are finally chosen, they make a most amusing sequence. For example, there is a new record by the New Mayfair Accordeon Band—"Hits of the Moment, No. 6"—*H.M.V. BD 675*—of which the titles on the first side make the following sentence: "Jeepers Creepers"! Grandma said, "Georgia's Gotta Moon."

I tried to count the number of tunes Mr. Alford has squeezed into his "Musical Switch" recorded on *H.M.V. BD 674* by the Black Dyke Mills Band, but had to give it up.

The disarming title of "Hold Tight" on *H.M.V. BD 5469* scarcely prepares you for what is coming. Even the printed words hardly make sense, but when they are sung at the high speed the song demands—and at which Fats Waller sings them on this new record—they become just gibberish. One thing I can tell you. It is all about fish. "Fish, Fish, Fish..." and "I want some sea-food, Mama."

Keep your Set at its BEST!



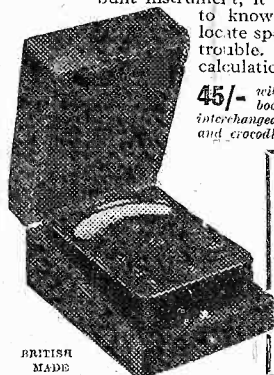
with the D.C.

AVOMINOR

Regd. Trade Mark

ELECTRICAL MEASURING INSTRUMENT

Use the D.C. AvoMinor periodically to check up valve performance, batteries and power output. Thus you'll always keep your set in good trim. A 13-range precision-built instrument, it tells you all you need to know, and enables you to locate speedily the seat of any trouble. Direct readings. No calculations. Complete in case.



BRITISH MADE

45/- with instruction booklet, leads, interchangeable test leads and crocodile clips.

DEFERRED TERMS IF DESIRED

Voltage	
0-6 volts	0-240 volts
0-12 volts	0-300 volts
0-120 volts	0-600 volts
Current	
0-6 m/amps.	
0-20 m/amps.	
0-120 m/amps.	
Resistance	
0-10,000 ohms	
0-60,000 ohms	
0-1,200,000 ..	
0-3 megohms	

Write for fully descriptive leaflet

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CATALOGUES RECEIVED

Ediswan Industrial Lighting Handbook

EDISON SWAN have issued a new industrial reflector catalogue, which has been compiled with the definite object of presenting a simplified handbook on industrial lighting.

The name "Industra" by which the new Ediswan reflectors are known, clearly indicates their sphere of application. The catalogue contains full details of about fifty different types of units by which practically every industrial lighting requirement can be met. Each reflector is illustrated and accompanied by descriptive matter setting out all that the engineer requires to know concerning the constructional details as well as the recommended mounting heights and lamps. On many of the pages this data is further enhanced by the addition of diagrams illustrating typical arrangements of installation.

All the reflectors shown in the catalogue are manufactured in accordance with B.S.I. specifications, where applicable, and are entirely British made of heavy gauge steel, finished with highest quality vitreous enamel. On most "Industra" reflectors the mountings are non-ferrous metal die castings fitted with porcelain lampholders, specially designed for easy wiring, erection and maintenance. The standard finish is green, but other colours can be supplied on request.

Other fittings included and illustrated are bulkhead, wall glass units, prismatic directional fittings, workshop brackets and watertight pendants. Such minor but nevertheless important accessories as chains, hooks, loops and brackets are also illustrated and fully described.

To facilitate the selection of the appropriate reflector, and everything that goes with it for trouble-free installation, nothing has been overlooked: and tables will assist the engineer to choose the most suitable reflector for a job are set out in a very simple form.

Fluorescent and electric discharge lighting are discussed in their appropriate sections. Descriptions of the construction and operation of these lamps, and the auxiliaries required for use with them, are included. In this simple and comprehensive handbook will be found all the essential information required for the correct and economical solution of industrial lighting problems.

MOTOR REPAIR AND OVERHAULING

ANY of our readers interested in the technical side of motor engineering—or even owner-drivers of a sufficiently mechanical turn of mind—will like to know of an important new work which is to be issued in weekly parts commencing on April 19th. *Motor Repair and Overhauling* will provide in convenient form all the practical points, and special repair methods applicable to the leading makes of cars. These special notes have been compiled under the direct supervision of the Service Managers or service distributors of the particular car dealt with and are, therefore, absolutely authoritative, and up to date. A very valuable feature of the work is the inclusion in each weekly part of a "Quick Check-over Data Sheet." On these sheets are given all the data required when a particular make and year of car is ready for tuning, repair or overhaul.

Some of the chief items covered by these sheets are as follows: Carburettor Setting; Location of Valve-timing Indication; Valve timing; Location of Ignition-timing Indication; Ignition Timing; Tappet Clearances; Best Plug Gap; Distributor Gap; Tyre Pressures; Toe-in on Front Wheels, etc.

As there is likely to be a big demand for Part I of this valuable work, readers are strongly urged to secure their copy without delay.

ELECTRADIX

To Readers of "Practical and Amateur Wireless".

Those who have read the various wireless journals during the last fifteen years and have noticed our regular advertisements during that time, include thousands of satisfied customers.

To those more recent readers we wish to point out that the selection of items advertised weekly, are not obtainable elsewhere and are only a very small portion of the goods we have in stock.

The First Edition of our 1939 Big Buff Illustrated 15-page list went so fast that we have another edition (No. 48) now in print.

Whatever you want it may save you pounds to send a stamped envelope for a copy at once.

D.C. GENERATORS.—Shunt wound.—110 volts 1 amp., 15/-; 200 volts 1 amp., 17/6; 200 volts 1 1/2 amp., 20/-; **LUCAS AERO**, 9/12 volts, 120 watts D.C., enclosed, 4.000 revs. As used on Aircraft wireless. Cost 4/5. Reduced Sale Price, 12/8. **DYNAMO H.T. DUAL**, 600 volts for H.T. 100 m.a. and L.T. 6 volts 5 amps. Reduced Sale Price, 15/-; **MOTOR BARGAINS**, in midsize H.P. motors for A.C. or D.C. 200/230 volts, 1/110th H.P. D.O.T. type totally enclosed K.B. Cover 2,000 revs. at a price never before offered: 7/6 only. Next larger G.M. No. 2 type high speed 1,600 H.P., 4,000 revs., 9/6. Larger still 1/45th H.P. Model G.E. No. 1, 12/6. Other A.C. motors, 1/4, 1/2 and 1 H.P., etc.



NEW PANELS. Metal, Parolin or Ebonite. Polished aluminium. 18 and 16 gauge, bright or enamelled. 12in. x 12in., 3/-; 18in. x 18in., 5/6. Ebonite quarter-inch Panels 24in. x 24in. for 8 G. **SCREENALL** for lining cabinets, anti-interference screen, flexible, fireproof thin asbestos faced aluminium foil back and front. Any length cut in 24in. width, 1/- per 2 square feet.

TAPPER KEYS for Morse or Signal Transmission. R.A.F. Type KBSL, massive balanced brass pivot bar, spring mounted tungsten contacts. On polished wood base with lamp sockets; Walter's H.T. Key. All bakelite, with cover, 10-amp. contacts. Brown's car patrol double-acting, cast aluminium-cased. Keys, finest ever made, 21/-. Marconi type ship keys, 25/-. 3-point triple switch box with master key for signals on either circuit, 4/6.



PARCELS of experimental coils, magnets, wire, chokes, mikes, condensers, switches, terminals, etc., post free, 10lb. 7/-; 7lb. 5/-; 1,000 other Bargains in New Sale List "N."



ELECTRADIX RADIOS

218, UPPER THAMES ST., LONDON, E.C.4

Telephone: Central 4611.

LATEST PATENT NEWS

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume or in bound volumes, price 2s. each.

VALVE CIRCUITS FOR WIRELESS RECEPTION.

Naamlooze Vennootschap Philips' Gloeilampenfabrieken. No. 497,206.

In an ultra-short wave receiving set employing a half-dipole or dipole aerial and designed to receive only a comparatively-narrow waveband, maximum energy transfer is obtained by making the electrical length of the radiator or radiators

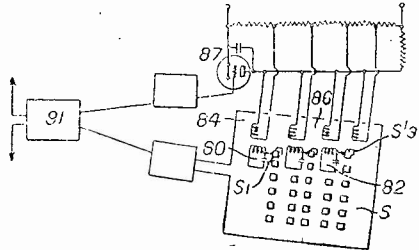


Fig. 1.

of the aerial equal to about five-eighths of the wavelength corresponding to a frequency within the band to be received, the input resistance of the receiving circuit being made equal to the radiation resistance of the aerial and the input reactance being opposite to the aerial reactance at the said frequency. (Fig. 1.)

TELEVISION. Toulon, P. No. 497,367. A group S of separate contiguous elements S1 . . S13 (Fig. 2) in a surface or line is permanently connected to a common transmitting channel 91, and scanning is effected by a local static distributor 87. The distributor supplies successive impulses to coils 84 . . 86 which bring tuned circuits 80 . . 82, associated with the elements, to resonance in succession. Alternatively the distributor applies a voltage to the successive individual leads to the elements, which renders them permeable to the signals in turn.

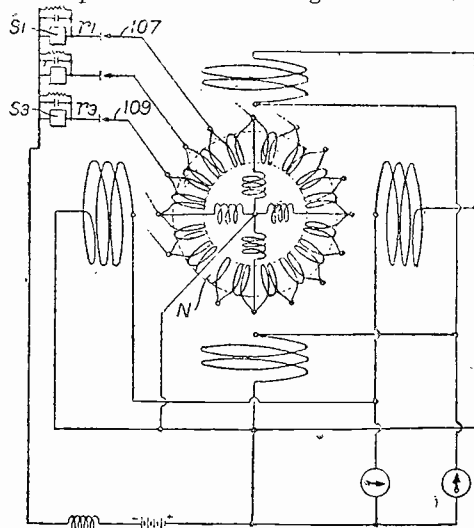


Fig. 2.

A rectifier allows the signals to reach the light valves S1 . . S3 only when a scanning impulse is produced in the corresponding lead 107 . . 109 by the distributor N. A time circuit associated with each of the light valves may prolong the duration of its action.

The Specification as open to inspection under Sec. 91 comprises also the subject-matter of Specification 497,404. This subject-matter does not appear in the Specification as accepted.

TELEVISION.

Farnsworth Television, Inc. No. 497,605.

Line synchronising signals are interrupted by the frame synchronising signals, as in Fig. 3, and are transmitted on a carrier separate from that transmitting the picture signals but of the same frequency. The train of synchronising signals is preferably produced by applying the line synchronising signals positively to a valve biased to cut-off while the frame synchronising signals are applied negatively.

According to the Specification as open to inspection under Sec. 91, the carriers may be of different frequency. A circuit for separating the line and frame syn-

chronising signals is shown in Fig. 4 (Cancelled), the line impulses being taken from 41 and the frame impulses from 44, the line impulses being integrated by

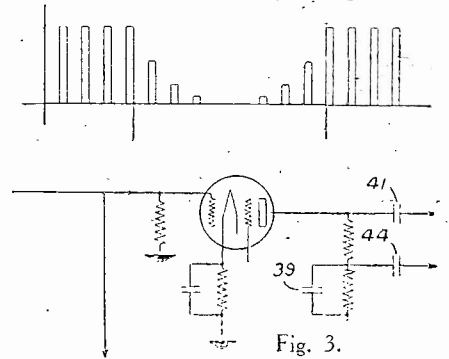


Fig. 3.

condenser 39, so that an interruption is effective at 44. This subject-matter does not appear in the Specification as accepted.

NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office and the Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. weekly (annual subscription £2 19s.).

Latest Patent Applications.

- 8392.—Baird Television, Ltd., and Jones, V. A.—Television, etc., apparatus. March 13th.
- 9053.—Baird Television, Ltd., and Tingley, G. R.—Means for controlling the deflection of cathode ray, etc. March 22nd.
- 8555.—Baird Television, Ltd., and Truffitt, E. V.—Thermionic valve circuits. March 17th.
- 8959.—Belling & Lee, Ltd., and Strafford, F. R. W.—Means for attaching radio aerials to supporting masts, etc. March 21st.
- 8374.—Browne, C. O.—Systems for televising, etc., a photographic record of a scene. March 16th.
- 8825.—Clothier, S. L., and Hogencamp, H. C.—Apparatus for television communication. March 21st.
- 8826.—Clothier, S. L., and Hogencamp, H. C.—Motion-picture film scanning. May 20th.
- 8453.—Daimler-Benz Akt.-Ges.—Aerials for wireless reception in motor vehicles. March 16th.
- 8799.—Edgar, E. C., and Truss, E.—Combined loudspeaker and sound diffuser screen. March 20th.
- 8656.—Ferranti, Ltd., and Thomas, G. I.—Aerial coupling systems in superheterodyne radio-receivers. March 18th.
- 8506.—Ferranti, Ltd., Searby, N. H., and Neill, V. A.—Tuning devices for radio receiving apparatus. March 17th.
- 8382.—Hughes, R.—Radio programme indicator. March 16th.
- 8929.—Izzard, A. T.—Wireless receiving aerials, etc. March 21st.
- 8953.—Kolster-Brandes, Ltd., and Beatty, W. A.—Carrier wave transmission systems. March 21st.
- 8609.—Marconi's Wireless Telegraph Co., Ltd., Rust, N. M., Brailsford, J. D., Oliver, A. L., and Ramsay, J. F.—Automatically variable frequency selective filters. March 17th.

- 8610.—Marconi's Wireless Telegraph Co., Ltd., Rust, N. M., Brailsford, J. D., Oliver, A. L., and Ramsay, J. F.—Automatically variable audio correction circuits. March 17th.
- 8914.—Munro, R.—Radio range-finder apparatus. March 21st.
- 8559.—Philco Radio & Television Corporation.—Radio tube and socket structures. March 17th.
- 8712.—Philco Radio & Television Corporation.—Radio tube socket. March 18th.
- 8713.—Philco Radio & Television Corporation.—Tuning control device for radio receivers, etc. March 18th.
- 8875.—Radio Corporation of America.—Sound recording. March 20th.
- 8890.—Rudkin, E. P.—Wireless receiving system. March 21st.
- 8522.—Scophony, Ltd., and Rosenthal, A. H.—Secret transmission of television, etc. March 17th.
- 8843.—State, S.—Wireless reception means for use with hair driers, etc. March 20th.
- 8662.—Taylor, G. H.—Method of wireless communication, etc. March 18th.
- 8588.—Wallace, M.—Wireless apparatus for the simultaneous reception of a plurality of signals. March 17th.

Specifications Published.

- 502,472.—Baird Television, Ltd., and Colls, J. A.—Electron multipliers.
- 502,172.—Mallory & Co., Inc., P. R.—Variable-inductance tuning devices for radio apparatus. (Cognate Application, 21914/37.)
- 502,178.—Banfield, B. J.—Radio receivers and the like.
- 502,251.—Mallory & Co., Inc., P. R.—Radio frequency tuning devices.
- 502,351.—Baird Television, Ltd., and Ridgeway, D. V.—Television receivers.
- 502,358.—Carpmael, A. (Velde, H. R. C. Van de).—Television receivers.
- 502,269.—Adie & Nephew, Ltd., C. J., and Fletcher, R. A.—Earthing posts for wireless receiving-apparatus.
- 502,460.—Mongce, G. de.—Radio aerials.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM

From all Booksellers 5/- net, or by post 5/6 direct from the Publishers, George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, London, W.C.2.

LETTERS FROM READERS

These calls are best heard in this country after 8 p.m.—CHARLES MORGAN (Vancouver, B.C.)

Prizewinners' Thanks

SIR,—Very many thanks for "Every Man's Wireless Book," which was awarded me for solving Problem 340. I am delighted with the book, and am sure it will bring me many hours of interesting reading. May I also add that I have been a regular reader of PRACTICAL AND AMATEUR WIRELESS and "Practical Mechanics" since the first copy. I also wish to thank you for the way you have answered my queries from time to time.—A. E. LINTER (Grimsby).

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

"Audible" Radiations

SIR,—I notice that A. W. (Bridlington) has disputed my statement regarding the possibility of a pick-up receiving wireless signals. As far as I can see, G. T. D. (York) mentioned nothing about aerial or earth, which is unnecessary anyway in a gramophone amplifier.

A. W. says he received signals with his aerial and earth in the usual connection. Is this so very unusual, considering the usual connection is at alternate ends of the aerial coil?

Also, if there is so much radiation from these local relays, why do they cause no interference with other listeners?—Mr. E. YALDEN (London).

That Elusive Friendly Spirit!

SIR,—Lest it should be thought that the Croydon Radio Society's views on this topic are elusive, please permit me to offer a few observations from our angle. This society is naturally perturbed when it sees accusations of the missing friendly spirit, as that is one part of our activities which always receives full attention. *The difficulty is that for the first meeting or two the new member is necessarily among strangers and time must elapse before he is thoroughly at home. The new member most difficult to make one of us is he who seems to know everything, scorns the way we do things, and expects us to change our type of programmes to suit his particular branch of wireless. At the same time he, being so vastly superior, expects us to flock round him and beseech him to utter wise words for our grateful reception.*

After all, a society cannot please everyone all the time. In our case, the committee is re-elected annually, and the most energetic steps are taken to see if the trend of our activities is pleasing the majority. *We cannot do much more, but quite appreciate that the first few meetings are rather trying for the newcomer, as any little shyness on the part of him or the older hands is apt to be grossly exaggerated.*

During the past session, I may add, a record number of PRACTICAL AND AMATEUR WIRELESS readers have joined this society, and these are the type who have joined to learn something. Our diverse activities have interested them, while we on our part have learnt much from them. *It is indeed this pooling of knowledge which makes any society so invaluable to the enthusiast.*

In conclusion, therefore, I most strongly disagree that the friendly spirit is elusive, certainly it is not in this society, and in my experience also in other societies. Let those who cannot find it look first to themselves and, having seen their own shortcomings, they will realise that fellow members have any amount of that elusive friendly spirit!—E. L. CUMBERS (Hon. Publicity Sec., The Croydon Radio Society.)

Correspondent Wanted

SIR,—I shall be glad if other A.A. or full "hams" would exchange their Q.S.L.s with me.—G. WILCOCK (2FKS) (50, Ravensbourne Park, Catford, S.E.6).

U.S.A. and Canadian Police Car Calls

SIR,—In reading PRACTICAL AND AMATEUR WIRELESS recently I noticed that several readers have asked for details of the wavelengths used by American and Canadian Police Car calls.

I came to live here from England eight years ago and I take a great interest in wireless, although I am half Canadian by now. I still read PRACTICAL AND AMATEUR WIRELESS, and have a short-wave receiver. The police in this country are on the 75-metre wave-band and you can receive them quite well using an 80-metre coil made out of an old tube base, with an extension to it, wound with 28 turns for the secondary, and 16 turns for the reaction, close-wound, leaving, say, $\frac{1}{2}$ in. between the two windings. The U.S.A. police calls come in on the 160-metre band, using a coil with 62 turns on the secondary and 24 on the reaction, close wound.

CUT THIS OUT EACH WEEK.

Do you know

- THAT in a transmitter it is possible to measure the modulation by means of a cathode-ray oscilloscope.
- THAT the lead-in wire in most types of aerial is an actual part of the aerial and must be considered when calculating the length of the aerial.
- THAT it is a dangerous practice to break the anode circuit of high-powered valves whilst H.T. and L.T. are still connected.
- THAT when considering condenser voltage ratings, surge voltages, or peak voltages, have to be considered.
- THAT special insulated resistors are now available and remove the risk of short-circuits to a metal chassis.
- THAT the glass of a window may be used as the dielectric of a condenser coupling the aerial lead-in to a receiver.

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

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

Copyright in all drawings, photographs and articles published in PRACTICAL AND AMATEUR WIRELESS is specifically reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden.

SIR,—I have to acknowledge with thanks the book you awarded to me for the solution to Problem 340. This will prove invaluable both as an instruction book and a reference book.

I have been a reader of PRACTICAL AND AMATEUR WIRELESS for about three years, and have found a great deal of informative and instructive matter therein.

I am particularly interested in the recent "Making Your Own Components" series, and the "Spares-box" sets.—CLAUDE PIERREPONT (Bolton).

Decoupling

SIR,—With reference to the paragraph on decoupling, on page 8 of the March 18th issue, may I give the "unknown reason"? Cascade decoupling is geometrical and not arithmetical.

Let us consider 100 cycles and call $2\pi f = 600$. The decoupling potentiometer of 20,000 ohms and 4 mfd. is then 20,000 + 400 ohms, and the decoupling index thus 51:1.

If we substitute two cascade potentiometers each of 10,000 ohms and 2 mfd., each becomes 10,000 + 800 ohms and the decoupling index of each is 13 $\frac{1}{2}$:1. The combined decoupling index is thus 13 $\frac{1}{2}$ × 13 $\frac{1}{2}$:1, or about 182:1.

In short, 10,000 ohms + 2 mfd. twice is, at 100 cycles, $\frac{182}{51} = 3.6$ times as effective as 20,000 ohms + 4 mfd. once. At higher audio frequencies the difference is greater and the double decoupling is better than the single down to 25 cycles.—W. STANDFORD (King's Lynn).

Logged on the "Prefect" S.W. Three

SIR,—Other readers may be interested in my log of amateur stations received on the "Prefect" Short-Wave Three. The following were heard during the DX phone contest week. Evenings, March 18th to 22nd, on the 20 m. band.

YR5PP, 5AA, SM6WE, LX1AY, LY1J, 6J, 1S, CTICK, 1QG, 1QA, 1ZZ, OZ9R, ITKM, G6VX, 5LU, 8CP, ES5C, F3DY, LAIF, HA2C.

SU1MW, 1CR, EQ1AY (?), HP9CK, LUIQA.

W1CND, DQ, FJF, ME, FUY, GFJ, HKK, AQM, ADM, ATK.

W2FE, JT, HPM, LHI, AZ, EOA, IK, KDY, IXY.

W3PF, EOZ, FQP, FJG, BNC, EMN, CHE, UA, TA(?).

W4DRZ, 6GRL, 7DRX, 8CMA.

The aerial used was a 20ft. horizontal one outdoors. The end of this was connected direct to the wire netting of an aviary for an experiment which seems to have worked well, for these are the first long-distance amateurs I have yet received.—E. ANDREWS (Brighton, Sussex).

RADIO CLUBS & SOCIETIES

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

SLOUGH AND DISTRICT SHORT-WAVE CLUB

Headquarters: 35, High Street, Slough, Bucks.
Meetings: Alternate Thursdays, at 7.30 p.m.
Secretary: Mr. R. J. Sly, 16, Buckland Avenue, Slough.

At the meeting held on March 30th, there was a lengthy discussion on the causes and effects of the prevailing poor conditions on all bands, which were attributed to various recent magnetic disturbances. The next item was a talk on the "Short-Wave Receiver," given by Mr. F. J. Tuckfield. The lecturer dealt briefly with the theory of the various stages of both the straight and superhet receivers, and went on to illustrate his own method of building a straight receiver. The talk evoked a number of questions from the members, all of which were answered ably by the speaker. The construction of the club's receiver, is proceeding, with Mr. Baldwin (2BWV) taking a leading part. In the absence of any other business, the chairman (G6FR) closed the meeting.

The agenda for the next meeting included a talk by our secretary, Mr. R. J. Sly, on "The High-Frequencies," besides the usual general discussion, and morse practice. New members are welcome at any of our meetings, or at members' own QRA's.

THE SURREY RADIO CONTACT CLUB

Club Headquarters: 79, George Street, Croydon, Surrey.
Secretary: S. A. Morley, 22, Old Farleigh Road, Selsdon, Surrey.

The April meeting of the Club which took place on the 4th instant, consisted of a sale of members' surplus gear. The auctioneering was very well conducted by Mr. L. W. Hooke (G5XH), who was ably assisted by his two clerks G2KU, and Mr. Drummond.

It is very gratifying to know that the Club is taking charge of the 1.7 mc X.F.D. station, which has been allotted to Croydon. The site has been chosen at Riddlesdown which is about 600ft. above sea-level, and at the present time members are busily engaged in preparing the gear for this event which takes place during the first week-end in June. Will prospective members please note the name and address of the new secretary.

COLDERS GREEN AND HENDON RADIO SCIENTIFIC SOCIETY

All communications to be addressed to: H. Ashley Scarlett, 60, Pattison Road, Hampstead, N.W.2.

The Open 40-metre Direction Finding Competition will be held on May 21st. The area of operations will be about: St. Albans—Berkhamsted—Dunstable—Stevenage. Map to be used.

During the first part all groups will be confined to a central area of country. The transmitter operating in the country surrounding the central area. A test will take place on May 7th. Numerous prizes will be given.

On April 26th, at 8.30 p.m., at the Regal Cinema, Finchley Road, N.W.4, Mr. Maurice Child will discuss 40-metre direction finding, and will show his latest piece of apparatus.

During June, July and September, 5-metre meetings have been arranged. Several valuable prizes will be presented to the winners of these competitions.

A most cordial invitation is extended to PRACTICAL AND AMATEUR WIRELESS readers to attend any, or all of the above events.

ROMFORD AND DISTRICT AMATEUR RADIO SOCIETY

Meetings: Every Tuesday, 8.30 p.m., at Red Triangle Club, North Street, Romford, Essex.

Hon. Sec.: R. C. E. Beardow (G3FT), 3, Geneva Gardens, Chadwell Heath, Essex.

Our last four meetings showed a further increase in membership. A very pleasant evening was spent with Tungram's lecturer on Amplifiers and a competition arranged by the chairman, produced some surprising results. Plans are being formulated for Brentwood, Southend, Welwyn, Ilford, and Romford societies to co-operate in holding joint field-days.

EASTBOURNE AND DISTRICT RADIO SOCIETY

Hon. Sec.: T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

On Tuesday, March 28th, the above Society held an Exhibition Night at the Cavendish Senior School, East Street. Unfortunately, there was a very poor attendance, and only two exhibitors, but in spite of this a most enjoyable evening was held.

The exhibitors were as follows:—

Mr. S. M. Thorpe, A.M.I.R.E.: a selection of old and pioneer day valves, including Round's valve. Also valves with two filaments were shown, valves with two grids and two anodes, and a valve which had to hang up, etc. He also demonstrated two old crystal detectors, and an electrolytic detector.

Mr. T. G. R. Dowsett: a selection of meters, including a Cambridge 50 microammeter, built to the finest possible standards; three of the first A.C. mains valves to be manufactured, and a valve with three filaments, and one of the first Pye A.C. mains wireless sets, including some of the first A.C. mains valves just mentioned. The radio was working perfectly, and was built about the year 1928.

THE MEDWAY AMATEUR TRANSMITTERS' SOCIETY

Headquarters: The Navy Wives' Club, Dock Road, Chatham.

Hon. Sec.: S. A. C. Howell (G6FN), "Veronique," Broadway, Gillingham.

The outstanding meeting of March was undoubtedly the one held on the 14th, when Mr. H. G. Ménage, of R. A. Rothermell, Ltd., delivered a lecture on "The Commercial Applications of Piezo Electric Crystals," and demonstrated numerous pieces of apparatus employing Rochelle Salt Crystals.

2BCH is now G4HG, and is working 'phone on 1/7 mc/s. and c.w. on other bands, whilst Mr. Stone has been granted the A.A. licence 2HAC. A large number of the members attended the Maidstone A.R.S. "Ham Evening" and had a thoroughly enjoyable time. The M.A.T.S. heartily congratulate the Maidstone Club on the well-deserved success of the event, and intend reciprocating with a similar function to be held at their H.Q. on May 10th. All Kent amateurs, and others interested, are invited to attend, and should advise the Assistant Secretary as soon as possible of their intention so that the necessary reservations, etc., can be made.

Further interesting lectures have been arranged for May, including one by Messrs. A. C. Cossor, Ltd., on "Cathode-Ray Measuring Instruments." The morse code training proceeds apace.

Readers of PRACTICAL AND AMATEUR WIRELESS in the district are invited to become members of the Society, and participate in the field days which will be held during the summer months.

THE EXETER AND DISTRICT WIRELESS SOCIETY

Headquarters: Y.W.C.A., 3, Dix's Field, Southernhay, Exeter.

Meetings: Mondays at 8 p.m.

Hon. Sec.: Mr. W. J. Ching, 9, Silver Place, Heavitree, Exeter.

At the meeting of this Society held on Monday, March 27th, the Society's amplifier which has been reconstructed by Mr. C. J. Poulter, was demonstrated. Its performance was excellent, and curves are now being taken of its performance. Several interesting demonstrations were carried out, and it is to be hoped the amplifier can be used in future lectures, together with a microphone.

At the meeting held on Monday, April 3rd, an illustrated lecture was given by Mr. D. R. Barber, B.Sc., F.R.A.S., of the Norman Lockyer Observatory, entitled "Atmospheric Electricity." His main points were:

1. Ionisation due to radio-active matter, penetrating radiation—cosmic rays.
2. Electrification influenced by weather changes, thunderstorms, etc.
3. Incoming Solar Radiation.

He explained that there is a marked difference in ionisation over the land and the sea, and showed data to prove this.

All interested readers should get in touch with the secretary, at the above address.

ASHTON-UNDER-LYNE AND DISTRICT AMATEUR RADIO SOCIETY

Headquarters: Commercial Hotel, 56, Old Street, Ashton-under-Lyne.

Meetings: Alternate Wednesdays from April 12th.

Secretary: K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne.

On Sunday, March 18th, a party of members comprising G6DV, G3PM, G3WI, 2BBV and Mr. W. Taylor, paid station visits to G3PD and G4GS at Oldham. From there this group of amateurs went to Royton, and paid a surprise visit to G2BK, who has a really FB station with three separate transmitters. The visitors were particularly interested in the Selector Switch and Relay which automatically tapped out a test call while 2BK explained his rig.

Members are now very keen to get a club-room where gear can be installed, and each member can have a key. Business meetings are now dealt with by a committee every month, and this allows more time for lectures, etc. Mr. B. L. Simpson is now licensed as 2 HAP.

DOLLIS HILL RADIO COMMUNICATION SOCIETY

Headquarters: Braintrot School, Warren Road, Cricklewood, N.W.2.

Hon. Sec.: E. Eldridge, 79, Osgate Gardens, Cricklewood, N.W.2.

The president (G6SK), has now completed a series of talks on transmitter design. A power pack was designed, to be capable of giving 200 mA. at 400 volts, using an 83 mercury vapour rectifier, and choke input for smoothing. For the P.A. stage a 120 valve was used, to be run at an input of 24 watts, and for the modulator a 6L6 was used, under conditions which enabled it to handle 11.5 watts of audio at 7 per cent. distortion; this should enable a good quality signal, as regards amateur work, to be radiated. On April 11th, a junk sale was held. A talk of particular interest to amateurs who deal with high voltages is to be given by G6OV, on April 25th, at 8 p.m. in which G6OV will lecture on methods of first aid in cases of electric shock. Any readers of PRACTICAL AND AMATEUR WIRELESS who are interested will be welcome at this meeting.

RADIO IN AVIATION

(Continued from page 133.)

quate mechanical strength. This insulator may be made in a considerable variety of forms and Fig. 5 shows a typical example used in England.

The need for stability demands that the wires shall be kept as taut as possible, but on the other hand this tautness is restricted by conditions of design of the aircraft itself which do not tolerate excessive stresses, especially if there is any tendency for them to become unbalanced. Consequently it is usual to find that these aerials are subject to considerable vibration.

The lead-in insulator does not raise any special problems; the stresses on it are small, and it causes little drag in view of its small dimensions.

But the design of insulators, fairleads, and lead-in devices is complicated by a relatively new factor, namely, the formation of ice at high speeds and in an atmosphere of appropriate humidity and temperature. The conditions for ice formation are very restricted in respect of temperature and humidity. The former condition in particular is generally limited to a few degrees above and below zero Centigrade. Nevertheless, when such conditions are encountered ice is formed, and, besides its effect on the aircraft in general, such ice formation is responsible for two defects. First, on the aerial wire there may accumulate a heavy layer of ice which by virtue of increased drag may cause the wire to break. Secondly, the insulators become covered over and may cause sufficient losses to interfere seriously both with reception and with transmission. It may be that the efficiency of the transmitter is very considerably reduced, or in other cases that the tuning of the circuits is sufficiently altered to cause a change in the frequency emitted and occasion faulty reception of signals.

The worst offender in this respect is the strain insulator in Fig. 5. The effect due to ice-accretion on this component has been eliminated by fitting a skirt extending beyond the insulator (see Fig. 6); this skirt remains free from ice on its internal surface, and leakage or short-circuiting is thus eliminated.

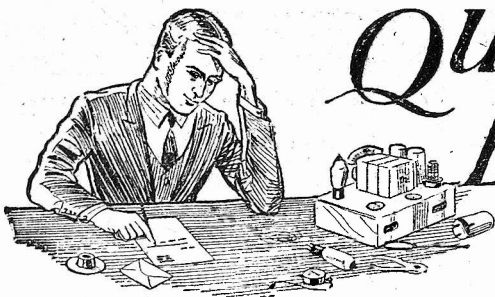
Protection for the lead-in or deck insulator can be provided by the simple expedient of partly enclosing it in a cowl on the leading side; this cowl, which may be of metal, collects ice but prevents its accretion on the deck insulator itself. (See Fig. 7.)

The fairlead for the trailing edge is a more difficult matter, as it is impracticable to fit a baffle along the whole of its length and particularly at its extremity. Such a baffle would produce a heavy drag, which would demand further strengthening of the tube with consequent increase in drag. One way which has been suggested for overcoming the difficulty is to make the whole fairlead of metal and to rely on adequate insulation at the point of attachment to the fuselage. It is then permissible to fit a short baffle in front of the insulator, and as this baffle may be supported directly from the fuselage it imposes no increase in drag and consequent stresses to the tube.

Apart from the skirted strain insulator it is not thought that these measures have yet been applied extensively.

PATENTS AND TRADE MARKS

Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner and Co., Patent Agents, of Bank Chambers, 29, Southampton Buildings, London, W.C.2, who will give free advice to readers mentioning this paper.



QUERIES and ENQUIRIES

Twin Turntables

"I am anxious to make up a really good public-address unit, and have now in my possession two turntables with separate pick-ups—they are taken from a portable home-recording outfit. What is the best way of mounting up these so that they will offer the widest scope of use, and should the motors be separately controlled? Any help you can give me in making a really good unit would be appreciated."—J. E. B. (N.W.9).

FOR best results we think the best plan would be to mount the two motors side by side with pick-ups in the correct tracking position as usual. A separate on/off switch for each motor would be desirable, and one pick-up should be joined to a volume control in the usual manner. The other pick-up would preferably be joined to a jack or pair of sockets, across which a volume control is connected. The jack should be of the double-circuit type and the connections then taken to the other volume control and to the input of the amplifier in the manner needed for standard mixing, with which we presume you are familiar. By adopting the jack connection just referred to it will be a simple matter to insert a microphone in place of the pick-up, a plug being joined to the mike transformer, and then insertion of the jack will cut out that pick-up. Standard mixing and various combinations will then be possible.

Parts for Receivers

"I am a new reader of your paper, and should like you to tell me where I can obtain all the parts of F. J. Camm's 50s. All-wave Three."—S. G. (Ellesmere Port).

ALL parts for any of the complete receivers described in this paper may be obtained in Kit form from firms who advertise in our pages—such as Messrs. Peto-Scott. Alternatively, you may be able to obtain the items from your local dealer or direct from the manufacturers, but by dealing with one firm you save postage costs and in many cases avoid delay by getting all of the parts at once. Messrs. Peto-Scott can, of course, arrange Hire Purchase terms for most kits.

D.C. Mains and Earth

"I have completed the Experimental two-valver described in your issue dated January 14th last, and on testing it I found that when I connected the H.T. supply the fuse went. I had the G.B. and L.T. in circuit at the time. I get my H.T. supply from a D.C. mains eliminator. Could you tell me the cause of the trouble and how I could remedy it? What lamp do I need for charging my accumulator from 200-volt mains."—A. S. F. (Felixstowe).

WHEN using D.C. mains for H.T. supply it is essential to include a fixed condenser between the earth lead and the earth terminal on the receiver, as this is joined direct to H.T. negative which is one side of the mains. Consequently when joined to earth it is possible in some cases

to earth the mains, and this blows the fuse. A 2-mfd. fixed condenser rated at 250 volts would be suitable, and this is all that is needed to avoid the trouble. To charge at .5 amps from a 200-volt supply you need a 100-watt lamp in series with the mains lead.

Adding a Pick-up

"I have a Cossor AC4 (Model 3783). I wish to add a Record Player, but there are no pick-up sockets. I have tried a mike and transformer with one wire to the grid of the MS/Pen. and the other to earth. The volume was ample, but when the set was switched on the set screeched, but gradually died down. Can you tell me the best way to connect up?"—J. F. (Manchester, 9).

WHEN you connected the pick-up to earth you were using the valve without grid bias. To enable you to

RULES

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

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

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

connect the pick-up in this stage you must insert a biasing resistance in the cathode lead of the valve in question with a 25-mfd. electrolytic condenser across it, making certain that the existing grid leak is joined direct to the cathode—not to earth. The resistance should have a value of 350 ohms.

Electrolytic Condenser Mounting

"I was very interested in your recent article 'Electrolytic Condensers.' I may be stupid, but could you please tell me why these condensers have to stand upright while in use, and not on their sides or upside down? I understand from enquiries that I am not the only person who does not understand this point. I shall be very glad if you can enlighten me."—R. G. (Weybridge).

THERE are two classes of electrolytic condenser, as mentioned in the article in question, and these are dry and wet. In the former the electrolyte is in paste form and in the latter it is in the form of a liquid. The instructions regarding mounting in a vertical position only apply to the wet type of condenser, and the reason is as follows. When a surge voltage higher than the rated voltage is applied, a greater current will flow across the condenser and this will result, generally, in the production

of gases. To liberate these gases a vent arrangement is provided at the top of the condenser and obviously this, must be placed at the top so that it is not covered with liquid and the gas may therefore pass out of the condenser. The vent is so designed that liquid cannot get out. The dry type of condenser may, however, be mounted in any position as this factor does not apply and gas should not form in the condenser.

Visual Tuning Indicator

"My commercial set is fitted with a tuning eye which gives correct tuning indication. I am rather puzzled, however, by the behaviour of this component. On the broadcast band it does not matter how loud I make the set the crosses of light on the indicator do not move when once the station has been properly tuned in. When I tune the short waves, however, the crosses move with the signal, and on a morse station, for instance, you can read the signal with the volume control turned off, the arms of light flashing with the code signal. Can you explain this, please?"—J. E. R. (N.W.6).

WITHOUT a circuit diagram it is not possible to state definitely why this should take place but we think you will find that the set is so arranged that when switched to the short waves the A.V.C. circuit is cut out. Thus, on broadcast bands the indicator gives a steady reading dependent upon the incoming signal, but on short waves the strength of a powerful signal will cause changes in anode current, and the connections to the indicator are then such that the current in this component changes with the signal modulation. Can you check the connections to see whether this is the case?

A Licence Problem

IN our issue dated April 8th under this heading we gave an abbreviated reply which has caused some confusion. Under the terms of the normal broadcast licence a listener may install any number of receivers in his home for the use of himself, family or domestic servants. If, however, any part of the premises is sub-let, then apparatus installed in that part of the premises must be covered by a separate licence. As mentioned in the reply, car radio, if permanently installed in the car, also calls for a separate licence, but a portable receiver may be used under the normal licence.

REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

W. J. M. (Birmingham 23). Write to the makers, Columbia Graphophone Co., Ltd., 98-108, Clerkenwell Road, E.C.1.

H. A. R. (Hendon). The S.W. Unit recently described would be ideal for your purpose. Modifications to the existing coils should not be made.

E. D. (S.W.19). We have not published constructional details of a set of the type mentioned for some considerable time, but may cover it again at a later date.

H. W. L. (Sheffield). Various constructional notes have been given in the Wrinkles section from time to time, but nothing has been described other than in those pages.

D. L. (Newcastle-on-Tyne). A good L.F. valve may be suitable, but best results would probably be obtained with one of the special Midget valves.

M. W. J. (Liverpool). The details were given in our Christmas number. Without a diagram of the set we would not give definite advice.

The coupon on page iii of cover must be attached to every query.

Miscellaneous Advertisements

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," Tower House, Southampton Street, Strand, London, W.C.2.

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SALE—1938 Vidor 5-valve superhet, also box of components.—H.H.ch, 36, York Road, Grays, Essex.

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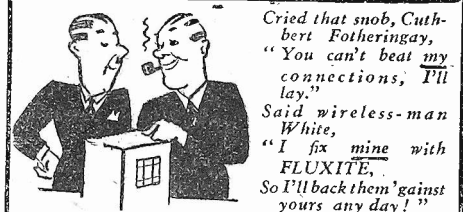
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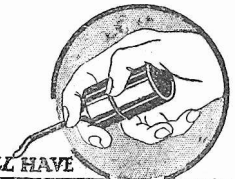
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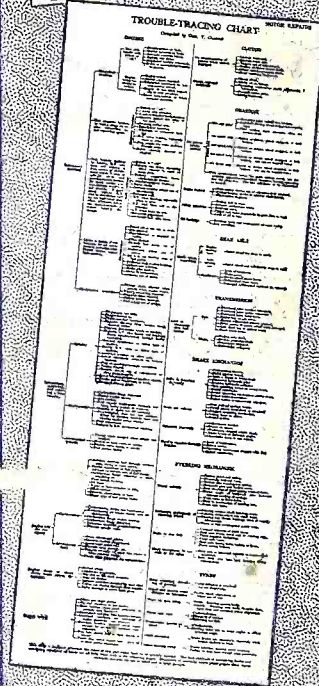
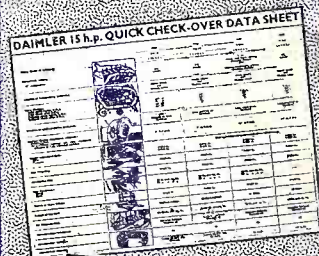
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