TESTING YOUR COMPONENTS—

See Page 620

Practical and Amateur Wireless

3D. EVERY WEDNESDAY

Edited by F. J. CAMM

A GEORGE NEWNES Publication

Vol. 13 No. 337. March 4th, 1939.

AND PRACTICAL TELEVISION

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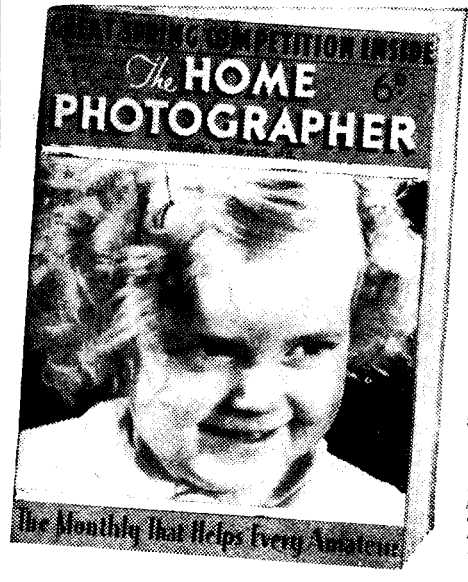

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6D MARCH

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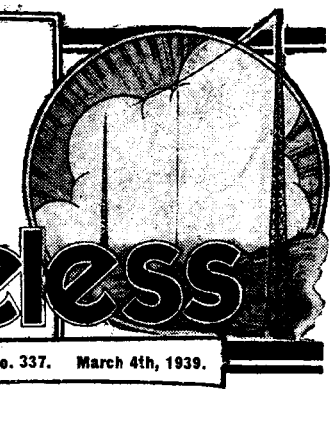
HARNESSING THE MAINS —See Page 625

Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh.Sch., B.Sc., A.M.I.E.E., Frank Preston.

Vol. XIII, No. 337. March 4th, 1939.



ROUND *the* WORLD *of* WIRELESS

Testing Your Components

THE recent series of articles on making your own components has caused considerable attention to be paid to this section of radio construction, and many readers are now trying their hand at making some of the items which have been described. It should be remembered, of course, that in many cases it will not be possible to make a component to give the same degree of performance as a commercial article, but with care and suitable design it is possible to make a most reliable component, and cases have been reported on many occasions when better results than a commercial product have been obtained. However, the main point after having made a component is to test it, and although this may be done by including it in its normal place in the circuit, doubts are removed, and in many cases time is saved, if the part may be properly tested. In this issue we deal with the problem of testing components, using standard apparatus, which may also be made up at home, and which will find many other applications in modern radio work.

Transmitter for Siam

STANDARD TELEPHONES AND CABLES have received an order for a 100-kW station to be erected at Bangkok for national broadcasting purposes. The order, amounting to approximately £60,000, includes all studio equipment and a vertical mast of the type recently used by the B.B.C. at Stagshaw and other places.

Italian Enterprise

THE Italian authorities are taking great care to popularise radio in various places. At Zara, the small Italian town on the Adriatic, a sum of money is to be spent each month to reduce electrical interference, whilst at Tripoli speakers have been placed in streets and bazaars to enable the population to hear the Italian Arabic broadcasts. A competition has also been opened to all members of the Fascist party for the design of new studios to be built at the Milan station, E.I.A.R.

Philips Factory

DURING the recent visit of the Mayor of Blackburn to the Philips North of England factory, plans for doubling the size and the transfer of important manufacturing processes from other factories were announced by Mr. J. Visman, Managing Director of Philips' Blackburn Works, Ltd.

B.B.C. Book a "Discovery"

AS Charles Shadwell conducted the B.B.C. Variety Orchestra some time ago during a broadcast by a number of Carroll Levis's "discoveries," he was struck by the ability of a young girl singer, Constance Impey, who works in a Leyton office. So he made a point of meeting her at the end of the show, told her how much he had enjoyed her songs and offered her professional advice. Miss Impey took the hint.

Now, having recently passed an audition at Broadcasting House, she has been booked to sing in a Variety Orchestra concert which Charles Shadwell will conduct on the Regional wavelength on March 8th.

ON OTHER PAGES

Symphony Orchestra's Visit to Preston

THE B.B.C. announces that the programme of the concert to be given by the B.B.C. Symphony Orchestra, under its conductor, Sir Adrian Boult, in the Public Hall, Preston, on Wednesday, March 29th, at 8 p.m., will be as follows: Overture, "Euryanthe," by Weber; Symphony No. 6 (Pathetic), by Tchaikovsky; Violin Concerto from Serenade No. 7 in D (Haffner), by Mozart; "The Walk to the Paradise Garden" (from "A Village Romeo and Juliet"), by Delius; and "Siegfried's Journey to the Rhine" ("Twilight of the Gods"), and "Entry of the Gods into Valhalla" ("Rhinegold"), by Wagner.

The solo violin part in the Mozart Concerto will be played by Paul Beard, leader of the B.B.C. Symphony Orchestra.

This will be the first visit of the orchestra to Preston.

Variety Comes Back

CONTINUING the series entitled "Variety Comes Back," the Theatre Royal, Bilston, will be visited in the Midland programme on March 9th, and David Gretton will tell the story of the theatre, from which listeners will hear turns by some artists well known both on the halls and on radio. This theatre was converted into a cinema about 1930, but has since reverted to "the legitimate." Its earlier story is notable. It was opened in the middle of the nineteenth century and in 1902 was reconstructed. Its director then was the late Henry Battersby, who produced and toured juvenile opera companies in "Les Cloches de Corneville" and other works. Florence Baines made her début at this theatre. Another regular performer there was Dan Rollyat, who appeared in Frank Bateman's Company in the famous "Sentenced for Life." Other noted artists who have appeared there are Bransby Williams, Sydney Howard, and more recently, Tommy Trinder.

A John Hilton After-dinner Speech

PROFESSOR JOHN HILTON is to be one of the speakers at the Sheffield Trades' and Technical Societies' annual dinner on March 6th. A visit to this function by the B.B.C.'s Northern microphone and recording van will enable the words of this very popular broadcaster (a Northerner, Bolton-born, and an authority on technical education and industry) to be heard by a wider audience than that made up of his fellow diners. His speech will be recorded and broadcast in the Northern programme on March 7th.

ROUND the WORLD of WIRELESS (Continued)

INTERESTING and TOPICAL NEWS and NOTES

Broadcasts for South African Natives

IT is reported that an interesting experiment in broadcasting is now being made in Uganda. Every evening a programme is sent out from Kampala by land-line to four loudspeakers situated in villages between one and seventeen miles from the studio.

Over 15,000 persons listen to the programmes every evening. Their reactions are noted by trained African observers. It is hoped ultimately to establish a real broadcasting service with loudspeakers in every village.

Robert Lynton explaining to radio star Diana Miller his ingenious invention, the "Voice Master," designed to "self train" the singing voice.

Ban on Radio News

ACCORDING to a recent decree of the local Government, Jamaican newspapers are now forbidden to publish news received over the air by wireless.

Hitherto the newspapers of the island have published news received by radio.

"Western Magazine"

ENTERTAINMENT, interest and information will be included in the weekly programme, "Western Magazine," on March 10th. Among the items will be "If I had a million" by David Kean, "This Week's Recipe," "West Country Visitors' Book" and other topical talks. The compère will be Victor Fawkes.

Studio Engineers' Musical Training

THE quality of the music that goes out from station WLW (Cincinnati) is not entirely in the hands of the directors and instrumentalists who actually produce it, according to Charles Butler, control supervisor of the station. Listeners are aware that before any broadcast goes on the air it must pass through the hands of a control room engineer who modulates tone and sound elements coming from the studio microphones. What they may not know, Mr. Butler revealed, is that the 30 WLW studio engineers all must be able to read music as a condition of employment, and that many of them have had extensive musical training which assures familiarity with musical scores.

B.B.C. Organ Recital

A RECITAL of French organ music will be given by André Fleury, organist of St. Augustin, Paris, before an audience in the Concert Hall, Broadcasting House, on March 10th.

SOLVE THIS!

PROBLEM No. 337

Jackson had an A.C. mains three, with a standard detector stage to which pick-up terminals were connected in the usual manner. He decided that anode-bend rectification would be an improvement in the set, and knowing that bias was applied automatically when a pick-up was joined in circuit, he decided to use that bias for the anode-bend detector. To avoid drastic changes to the circuit he thought the best plan to try the new form of detection would be to short-circuit the pick-up sockets and he did this without obtaining any results. Why was this? Three books will be awarded for the first three correct solutions opened. Entries must be sent 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. 337 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, March 6th, 1939.

Solution to Problem No. 336

The armature in Lewiss's pick-up had become jammed due to the rubber support having perished. Consequently, although tested for continuity and found in order, signals could not be obtained as the needle failed to move the armature and thus produce the signal voltage variations.

The following three readers successfully solved Problem No. 335 and books have accordingly been forwarded to them: Geoffrey Hill, The Nest, Hollym Road, Withernsea, E. Yorks; A. Gilbert, 79, Nelson Road, Whitton, Twickenham, Middlesex; H. E. Saunders, 72, High Street, Whitstable.

Mail Service to Spain

THE Postmaster-General announces that the mail service (letters and parcels) to Government Spain is suspended until further notice. Letter and parcel mails for Nationalist Spain are being dispatched as usual.

Visits of Famous Composers

ON March 10th Leslie Heward will conduct the B.B.C. Midland Orchestra in the fourth of the programmes of music written by famous composers when visiting England. This one consists of Haydn's symphony No. 93 in D, Mendelssohn's No. 3 in A minor, and the Concerto Grosso in D by Geminiani, the Italian composer who died in Dublin.

Australian Short-wave Transmission Schedules (March, 1939)

VK2ME (Sydney) 31.28 m.: Sundays (Sydney Time), 4 p.m. to 6 p.m. (06.00-08.00 G.M.T.), 8 p.m. to midnight (10.00-14.00 G.M.T.). Mondays, 12.30 a.m. to 2.30 a.m. (14.30-16.30 G.M.T.).

VK3ME (Melbourne) 31.5 m.: Nightly (Melbourne Time), Monday to Saturday (inclusive), 7 p.m.-10 p.m. (09.00-12.00 G.M.T.).

VK6ME (Perth) 31.28 m.: Nightly (Perth Time), Monday to Saturday (inclusive), 7 p.m. to 9 p.m. (11.00-13.00 G.M.T.).

Miss Phyllis Konstam (Mrs. H. W. "Bunny" Austin), who appeared in "Monday Night at Seven" in the popular sketch of the "Paul and Virginia" series, is here seen studying her script for one of her broadcasts.

Concert from Weymouth

WEYMOUTH Choral Society will broadcast a concert from the Alexandra Gardens, Weymouth, on March 10th, in the Western programme. The Society was founded in 1891 as the successor to the Weymouth Philharmonic Society, and was reorganised in 1931. Margaret Trigg will be the pianoforte soloist in this programme. She is a native of Southampton, and has won awards at a number of festivals.

The "Request" Straight 6

Having Completed the H.F. and Detector Section of this Receiver, this Article Describes the L.F. and Output Chassis, which is so Designed that it can be Used as a Separate Unit if so Desired — By L. O. SPARKS

IT will have been noticed that the output valveholder on the chassis of the H.F. and det. section is wired so that its anode socket provides an anchoring point for the maximum H.T. supply lead, and the means of getting the H.T. to the first stage of the amplifier.

In the *theoretical* diagram of the first section the output connections are slightly different. The anode socket being connected to the negative side of the L.T., or, in other words, the earth line. That is quite in order when the H.F. unit is going to be used with headphones, or with any other form of L.F. amplification, as the coupling in the Det. anode circuit is arranged on the usual R.C.C. lines, which allows the output to be taken from the free side of the coupling condenser and earth. The method shown on the chassis is identical, theoretically, but the connections are modified for practical reasons and for the amplifier now about to be described.

The theoretical circuit is shown in Fig. 1. It is the well-tried Class A Push-pull arrangement, free from elaborations, which are so often of doubtful practical use.

The components are few and, in view of this, I would suggest that those of doubtful or inferior make are barred from the ultimate selection, otherwise the efficiency of the amplifier and the quality of its output will be seriously affected.

Circuit Details

A four-pin chassis mounting valveholder is used to form the input connections, thus allowing input, L.T. and one H.T. feed to be obtained from the first unit via the four-pin plugs and a four-lead cable.

The input—i.e. the grid socket—is taken to one side of a .5 megohm potentiometer *through* an H.F. stopper resistance of 50,000 ohms. The potentiometer is directly across the grid circuit of V4 and serves the purpose of volume control and grid leak. It is placed in this stage to enable a complete control to be maintained over all the L.F. valves, and to eliminate any possibility of distortion through overloading.

An ordinary Cossor L.F. valve is used for V4, and its anode is connected to one side of the primary of the push-pull input transformer via the parallel-feed coupling condenser C.

Although the primary of the specified transformer will carry the anode current of the L.F. valve with safety, the parallel-feed method of coupling was selected to allow the primary winding to develop its maximum inductance by keeping it free of any direct current. A high-inductance valve is very essential for good bass response.

Clean and simple lines are the keynote of the layout and chassis construction.

The anode circuit is completed by two fixed resistances the first forming the anode load and the second the decoupler, the junction being by-passed to earth by means of the 2 mfd. condenser.

The tone control isalso introduced into the circuit in this stage, it being formed by a 50,000 ohm potentiometer connected in series with a .05 mfd. fixed condenser between the anode of V4 and earth. Although this arrangement will be found most useful, it is not, in the strict sense of the word, a tone control, as it only provides a means of accentuating the lower register by cutting off or by-passing some of the higher frequencies. However, if a complete high and low-note control is required, then I would draw attention to the very efficient little unit which is described in the issue for February 11th, 1939, as this could quite easily be embodied in the amplifier.

The secondaries of the input transformer are taken to the grid sockets of the two output valves via H.F. stoppers of 50,000 ohms, the necessary bias being applied by means of the centre tap in the normal manner.

As an additional precaution against parasitic oscillation, two more stoppers are inserted in the anode circuits, and it is essential for these to be connected direct to the anode pins of the valveholders. The values are quite low, 100 ohms being sufficient. It must not be overlooked that the output from the amplifier will consist of three connections, namely, one from maximum H.T. and one from each anode of the output valves. A push-pull output transformer is not included in the list of components, as most modern P.M. moving-coil speakers are provided with a suitable matching transformer. However, if it is a question of purchasing a new speaker, the make and type of the output valves should be specified when ordering.

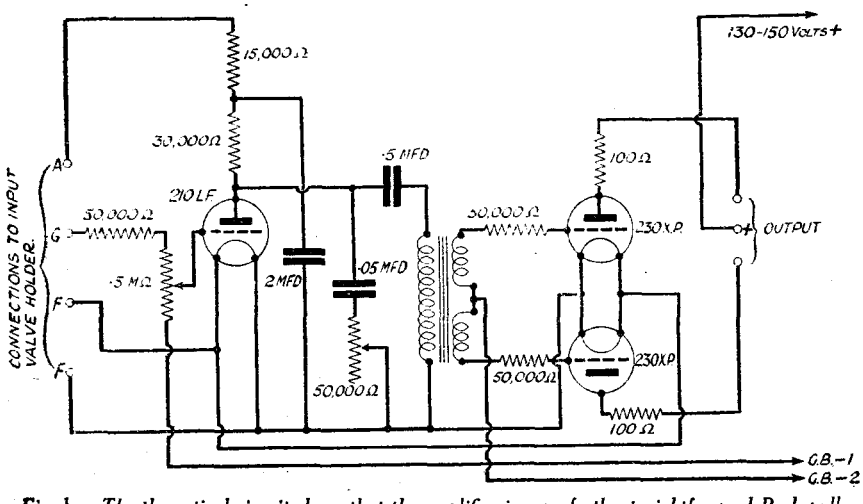


Fig. 1.—The theoretical circuit shows that the amplifier is a perfectly straightforward Push-pull arrangement, the input transformer being "parallel-fed."

Construction

The chassis is 9in. by 6in. by 3in. It is constructed from aluminium of the same gauge as the H.F. unit, the bending, marking off and drilling being carried out in the manner described last week for the first section.

Mount all the smaller components first and complete as much of the wiring as possible before bolting on the heavy input transformer, taking care to protect the upper surface of the chassis from damage by scratching, etc.

The potentiometer used for the volume control must be of the type having its spindle insulated from its fixing, otherwise when it is mounted on the chassis the grid of V4 will be earthed. With the tone control this is not essential, as the moving arm is normally connected to earth.

Operating and Testing

Before coupling the L.F. section to the H.F. and det. portion, exhaustive tests

(*Continued overleaf*)

THE REQUEST STRAIGHT 6

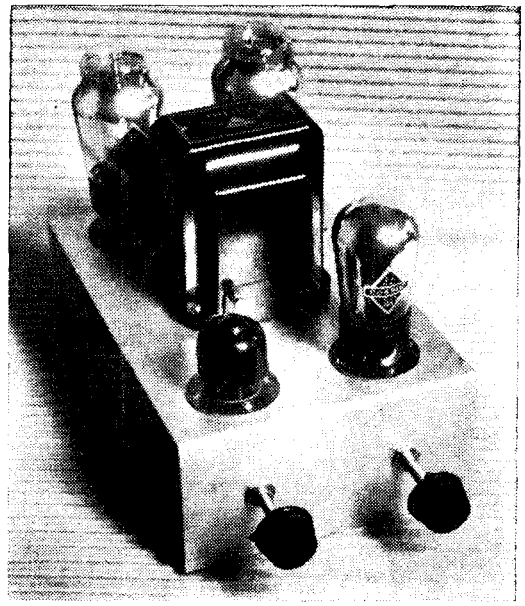
(Continued from previous page)

must be made with the latter to see that it is adjusted for maximum efficiency, consistent, of course, with satisfactory operation.

It is possible to adjust the operating voltages to a point where very high gain will be obtained, but such conditions would not necessarily be the most satisfactory owing to the question of stability over the two wavebands concerned.

With the values and components specified, everything should be quite stable, and the only variable factors left for adjustment are the trimmers and the volume control voltage. It is of course assumed that the layout and wiring have been carried out according to the published diagram. The details regarding trimming of the circuits must be followed carefully and diligently, and on no account must any attempt be made to hasten the procedure. It is best, while doing this part of the work, to use headphones plugged into the output socket, or if possible with a low reading milliameter in series with the H.T. supply to the anode of the detector valve.

The greatest dip of the meter needle will be produced by the most powerful signal, i.e., when all circuits are dead in tune.



The input plug and first valve are mounted on the front of the chassis over the vol. and tone controls.

When you are satisfied with the H.F. Unit, the L.F. section can be connected by means of the four-pin plugs, not overlooking the additional lead required for the H.T. feed to the two output valves via the output transformer.

See that the bias connections are in order, and test for G.B. voltage at the grid of each 230 X.P.

It will be noted that the Varley input transformer, type D.P.6, has separate secondary windings, four connections being provided. Normally, the two G.B. terminals can be strapped together as shown in Fig. 1, and one bias lead used, but if there is any doubt about the matching of the output valves, then each secondary can have its own bias lead and the voltage adjusted until each valve is passing the same anode current.

The correct bias voltage will be found on the valve maker's leaflet according to the anode voltage applied. Remember that the two valves can be considered as one, so far as bias is concerned, so it is only necessary to apply the bias voltage specified for one valve.

IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, March 1st.—Symphony Concert from Queen's Hall, London.
Thursday, March 2nd.—Lucky Dip programme.
Friday, March 3rd.—Radio Pie, light entertainment programme.
Saturday, March 4th.—Rugby Union Football: A commentary on the Royal Navy v. The Army, from Twickenham.

REGIONAL (*342.1 m.*)

Wednesday, March 1st.—I Remember, presented by Percy Edgar.
Thursday, March 2nd.—Transatlantic Shed, by N. C. Hunter, the story of Irish emigration.
Friday, March 3rd.—Midland Parliament: The School Leaving Age, a round table discussion.
Saturday, March 4th.—Music, Maestro, Please: a parade of song hits.

MIDLAND (*297.2 m.*)

Wednesday, March 1st.—I Remember, presented by Percy Edgar.
Thursday, March 2nd.—Variety from the Opera House, Cheltenham.
Friday, March 3rd.—Cavalleria Rusticana (Mascagni's opera), from the New Theatre, Northampton.
Saturday, March 4th.—Leicester Brass Band Festival, from De Montfort Hall, Leicester.

WEST OF ENGLAND (*285.7 m.*)

Wednesday, March 1st.—Made in the West—4, The Bridport Trade: The rope, twine, line and net industry.
Thursday, March 2nd.—The Leader of the Band (American series): Dance music on gramophone records.
Friday, March 3rd.—Choral programme.
Saturday, March 4th.—Sports Special, a feature for fans.

CROSSTOWN NEW YORK

THE postponement of William N. Robson's visit to this country will be in some measure compensated for by a second performance of his brilliant sound presentation of life on 52nd Street. This famous New York Street is to Americans what Piccadilly, Park Lane, the Old Kent Road and Limehouse Causeway are to Londoners. It cuts right across the city from East River to the Hudson, taking in its stride every phase of New York life.

Luxurious apartment houses, smart shops and restaurants, night clubs and slummy docks—all these will have a part in the broadcast. The programme, which was prepared in the New York offices of the B.B.C. and sent to London on records, will be handled by Laurence Gilliam. This broadcast will be given in the National programme on March 10th.

JENNY LIND

The greatest dramatic soprano of her time, and perhaps of all time, died just over fifty years ago. The "Swedish Nightingale" during her lifetime was idolised as few women or artists have ever been, but what does she mean to listeners to-day?

Denis Constanduros has prepared a programme which conveys skilfully the essential greatness of Jenny Lind and brings forcefully to life the romantic details of her career. She was born in 1820, and after studying in Stockholm and Paris achieved sensational success in a now-forgotten opera by Meyerbeer in Berlin. This was the turning point of her career, after which she became a diva beloved alike by commoners and kings. Maurice Brown, who will produce the programme, is the music adviser to the Features and Drama Department of the B.B.C. This broadcast will be given on the Regional wavelength on March 18th.

WELSH (*373.1 m.*)

Wednesday, March 1st.—Crug-y-Bar, a romantic play by Rhys Dafys-Williams.
Thursday, March 2nd.—A St. David's Day Service, from Llandaff Cathedral.
Friday, March 3rd.—Hawddamor Lydaw! Greetings to Brittany: a special programme of music and folk-lore.
Saturday, March 4th.—Songs by London Welsh Children: A St. David's Week celebration by the London Sections of the Welsh League of Youth.

NORTHERN (449.1 *m.*)

Wednesday, March 1st.—Music of the People: A Lancashire Concert from Colne.
Thursday, March 2nd.—The Hallé Society's Concert, from the Free Trade Hall, Manchester.
Friday, March 3rd.—Concert Orchestra: Swift Serenade.
Saturday, March 4th.—Across the Gangway: Sea Lore for Landsmen—third talk in the series.

SCOTTISH (*391.1 m.*)

Wednesday, March 1st.—Timber, a documentary programme (recorded).
Thursday, March 2nd.—Single Ticket, a one-man journey under the direction of Ian Sadler.
Friday, March 3rd.—Gaelic Concert.
Saturday, March 4th.—Glasgow Caledonian Strathspey and Reel Society.

NORTHERN IRELAND (*307.1 m.*)

Wednesday, March 1st.—Saturday Night at the Wellington Hall, a talk.
Thursday, March 2nd.—Transatlantic Shed, by N. C. Hunter, the story of Irish emigration.
Friday, March 3rd.—Northern Ireland Dance Championships, from the Plaza, Belfast.
Saturday, March 4th.—Orchestral Concert (in co-operation with Belfast City Y.M.C.A.), from the Wellington Hall, Belfast.

March 4th, 1939. Vol. 4. No. 141.

Interesting Details of the Apparatus and Principles Involved in Broadcasting Outside Events

MR. H. L. Kirke, A.M.I.E.E., Head of the Research Department of the B.B.C. gave some interesting insights into the present television system in a lecture to the Royal Society of Arts recently. Dealing with the recently introduced Outside Broadcast section he said that when the present television service was first established, no apparatus was provided for outside broadcasts, and the first apparatus of this kind was produced in time for and for use during the Coronation of King George VI. Unfortunately for the first television outside broadcast, the weather was not kind and the light poor. Nevertheless, this broadcast was a great success despite the fact that the ordinary type of Emitron was used.

The outside broadcast apparatus comprises three camera channels, similar to those used in the control room at Alexandra Palace. In addition, of course, sound apparatus is provided. The whole of the apparatus associated with the cameras is built into a large motor-driven vehicle of special construction. The power for this apparatus can be supplied either from a 50 cycle 3-phase supply, or if such supply is not available, by a special petrol-engine driven alternator in a second vehicle. The prime mover in this power unit is specially constructed to have constant speed and good regulation. Furthermore, it is necessary for it to be governed in such a way that the frequency of the alternator is as nearly as possible that of the supply mains, in order that interference beats known as "humbars" shall not appear on receivers.

Cable or Radio?

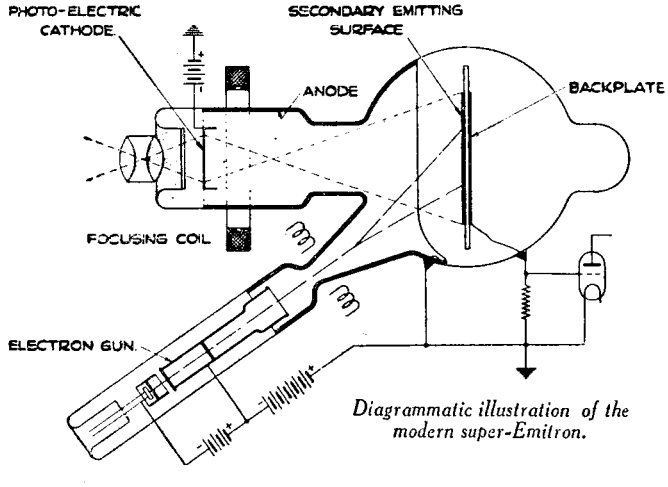
Two methods are available for sending the television picture from the outside broadcast scene to Alexandra Palace for retransmission to viewers, a special cable or radio link. Ordinary Post Office underground lines are not suitable for television transmission except for a very short distance, and a special underground cable was constructed running from Alexandra Palace via Broadcasting House and other strategical points to Victoria Station. It was arranged that this cable should pass through a number of important places from which broadcasts might take place, such, for example, as Westminster, for the Armistice Service.

The cable consists of a balanced pair of paper insulated copper conductors. Its attenuation is just over 8 db. per mile at 3 mc/s, and about 6.7 db. per mile at 2 mc/s. For the longer extensions from Broadcasting House, it is necessary to use a repeater, which for convenience is situated at Broadcasting House itself.

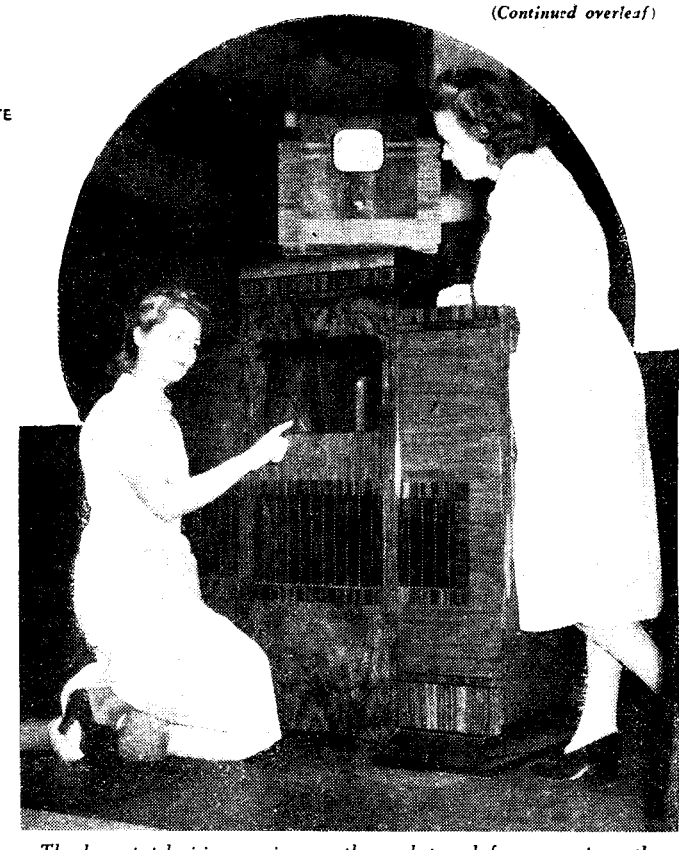
It is necessary for the attenuation and phase characteristics of the cable to be equalised over the whole frequency band to a high degree of accuracy. Another possible method is to use a co-axial cable with carrier transmission. This has been tried out experimentally, but in view of the success of the twin cable, no use has yet been made of the co-axial cable.

When the outside broadcast point was not situated close to one of the points on the cable, it was necessary to use a radio link, and to this end a small-powered radio transmitter was built by Marconi-E.M.I. in yet another vehicle. This transmitter was similar in general principle to the main transmitter at Alexandra Palace, but whereas the latter had a peak power output during white of a vision signal of 17 kW, the outside broadcast transmitter has a power output of 1 kW under similar conditions. This would correspond to an unmodulated carrier output in sound broad-

(Continued overleaf)



Diagrammatic illustration of the modern super-Emitron.



The largest television receiver on the market, and for comparison, the smallest. These receivers may be seen at the Selfridge exhibition.

PRACTICAL TELEVISION

(Continued from previous page)

cast of 250/300 watts. The transmitter uses special air-cooled valves of new design for the last stages.

Aerial Difficulties

One of the difficulties with the radio link is in the provision of suitable transmitting and receiving aerials. When the radio link was first provided, a directional aerial array supported by two 30ft. wooden supports was used fed by a concentric cable of low loss from the transmitter, while a special receiving aerial was erected on the top of the mast at Alexandra Palace. It was soon found that the range which could be obtained with this arrangement was smaller than expected, and that the physical position of the transmitting site in relation to the contour of the ground between it and the receiver, as well as the height of the transmitting aerial, were very important. This led to a consideration of a rapidly transportable means for supporting a much higher aerial, and the suggestion was made to use a fire escape. To this end a second-hand obsolete fire escape was purchased, and found to be very satisfactory in use, even though it was necessary, instead of using a complicated aerial array, to use a single dipole and reflector. Since then a new aerial support has been specially constructed in yet another vehicle, in which is carried a considerable amount of spare gear, such as cables, etc. The mast and top of the fire escape were shown in last week's issue.

The receiver for the radio link is situated at Alexandra Palace, and the receiving aerial is situated on top of the main mast. Considerable difficulty has been experienced with this arrangement, not from direct interference from the main transmitter on 45 mc/s, as the radio link frequency of 64 mc/s is sufficiently far removed to make adequate filtration a relatively simple matter. The type of interference was known as "splurging," and consisted of intermittent bands of black across the picture, often of sufficient intensity to throw the received picture out of synchronisation. As at that time all efforts to trace and eliminate this interference had failed, search was made for a second receiving site removed from the interference, but situated on the Alexandra Palace-Broadcasting House cable route, so that this cable could be used for linking the receiver with Alexandra Palace.

A suitable site was found, as has already been explained in these pages, at Highgate, and was used with a temporary 50ft. mast. A permanent station is, however, being established with a 150ft. self-supporting wooden mast. The source of the interference has since been traced to loose and broken wires in the main transmitting system, and although it is now possible to receive at Alexandra Palace, there is always the danger of the interference reappearing, which it sometimes does at the most inopportune moments. Further, the Highgate site is less noisy electrically and is geographically better situated for some outside broadcasts, and therefore it is still to be retained.

Experiments Still Being Made

The present transmitting aerial for the radio link transmitter is not final. The experiments which have been made to compare horizontal and vertical polarisation have shown that for television radio link horizontal polarisation is considerably the better, and that with a suitable design of transmitting and receiving arrays a gain of 6 to 12 decibels in signal strength over the present arrangement is expected, in addition to the improvement obtained by the reduction of general interference from motor-cars and so on. As a result of these experiments new aerial arrays for both transmitter and receiver are now being designed.

Further details regarding the present television system may be read in the remainder of this lecture, copies of which are printed in the Journal of the Royal Society of Arts, and which may be obtained for 1s.

CINEVISION

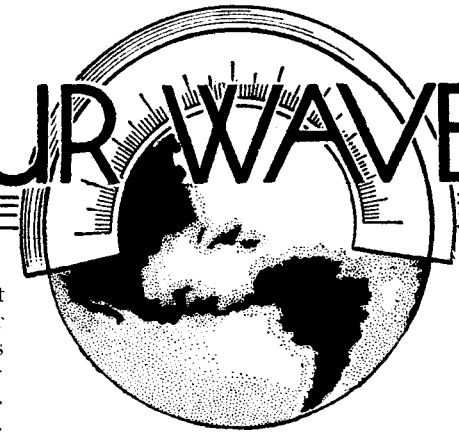
FOR want of a better name, the word "cinevision" has been coined to represent the latest phase of television's development, namely the portrayal of television pictures inside a cinema. The arrangements made in connection with the Boon-Danahar boxing match for the British light heavyweight championship involved an agreement which it is felt may have very far reaching effects on television programmes for the future. First of all, there is no doubt that the B.B.C. deserve commendation from the public for having made a material gesture which will certainly relieve the condition of apparent impasse which arose between an established form of entertainment—the cinema—and the newest form of picture portrayal—television. It is not too much to say that all forms of entertainment can be classed as one industry, and every new scheme which assists in making people more entertainment-minded is an asset to that industry. The greatest enemy to that industry is lack of interest, and any novelty such as is provided by big-screen television in its initial stages will help to bring about a new enthusiasm, and restore box office appeal in such a manner that all forms of entertainment will benefit. It is understood that the B.B.C. made no payment for the television transmission itself, but in return, conceded to the fight promoter the right to show the reproduced pictures to a paying cinema audience, a concession sold to the Gaumont British Picture Corporation. In this way two existing bans were raised for the occasion, the prohibition imposed by the B.B.C. on the commercial exploitation of its televised programmes, especially in so far as outside broadcasts are concerned, and that placed by big-fight boxing promoters on the televising of the matches. The course taken by the B.B.C. is understood to have had the full approval of the Government's Television Advisory Committee, and on the success of the experiment will depend any future action.

The Installation

SINCE the necessary arrangements for the occasion were carried out rather late, the Baird engineers had to undertake the installations in the two cinemas involved—the Marble Arch Pavilion and the Tatler—at rather short notice. Both theatres were therefore shut down for a few days to enable the necessary finishing touches to be effected to the entirely new equipment. Technical details of the apparatus have not yet been released, but it is known that projection cathode-ray tubes of a special type were designed and made in the Baird factory for this purpose. The equipment represented an important advance on anything which had hitherto been shown for other big-screen demonstrations. Not only was the picture screen very large—15ft. by 12ft.—but the pictures were much brighter and more detailed. Aerials on the roof of the cinemas conveyed the signals to the C.R. tube projectors in the auditorium, and the small but intrinsically brilliant picture on the fluorescent screen was projected on to the remote screen of the theatre by special lenses. Although the two cinemas mentioned are the only ones in the world to be equipped for work of this nature, it is understood that plans are now well advanced for making similar installations in three dozen other Gaumont British cinemas in the London service area. Representatives of important French and other Continental interests were among those watching the television pictures, and it is generally conceded that British television will enter upon a new phase of its development as a direct result of this work.

During a recent television broadcast, Miss Jasmine Bligh was televised taking part in an autogiro flight. She described her experiences by short-wave radio link.

ON YOUR WAVELENGTH



By Thermion

The Silent Screen

A FRIEND of mine who has just purchased a television receiver made a suggestion which I think is worth passing on to the B.B.C. My friend is most enthusiastic over television, and has been a keen theatre-goer all his life. He is, therefore, accustomed to applause at the end of an enjoyable item. Now, the television audience are unable to applaud, and he thinks, and I do, too, that at the end of each item the B.B.C. should run a few strips of Blattnerphone through the machine to give some recorded applause, and thus complete the illusion of being in a theatre. There does seem to be at the end of each item a dumb period, and I think that some fake applause at the B.B.C. end would help to liven things up.

Picture Size

I SEE that at a meeting organised by the Wireless Retailers Association they reached agreement on various points, not only concerned with marketing. I am pleased to record that the dealers are appreciative of the co-operation they are receiving in connection with television on the service side, and that they also gratefully acknowledge the training facilities offered by manufacturers at their schools. They emphasised, however, that it was necessary for standardisation of particular types of aerial to be made. They suggest that the present cross used for tuning purposes should be replaced by a tuning picture, and that a signal of this form should be transmitted from 11 a.m. to 1 p.m. to supersede the present demonstration film which many dealers think is useless. The Television Advisory Committee I see have agreed to consider the possibility of radiating some short films between 6 and 8 p.m. with a five-minute interval between each. Dealers were unanimous in recommending that no picture smaller than 6in. by 5in. should be regarded by them as satisfactory, and they were of the opinion that some of the sets giving a smaller size have resulted in dissatisfaction amongst the public.

One other point which I think is worth recording is that dealers are of the opinion that manufacturers should push combined radio and television receivers, as it would provide a solution to the part-exchange problem.

Interference

ONE of my readers, A. D. C., of Southport, complains that his short-wave set suffers from motor-car interference, but not to the extent of 90 per cent. He also agrees that it would be unfair to force every motorist to fit suppressors. I do not, however, subscribe to the view which my correspondent expresses that three or four million all-wave sets are in existence in this country, and his suggestion that 12 million people suffer from interference on short-wave sets is not only ludicrous but fantastic.

And now our old friend "Torch" writes to me as follows:

"Be calm! This time the following epistle does not imply any poetical 'Torchure,' as my divine afflatus is on a short vacation. (Thermion: 'Thank God for that!')

"I quite agree with what you said last week *re* television. A good job that someone has a sense of proportion. Did you come across the matter I attach from last Sunday's ——? Would it not make one sick? Such misleading hooey is a disgrace to any paper it is published in, and I have taken leave to tell the editor of that particular paper so. When this sort of thing is spread abroad amongst some millions of people, no wonder the plague of inventors never gets any less. Many thousands of pounds are extorted annually from the pockets of such as can ill afford their complete loss by these frequently recurring and most misleading fairy tales of fortunes in patents. Let the figures of the Patent Office speak for themselves. Every year some 30,000 patents are applied for; some 17,000 are refused (fees not returnable), and of the remaining 13,000 patents which are actually granted, not 5 per cent. ever reach any commercial success or result in anything but misery and loss to their inventors.

"To find one's way through the Hampton Court Maze is mere child's play to trying to work one's patent through the mazes of the Patent Acts successfully and profitably. The dice are loaded against the inventor in many insidious ways from the moment he turns his steps towards that Mausoleum of Buried Hopes, the Patent Office. And there are many interests which are only too willing for this state of blissful ignorance to go on for ever. I think that no greater service could be done by any reputable journal than for it to warn its readers against being misled by this romantic but quite untrue Tom Tiddler's Ground blarney about fortunes in patents, at least so far as their inventors are concerned. The fortunes are there all right, but the inventor is the only one who, as a general rule, never gets a sniff at them. The Patent Office itself collects a nice little fortune of a profit of £100,000 per annum after paying all its working expenses, and this it hands over to the Exchequer out of the pockets of the 'Fortune-hunters.'

"It would be an excellent reform if the Patent Acts were abolished entirely, and new inventions have to take their chance commercially on their merits and quality alone; but as there are so many vested interests against this, the next best thing is to let the alleged 'fortune' go hang. For quite 95 per cent. of inventors this will ensure a much more peaceful life, and their pockets will be far better lined by buttoning them up when the idea of taking out a patent enters their heads."

My Suggestion

I AM glad to see that my original suggestion for obtaining statistics on television interference is being acted upon. In the meantime, I suggest that all wireless clubs should conduct experiments on television interference, and I shall be glad to

draw up a form of investigation if they wish to do so, and to pass along their results to the B.B.C.

It is my view that this television interference problem is one which the B.B.C. itself should tackle. We know that manufacturers have suppressing apparatus, but no-one is prepared to say that it is the correct apparatus which will suit every case. Whilst competing commercial interests must inevitably have a strong bias for their own wares, I feel that the matter is one which should be investigated impartially, in just the same way as the B.B.C. was left to choose between two television transmitting systems.

The position at present is somewhat tantamount to asking motor-car manufacturers to solve the problem of the roads. In this respect the B.B.C. or the Television Advisory Committee is somewhat in the same position as the Ministry of Transport. I repeat that the investigation of television interference is not one for the trade. It is my experience that some suppressing systems for motor-cars interfere with the efficiency of the ignition system, so if such suppressing systems are made compulsory it could rightfullly be argued that television was causing interference with motor-cars. The needs of the few must be sacrificed to the needs of the many. Television is, after all, a form of entertainment, whereas motoring is largely a necessity, and motorists are likely to outnumber those owning television receivers by about ten to one for some time to come. The suggestion that motorists should be compelled to buy suppressing apparatus is a particularly selfish and untenable position to take up, and is likely to do damage to the development of the television industry. This is particularly true when we remember that suppressing apparatus has by no means reached that stage where it can be standardised. I have communicated my point of view to the B.B.C.

Success for British Wireless Industry

IT is interesting to note that in face of keen competition from American, Dutch, French and German companies, Marconi's Wireless Telegraph Company, Ltd., has secured an important contract from Finland for the supply and erection of a 50-kilowatt short-wave broadcasting station, to be installed at Pori, near the Gulf of Bothnia. The equipment is being designed and manufactured at the Marconi Company's works at Chelmsford, and will provide work for many skilled British craftsmen.

The station is to be completed in time for the Olympic Games which will be held in Finland in 1940, and will thus provide a world-wide channel for the rapid dissemination of news and commentaries on the sporting events.

Resistance Group Boards

MANY commercial receivers incorporate a strip or sheet of insulating material on the chassis, and a number of resistances and condensers are mounted on this board—which is generally referred to as a group board. The idea is to simplify construction, as the components may be mounted on the board by one operator, and the board mounted on the chassis by another, wiring being carried out at yet another stage. In endeavouring to utilise this idea in a home-made receiver some constructors have experienced difficulty due to their having overlooked the fact that the connecting wires and components are brought very close to each other. Therefore, it is essential to see that adjacent components and wiring are of such a type that instability or interaction will not take place, and in some receivers this may not be found a simple task. It may be necessary to split up the board into two or more sections, placing them at different parts of the chassis.

False Economy

WHEN considering means of economy in building receivers there are certain points which must be ruled out of any economy wave. An instance occurred recently where a constructor had decided to omit fuses in his receiver, placing fuses in the mains lead in order to give what he thought would be the necessary safeguard. After the receiver had been in use for some time, however, the rectifying valve developed a short-circuit, and owing to the absence of a fuse, and the operator's inability to ascertain the cause of stoppage of signals, the set was left switched on long enough to burn out the mains transformer. Thus, the saving of expense of a small fuse was offset by the cost of having the transformer rewound.

Interchangeable Plugs

MANY constructors use standard 5-amp plugs and sockets for inter-connecting various pieces of apparatus, and in some cases extension speakers are provided with this type of connection. It should be borne in mind, however, that there is a risk of someone who is not familiar with the system plugging a speaker, for instance, fitted with a 5-amp plug, into a mains socket and thereby burning out the speaker. It is desirable, therefore, to fit special non-interchangeable and also non-reversible plugs to such pieces of apparatus, and these are obtainable from various manufacturers.

Big "All Region" Plan

I AM informed that all the B.B.C. Regions will contribute separate features to a new series of variety magazine programmes entitled "Roundabout," which, organised by John Watt, B.B.C. Variety Director, will be given after next month in the main Wednesday night variety programme. This will be the first time that the B.B.C.'s programme resources in London and all the Regions will have been regularly "pooled" in a co-operative variety programme series.

"Arrangements are not yet complete," John Watt said recently, "but we hope to include musical and other features, 'interest items,' a comic strip, outside broadcasts, sketches and a new type of serial, in which listeners will be able to take a particular interest. All the contributions will be 'live' and will be co-ordinated through a control panel in Broadcasting House.

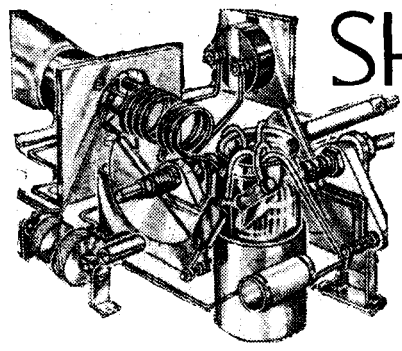
"The idea for 'Roundabout' suggested itself as the result of the success of the 'Seaside Nights' and 'Famous Music Halls' series, in which we had the co-operation of the Regions. We want to extend the principle by which we all work towards one end—the best entertainment for the listener."

The Passing of "Band Waggon"

THAT popular weekly feature, "Band Waggon," will make its last happy-go-lucky radio journey on March 15th in a programme that will end the present run of one of the most stubbornly successful B.B.C. variety series. Whether it will eventually be revived remains to be seen. Certainly there is quite an element of doubt about it. The future of Mr. Walker, the philosophical junk-man of the programmes, however, is a little more definite.

"You can say," declares John Watt, B.B.C. Variety Director, "that Mr. Walker will not be permanently lost to radio, though I cannot tell you how or when he will make his reappearance on the air."

To follow "Band Waggon," the B.B.C. has booked Greatrex Newman's "Fol de Rols," one of the most famous concert parties in the country and probably the biggest organisation of its kind. They will be on the air every Wednesday evening for six consecutive weeks.



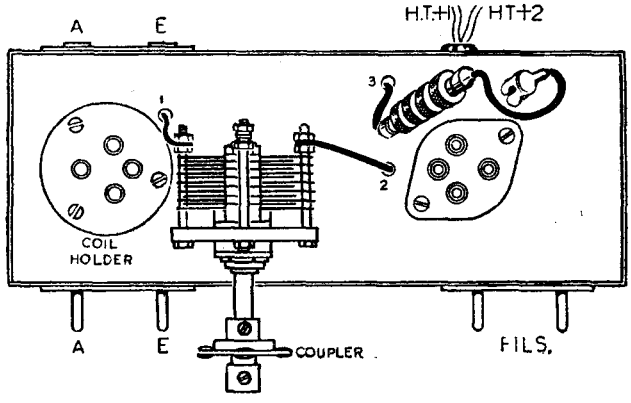
SHORT-WAVE SECTION

H.F. AND L.F. UNITS FOR THE SECTIONAL S.W. RECEIVER

Theoretical and Constructional Details of the Remaining Sections of this Novel Design.

By W. J. DELANEY

LAST week we described the construction of a detector stage which alone forms a good single-valve receiver for short-wave use. The original idea was, however, to make this the basis of a multi-valver which could be used at any time in any particular form. Therefore, we need an H.F. stage and one or more L.F. stages, which may be added to the original unit. The H.F. stage may be accommodated on a chassis 3in. deep, and this may be made of the same length as the original unit so that the two may be placed together to form a single chassis 8in. by 9in. L.F. stages may be accommodated on similar sizes of chassis and placed at the side, or they may be made 9in. deep and two stages may be placed on one chassis. The exact arrangement of these may be left to the individual constructor, although by using separate chassis it is a simple matter to remove a stage when it is not desired. This scheme is preferred by some to the incorporation of jack and plug or other switching systems.



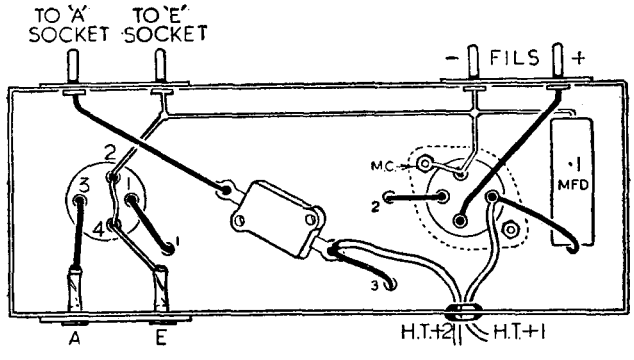


Fig. 2.—Top and underside wiring diagrams of the H.F. unit.

The H.F. Stage

For the H.F. stage we need a single tuning condenser identical to that used in the detector unit, a coupler by means of which the two condensers may be ganged together, a 6-pin coil and holder, and a valve with holder. The valve may be either an H.F. pentode or an S.G. component, but should not be of the variable-mu type. At the front of the chassis a small strip of paxolin may be bolted, and attached to this are two solid plugs capable of fitting into the aerial and earth socket strip on the rear of the detector chassis. If these are properly positioned it will be possible to plug the two units together. Bolted to the front runner of this unit is a vertical panel of aluminium, through which clearance holes for the plugs and condenser spindle must be cut (Fig. 1). When the two units are placed together this panel will act as a screen and effectively prevent interaction between the H.F. and detector stages, whilst removing the earthed panel clear of the field of either of the coils. In this way maximum efficiency is obtained. At the back of the H.F. chassis a similar aerial-earth socket strip should be mounted for connection of aerial and earth. To avoid the necessity of threading the battery cable through the chassis when changes are made, small sections should be cut out of the front and rear runners and thus the chassis may easily be placed over the cords without difficulty. The condenser should be mounted on a standard bracket and placed at a convenient height and distance from the front of the chassis, so that it may be locked to the spindle of the front condenser.

Standard connections will be made to the coil and valveholders, the filament terminals on the latter being provided with flex leads which may be joined to the detector valveholder or to the accumulator direct. It is not often that it will be found necessary to make rapid changes from one unit to another and thus "clip on" connections could be used for the valve filaments, provided that the clips gave really reliable contact. Failure to attend to the latter point may give rise to background noises due to vibration of the connection. If desired, a duplicate aerial-earth socket strip may be mounted at the rear of the detector chassis and a pair of plugs mounted as already described for the aerial connections. These may then be wired to the filaments so that this part of the circuit may be completed automatically.

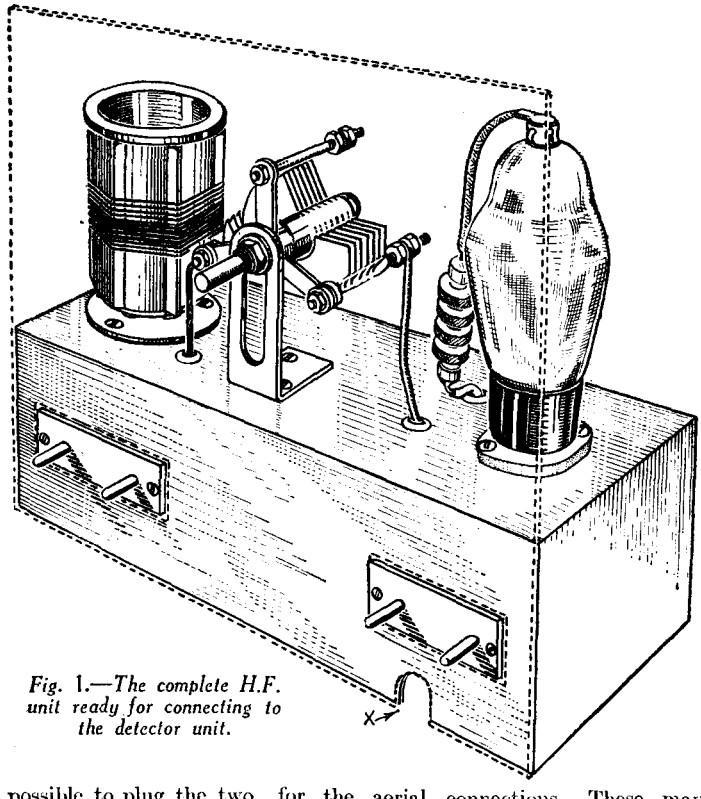


Fig. 1.—The complete H.F. unit ready for connecting to the detector unit.

L.F. Units

The L.F. units are preferably transformer coupled and made up on similar lines, the input being provided by a pair of terminals

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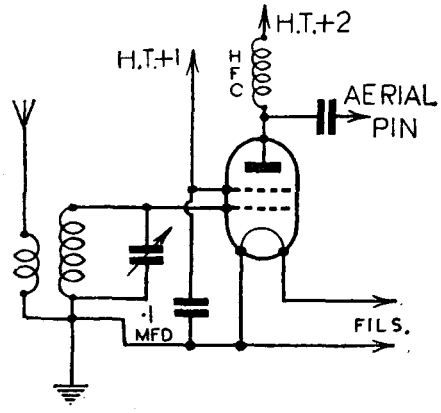


Fig. 3.—Theoretical circuit of the H.F. unit.

SHORT-WAVE SECTION

(Continued from previous page)

mounted as shown in Fig. 4. These are subsequently linked to the two 'phone terminals on the detector chassis when the L.F. stage is to be added. Filament connections may be taken care of in a similar manner to that indicated for the H.F. stage, the plug-and-socket arrangement being, of course, the most reliable. It will be seen that the L.F. chassis may be duplicated for a further stage if desired.

The single L.F. chassis will accommodate two L.F. stages, and for a really powerful multi-valver the second L.F. chassis could include push-pull valves fed from the second valve in the first unit—thus providing a five-stage receiver. There is ample room for such circuit arrangements in the chassis sizes which have been given, but the omission of the second L.F. chassis will still enable a four-valver to be built in small limits. The only point here is that there will be no ready means of cutting out the last L.F. stage where the additional low-frequency amplification is not required. This point could, however, easily be taken care of by mounting a standard jack on the front of the chassis, with plug connections for the 'phones or loudspeaker, although this would to some extent upset the main idea underlying the design of this unit multi-valver.

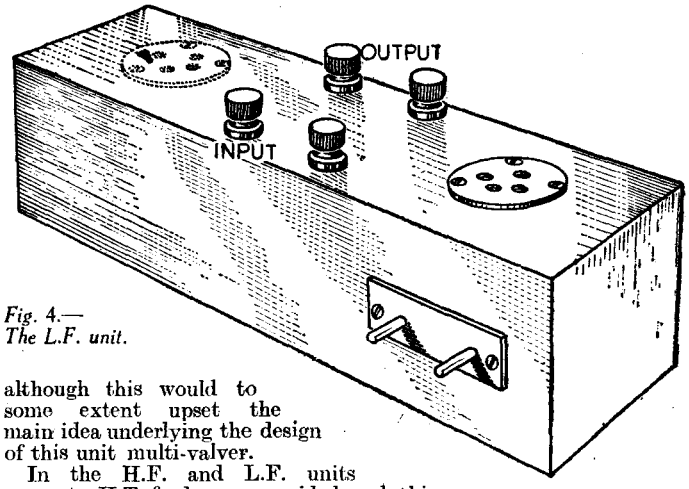


Fig. 4.— The L.F. unit.

In the H.F. and L.F. units separate H.T. feeds are provided and this is the most satisfactory arrangement as it permits each stage to be adjusted separately for maximum results. Furthermore, each stage may be decoupled more directly and thus may be used for experimental use outside the combination for which it is originally intended. It will be seen that by means of the idea outlined in this article a set may be built up which is no larger than a receiver built as a complete unit, but at the same time complete flexibility is provided so that economy may be effected when desired, and the best performance obtainable at all times under all conditions. The overall size of four chassis, which will provide H.F., detector and 2 L.F. stages is approximately 14in. by 9in. with 3in. runners.

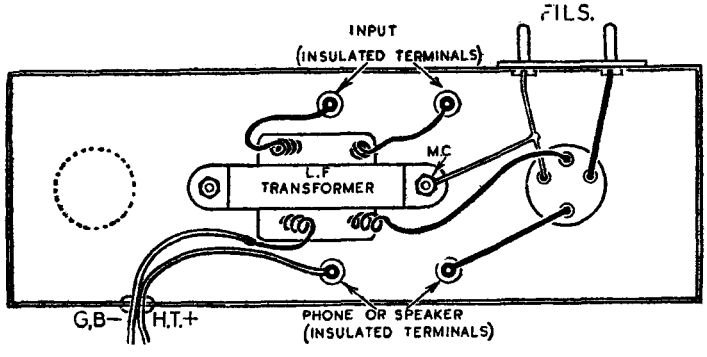
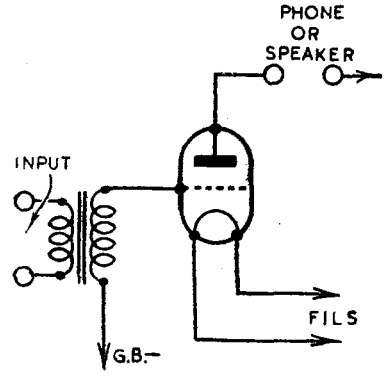


Fig. 5 (left).— Wiring diagram of the L.F. unit and Fig. 6 (right).— Theoretical diagram of the L.F. stage.



Leaves from a Short-wave Log

Brazil and Germany

RELAYS of programmes destined to be re-broadcast through the German radio network have been picked up on two channels, namely, 14.35 m. (20.08 mc/s) and 20.07 m. (14.935 mc/s), both transmitted through PSA and PSE, Marapicu (Brazil), respectively.

New Abyssinian Station

IUJ(?), Addis Ababa, is a new transmitter installed by the Italian authorities; it is now testing daily between G.M.T. 18.30-19.30. The wavelength is 31.5 m. (9.523 mc/s). It is reported that the station is only a provisional one as the eventual power will be 10 kilowatts.

Franco's Main Short-wave Station

THE Nationalist party broadcasts from its headquarters at Burgos news bulletins in the English language, as well as in Spanish, Italian and German, daily through station FET5 (Burgos), working on 40.8 m. (7.353 mc/s) from G.M.T. 18.00 onwards.

Radio Nations' Altered Schedule

FROM February 12th English broadcasts by the Secretariat of the League of Nations at Geneva (Switzerland) are being made through HBO and HBQ, Prangins, on respectively 26.31 m. (11.4 mc/s) and 44.94 m. (6.675 mc/s) at G.M.T. 19.30.

Moscow's Multiple Channels

BROADCASTS from Moscow for the benefit of neighbouring and other nations are now broadcast on seven different channels. They are: RW96, 19.72 m. (15.21 mc/s), G.M.T. 08.00 (English); RKI, 19.89 m. (15.08 mc/s), G.M.T. 24.00 (English); RW96, 31.25 m. (9.6 mc/s), G.M.T. 23.00 (Spanish); 24.00 (English); 02.15 (French); on 31.51 m. (9.52 mc/s), G.M.T. 18.00 (German); 19.00 and 21.00 (German); RNE, 25 m. (12 mc/s), G.M.T. 02.00 (Spanish); 11.00 (English); 12.00 (German); 13.00 (Dutch) and 14.00 (French); RNE, 50 m. (6 mc/s), 15.00 (English); 16.00 (Spanish); 17.00 (German); 18.00 (French); and RIA, 51.24 m. (5.855 mc/s), G.M.T. 20.30, in the Czech language.

Baghdad Heard on 30.7 m.

LISTENERS report reception of a broadcast by YI5KG, Baghdad (Iraq), on 30.7 m. and on the regular channel of 41.67 m. (7.2 mc/s). The former wavelength cannot be traced as having been formally allotted to this staton, and it is presumed that it is an experimental one. Reports should be addressed to I. Hassan, Director of Radio Station YI5KG, Civil Airport, Baghdad (Iraq). The station is on the ether daily between G.M.T. 12.30 and 20.00.

Manizales Changes Call-sign

HJ6ABB, Radio Manizales (Republic of Colombia), on 49.15 m. (6.103 mc/s), has altered its call-letters to HJ6FAB. It is on the ether daily (Sundays excepted) from G.M.T. 22.30-03.00. Address: Apartado Postal 175, Manizales.

And Havna . . .

THE 1-kilowatt COCQ station at Havana (Cuba) is now working on 33.52 m. (9.85 mc/s). The call is *Estaçiones La Voz de la RCA Victor, CMQ y COCQ en Habana, Republica de Cuba*. Interval signal: two gongs (one high and one low pitch). Address: Calle Maximo Gomez, 19, Vedado, Havana.

Radio Guadeloupe Logged

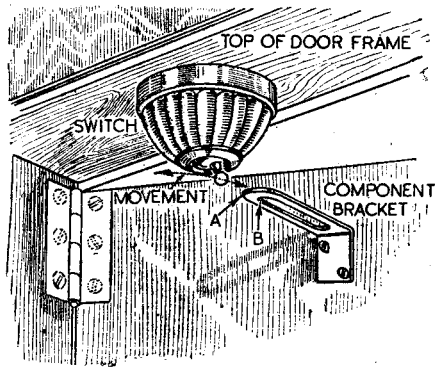
A TRANSMISSION by FG8AA, Pointe-à-Pitre (Guadeloupe, French West Indies), was recently logged by a listener on the south coast of England. The wavelength announced is 42.5 m. (7.058 mc/s), and transmissions are made daily from G.M.T. 23.00-00.30. The power is 100 watts, but it will be shortly increased. All announcements are in French, barring the last one before the station closes down for the day, and this is given in the English language. Broadcast concludes with the playing of *La Marseillaise*. Address: Boite Postale, 125, Pointe-à-Pitre, Guadeloupe.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA — **READERS WRINKLES** — THE HALF-GUINEA PAGE

Automatic Cupboard or Room Light

A SIMPLE device by means of which a light can be switched on or off by opening or shutting a door can easily be constructed from an ordinary electric-light



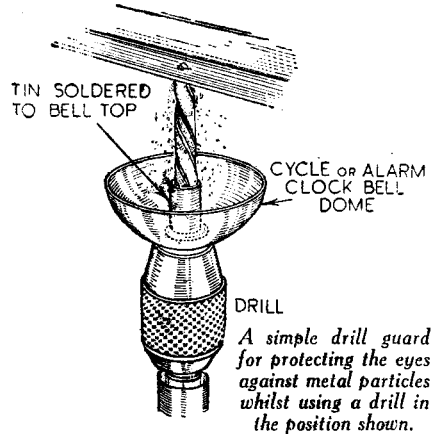
An easily-arranged switching device for a cupboard or room light.

switch and a component-mounting bracket. The switch, which should preferably be one of the old type with a metal dolly, is screwed into the centre of the top of the door frame. The component-mounting bracket is screwed into the door as shown in the illustration.

On almost shutting the door the point "A" of the bracket pushes the switch back, thus switching off the light, and when the door is completely shut the arm of the switch rests inside the centre slot of the bracket. When the door is now opened the point "B" of the bracket pulls the switch on and then slides free of the switch. —B. LOVELL (Newcastle).

A Drill Guard

A SIMPLE device for preventing metal particles from getting into your eyes, when drilling, is contrived as shown in the sketch. The bell dome from an old electric bell or alarm clock is taken, and in the centre is soldered a sleeve made of tinplate, which is passed over the drill in the manner indicated. When the drill is used in the position shown, this device also prevents the accumulation of metal particles on the bench.—R. FIELDHOUSE (Harrogate).



A simple drill guard for protecting the eyes against metal particles whilst using a drill in the position shown.

THAT DODGE OF YOURS!

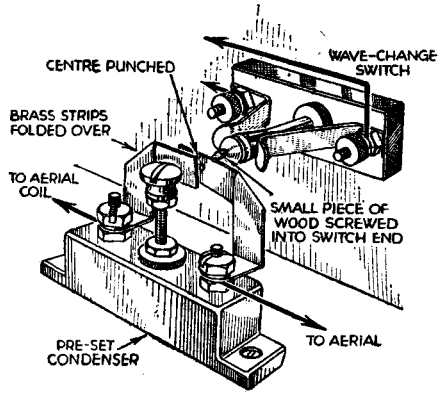
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account 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 notion sent in must be *original*. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.

SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page iii of cover.

Auto-switching for Aerial Condenser

THE accompanying sketch shows a simple arrangement for automatically switching a pre-set condenser in and out of circuit on the long and medium wavelengths. The contact strips are made of thin brass strip taken from old flash-lamp batteries. The strips are bent, as shown, and clamped under the terminal nuts of the condenser. The condenser is shorted out on the long waves, and a piece of hardwood



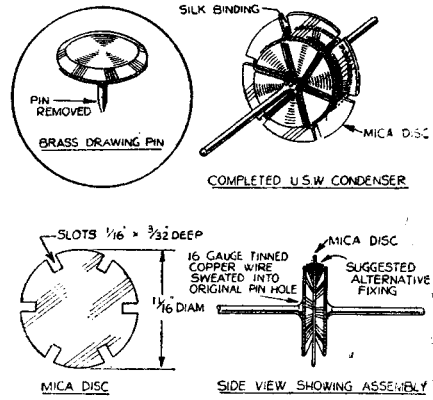
An automatic switching arrangement for an aerial condenser.

rod is screwed into the end of the wave-change switch to insulate it from the aerial. —F. S. RUDD (Brondesbury).

An Easily-made Ultra-short-wave Grid Condenser

THOSE amateurs experimenting on the ultra-short waves may be interested in the simple grid condenser shown in the sketch. Two brass drawing pins were used for the plates, these being of the type shown, having flat heads, ¼in. outside diameter, and a slightly bevelled edge.

The steel pins were first extracted, and a short length of 16-gauge tinned copper wire sweated into each hole. A small mica disc was then cut out, having six slots as shown. This was placed between the two heads, and the three parts bound firmly together by means of silk thread as indicated. An alternative method of fixing

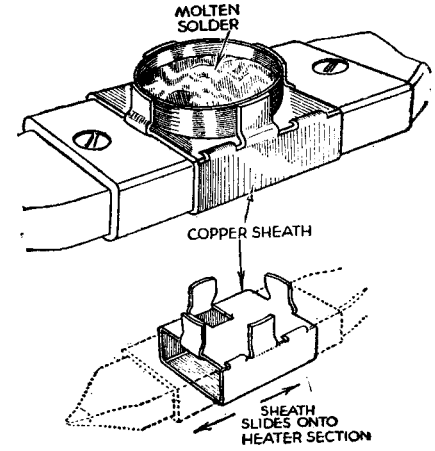


A novel method of contriving a U.S.W. grid condenser.

might be tried of running hot pitch into the space formed by the mica and the bevelled edges of the discs. In this case, the slots in the mica and binding could no doubt be dispensed with. The capacity of this condenser is, of course, in the micro-microfarad class, but will be found quite sufficient on the higher frequencies.—R. L. GRAPER (Chelmsford).

A Tinning Dodge

A SMALL clip for attachment to the soldering iron is useful for getting over the tinning difficulty when soldering. The clip is constructed from 20-gauge copper sheet, and four square upright pieces are made by cutting three sides of a square and bending upwards. This forms the holder for the tin lid, or solder container. The sheath and tin lid are then slid on to the heater section of the electric iron, and small parts are dipped into the molten solder. The clip is easily removed when not in use.—E. BENTLEY (Harrow).



This simple dodge facilitates tinning.

TESTING YOUR

How to Make a Useful All-purpose Neon Tester; Chokes; Testing Condensers and Resistors; Meas

THE majority of component tests likely to be made by constructors are those for insulation and continuity of windings. Quantitative tests—measurements of inductance and capacity for example—generally call for more elaborate test gear than that normally possessed by the amateur.

By far the most effective tester is one made by simply connecting a small neon tube in series with a fixed resistor, as shown in Fig. 1. A mains plug is connected to one end, whilst a couple of test prods with a long piece of twin flex are connected to the other. For the neon tube, a Bulgin midget neon indicator lamp is most convenient; it costs 3s. 6d. and can be fitted into a holder of the type used for standard 1¼in. fuses. This lamp passes a negligible current and should always be used with a series resistor of between .2 and 1 megohm. It has a striking voltage of about 180, which means that it will not glow until a voltage of this value is applied to it. Bear in mind that, because of the infinitesimally small current passed, the series resistor does not reduce the applied voltage to any measurable extent.

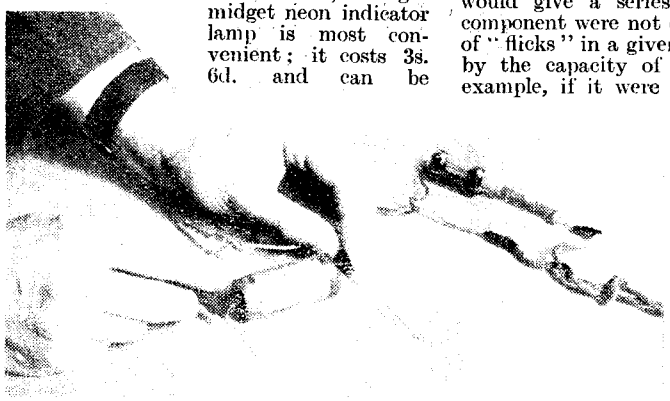


Fig. 1.—Testing a fixed condenser with a small neon tube. The flex on the right runs to a mains plug. Notice that the test leads are very well insulated.

Tester Construction

To avoid any possibility of touching the "live" leads it is a good plan to place the neon tube, in its holder, and the resistor in a shallow box. A hole could be cut in the lid, this being covered with glass or Cellophane to provide a window. Both twin flex leads should be passed through holes in the opposite ends of the box, and should be knotted on the inside to prevent their being pulled out. The mains connector could be either a five-amp plug or a lampholder plug. Standard test prods are best for the output leads, but two lengths of 16-gauge wire could be soldered to the ends of the flex leads if they are well bound with insulating tape to within about ⅛ in. of the ends. Actually, it is unlikely that any appreciable shock would be felt if the metallic parts of the test prods were touched, but those who are very sensitive to electricity might experience an unpleasant "twinge."

A small test unit of the kind described is shown in Fig. 2, where the simplicity and neatness of the arrangement is illustrated. In this case a small cigar box is used, but any kind of wooden container is perfectly satisfactory.

How It Works

Now let us see how this tester works. If the two test prods were joined together while the mains plug was connected the lamp would emit an orange glow, showing that the circuit was complete. Similarly, if the prods were connected to the two ends of a coil or transformer winding the lamp would glow if the winding were intact. Should the prods be held against the two terminals of a fixed condenser, the lamp would give a series of "flicks" if the component were not defective, the number of "flicks" in a given time being governed by the capacity of the condenser. For example, if it were found that the lamp lighted 30 times a minute with one condenser and, say, 75 times a minute with another, it would be known that the second had a larger capacity than the first. It is actually possible to calibrate a device of this kind so that it can be used for measuring capacity, but that aspect will not be considered further in this article.

It will be clear from what I have written above, that the tester could be "reversed" for testing in a receiver to see if current was reaching certain points. Thus, if the two pins of the mains plug were shorted the lamp would glow when the test prods were connected to two points between which there was a potential difference of 180 volts or more.

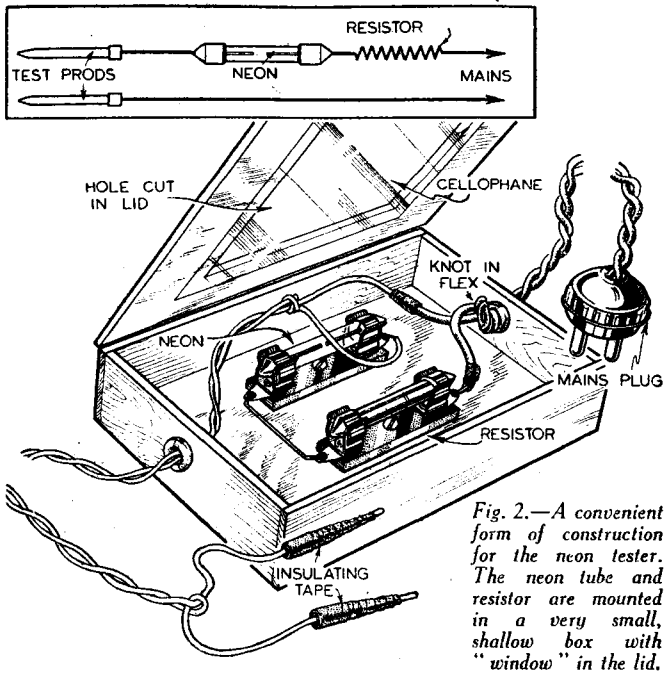


Fig. 2.—A convenient form of construction for the neon tester. The neon tube and resistor are mounted in a very small, shallow box with "window" in the lid.

In testing resistors the method is the same as that for coil or transformer windings, except that if a component has a resistance of more than one megohm it would probably be necessary to short the series resistor in the test unit. Alternatively, if the resistor were mounted between two clips or between two terminals, a component to be tested—with a value of not less than 200,000 ohms—could be temporarily fitted in its place. The two test prods would then be touched together, of course.

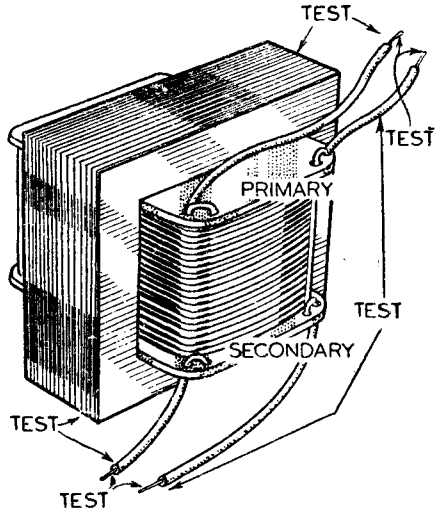


Fig. 3.—Points to which the test prods should be temporarily attached when checking a mains or L.F. transformer.

Transformer Tests

Another excellent use for the tester is in checking a home-made transformer before it is put into service. First the primary and secondary windings would each be tested for continuity by touching the test prods against the ends of the output leads; the lamp should glow practically as brightly as when the prods are connected together. Should the lamp fail to light, or should the light be intermittent, there is a fault in either the winding or the connections to it. Next, a test should be made of the insulation between the windings. For this, one test prod is touched against one primary

COMPONENTS

Checking Windings of Transformers, Coils and uring Transformer Outputs - By Frank Preston

lead, the second prod being touched against one secondary lead. This time a continuous glow would indicate a short-circuit between the windings, due perhaps to one turn having slipped down past the inter-winding insulation. It is very important that the fault should be set right before the transformer is connected to the mains. An occasional "flick" of the neon lamp would not point to a fault in most cases, but would simply indicate that there is a certain amount of capacity between the two windings, as there must inevitably be.

A final test should be made between the windings and the core. Here again there should be no more than a very occasional glow from the lamp. The tests just described are shown in Fig. 3.

Coil and Choke Tests

The same kinds of tests can be applied to coil and choke windings. Fig. 4 shows

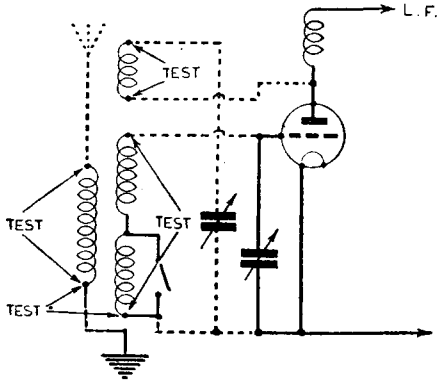


Fig. 4.—Test points—for continuity and insulation between windings—on a tuning coil. An insulation test would also be made between reaction and grid windings, and between reaction and aerial windings.

test points on a typical coil. It will be seen that each winding is checked for continuity, but in the case of the grid winding it is important that the test be repeated with the switch in both long- and medium-wave positions. A test can also be made between windings, when the lamp should not glow at all, since the capacity will be extremely small. With H.F. chokes a test is made for continuity only, whilst a winding-to-core test should be made in addition when dealing with an iron-core choke.

Battery users are probably thinking that the tests so far described are useless to them because they cannot tap a supply of sufficient voltage. This does not always happen to be the case, because use can often be made of a run-down H.T. battery wired in series with that feeding the set. The high internal resistance of the old battery is not a very serious item when the current consumption of the neon is so extremely low.

A Speaker-Battery Tester

If a battery of sufficient voltage is not to hand, tests of a similar nature to those described can be made by using a G.B. battery in series with a loudspeaker. With these connected together and to a pair of test prods as shown in Fig. 5, all of the

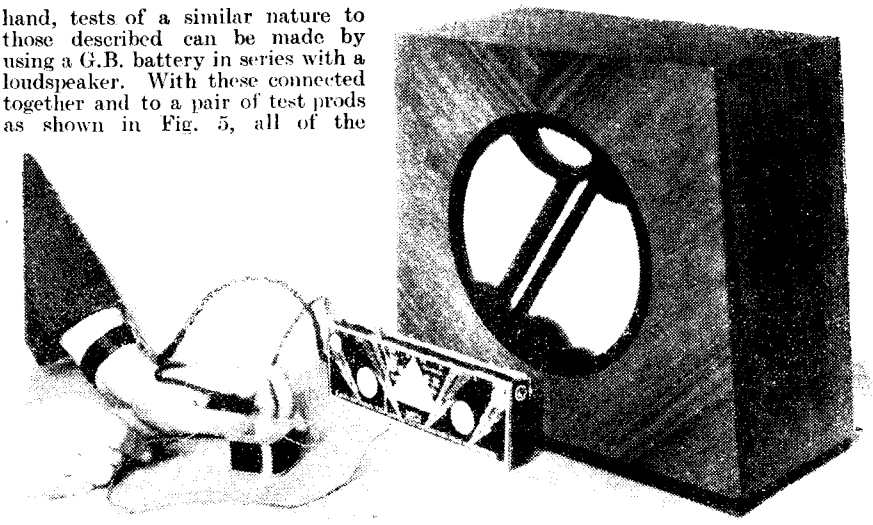


Fig. 5.—A simple method of testing continuity and insulation. The speaker is in series with a battery and the component under test. In other words, the speaker takes the place of the neon and resistor, while the battery replaces the mains supply in Figs. 1 and 2.

tests described, with the exception of those for high-value resistors, can be made fairly successfully. One prod is held firmly against one end of the part to be tested for continuity, while the other prod is smartly touched against the other end. If the continuity is intact a double "plop" should be heard from the speaker. When there is an open circuit—as there should be between adjacent windings, and between windings and iron core—nothing more than a very faint "click" should be audible.

When the resistance of the component under test is more than about 20,000 ohms it will probably be necessary to increase the energising voltage, replacing the G.B. battery with an H.T. voltage. If that course is followed, proceed carefully, starting with a low voltage and gradually increasing it. Resistances up to .5 megohm or so will usually pass enough current to produce a "plop" in the speaker if the supply voltage is raised to about 100 or just over.

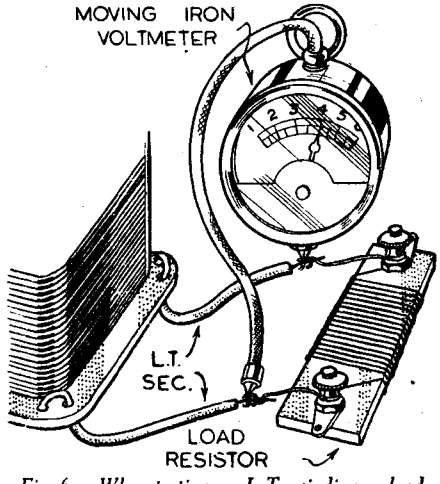


Fig. 6.—When testing an L.T. winding, a load must be placed across it.

Measuring Transformer Output

It is often desirable to check the output voltage from the secondary winding of a home-made mains transformer. For this to be done satisfactorily the normal "load" should first be joined between the ends of the winding. For example, if a test is to be made of a 4-volt 2-amp. L.T. secondary, a resistance that would pass 2 amp. at 4 volts should be wired across the connections, as shown in Fig. 6. In this example the correct value for the resistor would be 2 ohms. Such a resistor could be made from two yards of 22-gauge Eureka resistance wire, which has a resistance of almost exactly 1 ohm per yard. With this resistance across the winding the voltage measured with a reasonably accurate moving-iron meter should be almost exactly 4. If it is more than this, the length of the winding should be slightly reduced; if less the winding should be slightly increased in length.

For this test to be absolutely accurate the H.T. winding also should be normally loaded by connecting a fixed resistor across it. Thus if the winding were rated at 200 volts 100mA the resistor should have a value of 2,000 ohms, and should be rated at not less than 20 watts. With a fairly heavily constructed transformer, such as those described in these pages recently, it is not really necessary to take great care to load all windings exactly in order to measure output.

To test H.T. secondaries it is usually best to connect the transformer to the rectifier, which can in turn be connected to the receiver or suitably "loaded," and to measure the rectified voltage with a high-resistance voltmeter. Alternatively, the current passing through a known load can be measured with a milliammeter and the voltage thus determined from the old Ohm's Law formula: Voltage=Current times Resistance.

TELEVIEWS

Film Co-operation

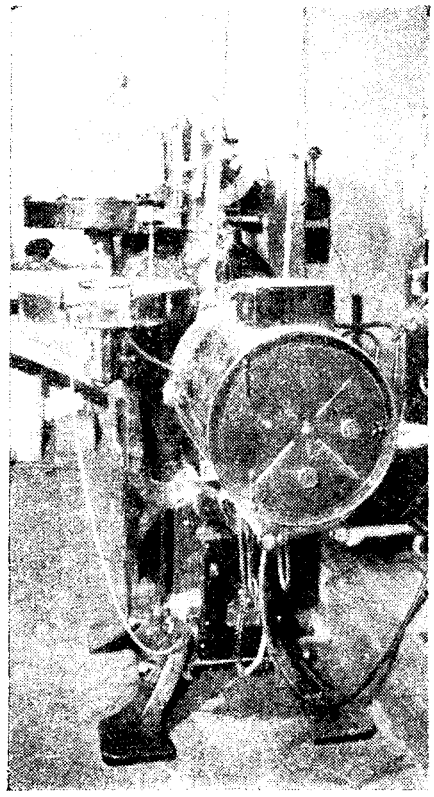
IT has been left to America to give a lead in a new form of co-operation between the film and television interests. The R.K.O. Radio Pictures Co. has, in conjunction with the National Broadcasting Co., produced a condensed version of the film "Gunga Din." This has been done by utilising actual shots from the film, the bulk of it comprising close-ups, and medium depth scenes. The film is timed to run for about ten minutes, and any gaps in the action of the story will be made up by sub-titles and commentary. Since many of the leading stars are featured in the trailer it is felt that the idea will help to publicise the film proper, and in consequence both industries will benefit by the showing of the "short" by television during the World Fair. So far in this country there has been a ban on the use of feature films by the B.B.C., although cartoons, news reels, and educational shorts, have been used freely with an occasional transmission of a Continental film, having sub-titles to help the foreign spoken word. Realising that film material must play its part in the programmes which sooner or later will have extended hours on the air, this new experiment should serve as a useful guide to immediate co-operation between the B.B.C. and film companies. The public will welcome it, for they will be given an opportunity of seeing in their own homes stars with whom they are familiar, and since any condensed version of the film must inevitably become a glorified trailer it will provide an excellent advertisement, and encourage the public to see the whole film at local cinemas.

Greater Emission

IN the ordinary form of electron multiplier the primary electron impact on the plane of the secondary emissive surface brings about a multiplication ratio of the order of ten. To give the degree of amplification desired, therefore, it is necessary to have successive stages, each contributing its quota to the main stream before final collection at the end of the tube. It is now learned, however, that Zworykin, who has contributed so much to the development of these devices, has discovered a method whereby the factor of ten can be increased to over a thousand. For this to occur, the target electrodes, against which are directed the impinging electrons, are built up by including a very thin layer of insulating material between the metallic backing plate and the caesium secondary emissive surface. It is difficult to see why this process should give more than a hundredfold secondary electron increase. The result may be due, however, to a polarising effect brought about by the initial electron bombardment, this causing abnormal sensitivity within the composite surface.

A Continuous Projector

SOME time ago a good deal of discussion took place concerning the best type of cinema film projector suitable for the televising of standard forms of talking films. It was felt that one of the earlier forms of continuous projectors would meet the stringent needs best, and the accompanying illustration indicates one of these machines as it was applied by the Baird Company to the early transmissions of films for television purposes. In the more usual projector the film is fed intermittently through a small gate, and the light is cut off at least twice for each frame of the film. With the form shown, however, a complicated but efficient combination of cam-operated mirrors gives the pictures of the film continuous movement when projected on to a remote screen, irrespective of the speed with which the machine is operated. When used in conjunction with an electron camera, therefore, the pictures projected on to the signal plate are essentially similar to those secured by studio or outside scenes. Questions of signal suppression during the



An example of a continuous film projector which lends itself admirably to the televising of talking films.

frame jump period do not arise, and normal black out and synchronising pulse injection into the generated signal follow direct camera practice. There seems little doubt, therefore, that machines of this character will be adopted for all film work in so far as it applies to television.

Constant Spot Size

THE theoretically perfect cathode-ray tube has to satisfy a number of important points when used for television picture reconstitution, but one of the most important is constancy of spot size, irrespective of degree of modulation. In other words, it does not matter whether the intensity modulation beam of electrons is reproducing a section of the picture which is full white or full black, the area of the tracing spot should not vary if a sharply defined image is to be observed. For a variety of reasons this does not always occur in practice, and tube designers have given special attention to ways and means whereby this desirable feature can be present in modern tubes. One of the latest schemes to be suggested is the use of a dual electron optical system. In the first section a pre-concentration effect is brought about by a relatively weak electron lens, and following this is a stronger lens. Made up conical-shaped sections pointing towards the cathode and having associated circular diaphragms are used, the positive potentials applied increasing as each anode is positioned farther from the cathode surface. This scheme is said to give quite material improvement in maintaining spot size constancy and also brings about a more sensitive control of the actual beam.

Modulation and Interference

SINCE the announcement of the standards to be employed in America for their initial television service, considerable controversy has existed among engineers as to the comparative merits and demerits of the English and American methods. Apart from the differing frame frequency and degree of picture definition, there are two other sections which are diametrically opposite in the standards chosen. In this country the radiated signal has a positive modulation, that is an increase from black to white in a picture brings about an increase in carrier-wave modulation. With the American practice, however, the reverse is the case—zero modulation is full white and 100 per cent. modulation corresponds to the troughs of the synchronising pulses. Again, the B.B.C. use a vertically polarised signal from the aerial system at Alexandra Palace, but in the United States they propose to use horizontal polarisation. Since there has been no public service in America, it is impossible to ascertain the degree of success which their methods will bring about. There are disadvantages, but on the score of interference—a problem which is engaging the attention of all interested parties in this country—it would seem at first sight that the American method may prove satisfactory. The light splashes seen on the television receivers here when, say, within range of the ignition systems of motor-cars are quite familiar, but in America they will not be so obvious. The interfering signal gives a strong excitation to the receiving aerial, but since full modulation is black, then the spot is of course not so conspicuous. Furthermore, it has been demonstrated that the field of interference encountered from a car's ignition system is in the main vertically polarised, that is, the present aerial system of a vertical dipole is efficiently oriented to give a maximum pick-up to the offending signal. Using horizontal polarisation, the Americans are therefore in the happy position of using aerial systems with a minimum sensitiveness to the interfering field. Whether the results on the score of interference will justify the United States signal standard can only be assessed when the service commences operations and sets are installed in the homes of the public, but it is certain that English experts will make this one of their first observations when comparing the two systems.

Television Features

Television Surveys No. 6—Canals

MR. A. P. HERBERT, M.P., will accompany the television cameras to a lock "somewhere on the Grand Union Canal," on March 12th, to give viewers an insight into life on canal barges. A lock is the ideal venue, for each barge stops long enough for a chat with its occupants, and as the television cameras will range the decks from bow to stern nothing of importance will be missed. Mr. Herbert, who has made a special study of canal lore and traditions, will unravel many mysteries as he talks to the bargemen and their wives and families. Viewers will perhaps learn why every cabin door carries the sign of a castle, why no barge is without its collection of gaily-coloured brackets, why the busy bargewife finds time to polish those bright brass knobs which seem more ornamental than utilitarian.

"The Unquiet Spirit"

CATHERINE LACEY has been booked to appear in Jean Jacques Bernard's brilliantly original play "The Unquiet Spirit," which is to be televised in the evening programme on March 3rd. The English translation is by J. Leslie Frith.

This is a play with an interesting idea subtly communicated to the audience less by what the characters say than what they withhold. With compelling suggestion, the author builds upon the theme that everyone has one, and only one, completely sympathetic "mate"; that proximity to this twin soul, whether there be recognition or not, leads to profound emotional disturbance and, possibly, disaster. Marceline, played by Catherine Lacey, is the supposedly happy wife who becomes the tragic figure in this play of unusual imagination and power.

"The Unquiet Spirit" will be produced for television by Royston Morley.

"Rope"

ERNEST MILTON takes his original part of Rupert Cadell in "Rope," the thriller by Patrick Hamilton, which is to be televised in the evening programme on March 8th, and repeated in the afternoon of March 13th.

The story of this powerful play, which has several times been broadcast, is based on a murder of some years ago, when two undergraduates murdered a boy of fifteen. Legally, the crime was without motive, but it provides a fascinating psychological study not only of the murderers but of the man who unmasked them.

"Rope" will be produced for television by Dallas Bower.

"Harlem in Mayfair"

HARLEM will come to Alexandra Palace via Mayfair on March 6th, when the all-Coloured Cabaret from the Old Florida Club will give a half-hour television programme. Topping the bill is Adelaide Hall, the coloured vocalist, who has won a great reputation on both sides of the Atlantic. With her in this lively programme will be Marko Hlubi and his Tom-Toms; Esther and Louise; Eddie Lewis; and Felix Sowande with his Negro Choir and Orchestra.

French President to be Televised

TELEVISION viewers will be among the first to see President Lebrun arriving in London on March 21st, on his State visit to this country.

Cameras mounted on a special rostrum in Victoria Station will give the first glimpse of the President stepping from the train and being greeted by the King. Other television cameras in the station courtyard will show the arrival of His Majesty and the departure of the procession for Buckingham Palace.

BOOK RECEIVED

Everyman's Astronomy. By Mary Proctor, F.R.A.S. Published by The Scientific Book Club. 246 pages. 2s. 6d. net.

THIS book, which is written in non-technical language, contains a fascinating collection of astronomical facts which should make interesting reading for the intelligent layman. As is well known, the author has made a life-long study of astronomy, and the subject is dealt with in a very entertaining and lucid manner. Celestial Photography; The Future of the Moon; The Great Meteor Crater of Arizona; and How Meteors are Trapped by a Camera, are among the subjects dealt with in some of the seventeen chapters of the book, an important feature of which is the remarkable collection of photographic illustrations.

BRIGHTNESS AND LINEARITY RESPONSE.

IT is not always realised that in any complete television system from camera to receiver it is essential to arrange linearity of reproduction between the differences in brightness in the reproduced image. This factor, together with those of brightness range between high-lights and shadows and the average brightness of the scene, are really just as important as picture detail and phase distortion. The range and linearity questions are often compared with the photographic analogies of range and gamma. In one case the gamma of a television system has been described as the exponent of the curve which is assumed logarithmic in form, and which relates the light level in the studio with the corresponding light level in the reproduced picture seen on the screen of the television set. With a linear relationship between these quantities the gamma of the system is said to be unity, and there is therefore an accurate reproduction between the distinctions of brightness in the televised subject. To achieve this desirable condition many intermediary factors have to be considered, and in practice it is often found desirable for some of the apparatus to depart from unity provided the overall effect is secured. For example, in America it has been suggested that the response of the transmitter can be a compressive characteristic, this corresponding to a gamma less than unity, while the receiver has an expansive characteristic (above unity). The combined effect will obviously be unity, but by working in this way it is claimed that the camera could be used more efficiently and have a better signal-to-noise ratio.

B.L.D.L.C. The British Long-Distance Listeners' Club

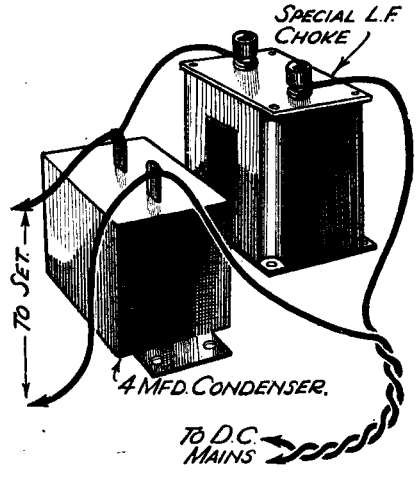
hort-wave Frequency Changers

SEVERAL members have made up superhets for use on all-waves and in many cases have experienced difficulty when tuning to the short waves. The point which generally seems to be raised is that the sets are required for use down to the television wavelengths. Under all normal conditions, it is quite possible to build a set which will utilise standard circuits and arrangements and which will function down to, say, 10 metres. When going lower than this, however, difficulty is often experienced owing to the effects of stray capacities. In a straight receiver this is not too difficult to overcome, but as the efficiency of a superhet depends upon the frequency-changing stage, poor results are often experienced below 10 metres, simply because the stage does not function correctly. We give below the circuits of the frequency-changing stage of a superhet, using an Osram triode-hexode valve, and the arrangement recommended by the makers of the valve for use down to 10 metres is shown in the first illustration, and for use from 5 to 10 metres is shown in the second diagram. It will be noted that a drastic change is made in the connections to the triode, or oscillator, section. In place of a separate grid and reaction winding a centre-tapped coil is employed and the tuning condenser is split, with H.T. fed to the tapping on the coil.

Another interesting point in this ultra-short wave design is the inclusion of the .01 mfd. fixed condenser from one side of the heater winding to earth. In practice it may be found that when this is included on one side it is more effective than on the other side and experiment is worth while here to find the best position.

D.C. Mains Supply

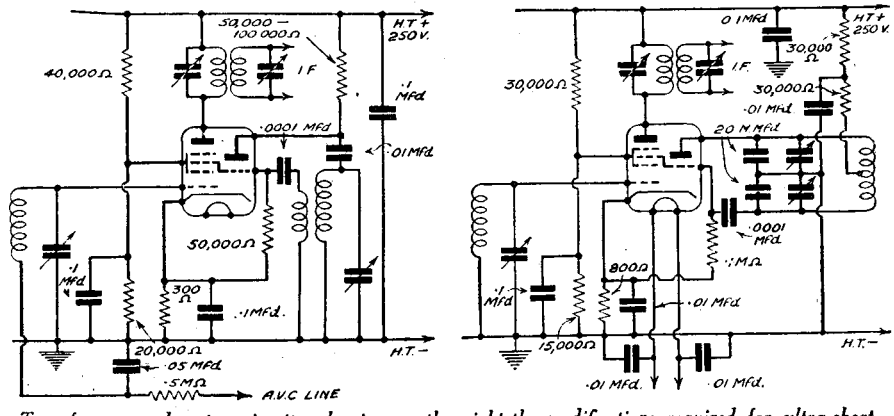
WHEN D.C. mains are available the problem of supplying H.T. to a battery receiver is removed, but it is essential to remember that the supply as taken from any mains socket will not be good enough to apply direct to a receiver. A smoothing circuit must be included and although in its very simplest form a choke and condenser are all that are called for (arranged in the manner shown above), this may not prove adequate on some supplies. As battery valves operate with a maximum H.T. of 150 volts it will be necessary to dispose of 50 volts or more depending upon the output of the mains. Therefore, in addition to the choke a further resistance must be included in the positive line, and the exact value of this component will depend upon the resistance of the choke and the total current flowing through the H.T. line. A good plan is to take the output from the circuit shown here through a fixed resistance of suitable value to the output stage, and to include a further choke of suitable valve (or with fixed resistance in series) for the detector and other stages. It is, of course, quite permissible to use electrolytic condensers of suitable rating in place of the fixed condenser which is illustrated.



The basis of a D.C. mains unit.

Amateur Transmitting

SEVERAL members have written recently asking for details of transmitting circuits and of the necessary licence. It should be borne in mind that no experiments in transmitting may be carried out until a licence has been obtained, and a "radiating" licence will not be issued, except in very special circumstances, and therefore it is not possible to obtain a licence merely to enable you to talk to a friend who lives some distance away.



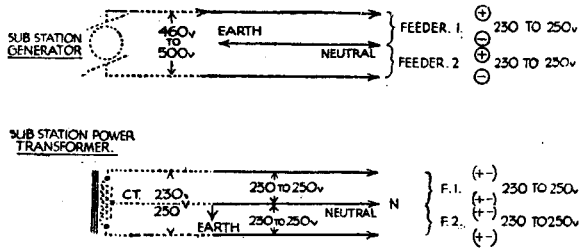
Two frequency-changing circuits, showing on the right the modifications required for ultra-short-wave working.

HARNESSING THE MAINS

Details of House Wiring and Other Mains Equipment

WHEN making adjustments or alterations to one's mains equipment, and when installing new apparatus, there are a number of points concerning wiring and construction with which some readers are not fully conversant.

Consider, first of all, the way in which the mains power is distributed; the district served derives its supply in a number of ways. Two of the more usual, dealt with here, form the essential circuit features of the other systems. Fig. 1 illustrates what is known as the "three wire system," and referring to this circuit, it will be seen that the sub-station power output is divided into two feeders by the introduction of a neutral or earth wire, thus the maximum output, which may be 460 to 500 volts, is halved, one feeder giving 230 to 250 volts below earth potential, whilst the other feeder is 230 to 250 volts above earth potential. Therefore, one house or



Figs. 1 and 2.—(Above) The D.C. version of the three wire system. (Below) The A.C. version of the three-wire system.

street may be wired to the positive side, whilst another will be wired to the negative side, both, however, receiving their positive or negative poles from the earthed neutral respectively.

Now from this it will be apparent that in a supply where the positive pole is at earth potential, the negative side must be guarded against possible short circuit to earth which could occur through any associated apparatus, and, of course, where the negative pole is at earth potential this is similarly applicable to the positive pole, although in this instance, there is less likelihood of this arising, since the majority of experimenters take for granted the negative pole as being at neutral.

In Fig. 2 the A.C. version of the D.C. three-wire system is modified slightly, but at the sub-station end, inasmuch as the earthed neutral is shown taken from the centre tap of the power output transformer, this being the more usual method of distribution, and although space will not permit details regarding the benefits of this system, it serves, however, to show the fundamental difference of the A.C. and D.C. supplies.

The point to be noticed here is that each pole (Fig. 2) is alternating between positive and negative, and so far as radio is concerned, it is always advisable to locate the neutral pole, since in some receivers a hum will be more decided when the chassis is live in respect of earth, so that a reversal of the mains polarity should assist in curing the trouble. In all instances when endeavouring to locate the neutral wiring in a house, it is useful to have a small neon light attached to a length of twin flex, thus permitting an earth return to be made through an inefficient or high resistance medium, such as one's own body.

The illustration, Fig. 3, clearly shows the effect referred to, but on no account should this be made in direct contact with the ground or a damp floor, and it is a wise plan to obtain, where possible, a definite earth connection to one side of the lamp, tapping the mains with the other wire until the dead or live side, as the case may be, is ascertained.

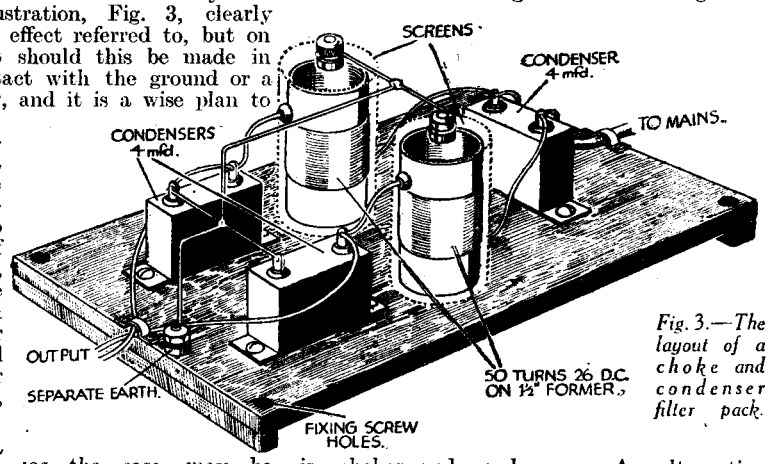


Fig. 3.—The layout of a choke and condenser filter pack.

D.C. Hum

Now, in this country, the lowest supply is approximately 100 volts, and in a number of instances, where mercury arc rectification is employed at the power station, consumers experience bad D.C. hum, and sometimes voltage fluctuation, thus necessitating extra smoothing with chokes and condensers. An alternative method of current derivation is in the use of a convertor, and this will be dealt with later.

Many amateurs are reluctant to tamper with the mains, and quite naturally, since the various regulations concerning specific cables and fuse box capacities are apt to be a little confusing; however, the local

(*Continued on next page*)

HARNESSING THE MAINS

(Continued from previous page)

electrician should be consulted when it is a question of altering the wiring, since he is best suited to explain the correct cable to use for various circumstances.

Incorrect gauge of cable can result in serious trouble by fire, for example, in some cases caused through fusing wires igniting adjacent woodwork, such as skirting boards or slats, and compensation would be difficult to obtain from an insurance company. This, of course, also applies to inferior installation, such as switches and points generally.

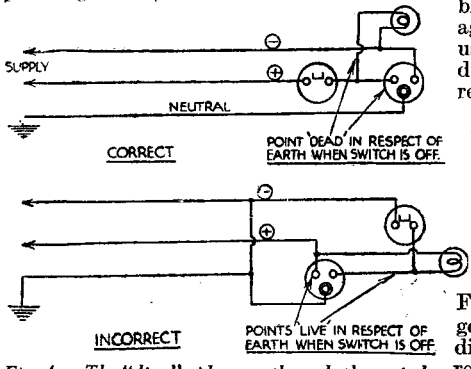


Fig. 4.—The "live" side goes through the switch first and not direct through a socket.

When fixing a new switch or plug socket the first consideration is the supply; this should be switched off from the house wiring by the main switch, and to prevent confusion it should be remembered that a fuse box is designed to handle a specific number of points only, and in some cases it will be found that there are anything up to three or four or even more independent fuse boxes, some of wood, whilst others are of the "metal clad" type. In the new housing property, the whole house supply is invariably divided into two separate units, one comprehensive fuse box of wood for handling all five-amp. points, whilst the other, for 15-amp. power points, is of the metal clad type.

The fuses in the metal clad boxes are not accessible for replacement until the switch is turned to the "off" position. This unlocks the lid, which may be let down by unscrewing one terminal, usually on a hinged shank.

The cabling can be roughly traced from the switching to the points by following the direction of the cables emanating from the fuse boxes, but in cases where the fuses are installed in, say, the garage adjoining the property, the ascertaining of the switches governing the different points can only be made by experimentally switching on and off the different sets of wiring and noticing the points affected in the house; in fact, this is the better method to adopt, and the safest.

Having switched off the supply, the next thing to do is to remove the switch cap, loosen the wire clamps and remove the switch fixing screws. In the case of a switch mounting block, it may be found that the screws holding the block are those securing the switch, or again, separate screws may have been used for block and switch, but little difficulty should be experienced in this respect.

The switch or plug socket having been removed, the mounting block is usually left screwed to the wall through the centre; the wires should be examined for corrosion and cleaned carefully with a penknife.

Short-circuits

The dangers in using the incorrect circuit will be apparent when studying Fig. 4, which shows that the live side goes through the switch first and not direct through a socket or lamp holder returning to the switch; and this brings us to a simple rule, i.e., all metal work in the vicinity of a point, if within arm's length, must be earthed, and in any case the council responsible will invariably require the earthing of the apparatus in question whether this applies or not.

With regard to the suitability of the supply for radio purposes, and recalling the instance of the bad D.C. supply, it is sometimes best remedied by independent smoothing by the use of reservoir condensers connected across the mains, with a centre tap made to earth, this being effected prior to supplying the apparatus. To quote a simple example, a battery-operated receiver employing an H.T. battery eliminator could be arranged to be fed from a condenser and choke filter pack, similar to that illustrated in Fig. 3. It may not be necessary to use more than a total capacity of 8 microfarads, but in some instances anything up to 40 m.f.d. capacity may be found necessary. In the pioneer days of radio this meant rather large condenser packs, but with the advent of the electrolytic condenser, it is now possible to obtain a capacity of as much as 1,000 mfds. for 500 volts working, although, of course, this would be rather large for ordinary use, and the maximum average voltage for this size of condenser is in the neighbourhood of 12 volts.

With the installation in question, the use of a multiple of electrolytics, each having a value of about 16 mfd. at 250/500 volts D.C. working, would be suitable.

The two high-frequency chokes which are shown assist by impeding the passage of frequencies in the neighbourhood of 1,000 cycles, thus meeting the range of interference generally attributed to man-made statics, such as vacuum cleaners, refrigerators, small motors, etc., and as much as 40 per cent. suppression has been obtained in this manner.

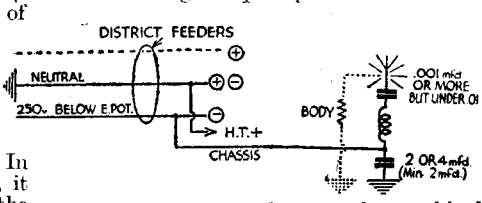


Fig. 5.—Inserting a condenser in the aerial lead to obviate shock.

The advantages in the use of alternating current mains are now well understood, but there are other points which may prove troublesome, for example, if a heater is used in the radio "den" and stands on bare boards, any dust or extraneous substances which has accumulated on the elements during the period of disuse will, the moment the current is switched on, cause a loud humming which sometimes may resonate through the house, being amplified by the sound box effects of the rooms underneath. This is due to the effective inter-turn insulation of the elements causing inductive influence on the metal work of the heater.

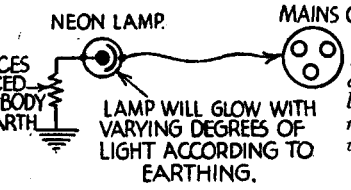


Fig. 6.—A device for locating the neutral wiring of a house.

After a while this disturbance will gradually subside as the foreign substance on the elements is burnt away, but during the trouble the heater apparatus should be stood upon a mat or other suitable absorber.

Low-voltage Supplies

With regard to the radio receiver generally, it has often been stressed that it is advisable to insert in the earth lead of the receiver a suitable condenser, preferably one of at least 2mfd., the reason being that in the case of a positive neutral, a short circuit to earth through the receiver will be avoided, and it is just as advisable to insert a condenser in the aerial lead, to obviate the possibility of shock to anybody touching the aerial lead when the earth is

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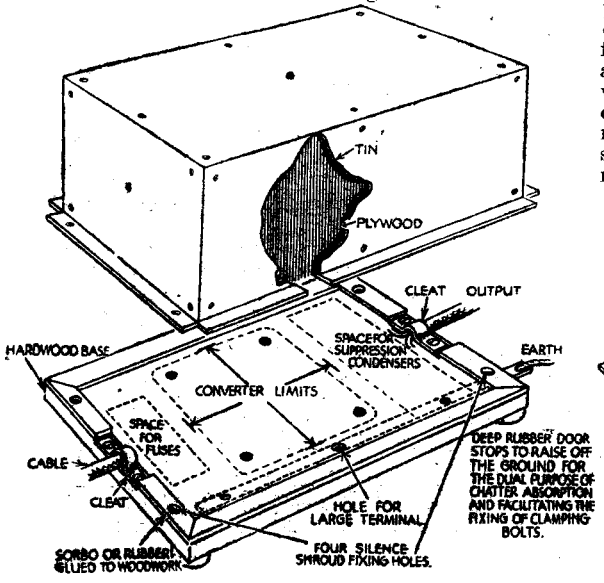

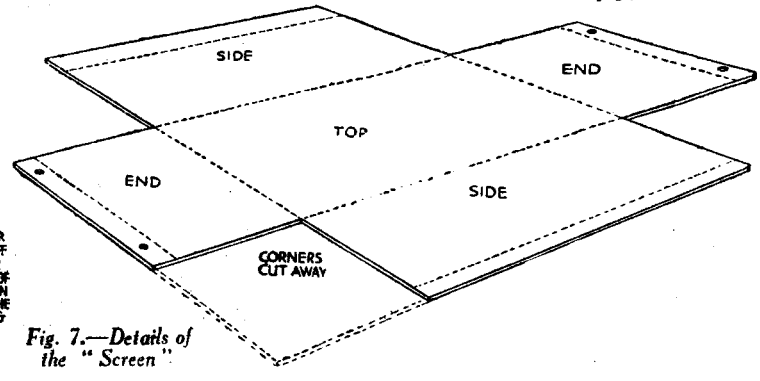

Fig. 7.—Details of the "Screen".

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positive in respect of the chassis. The capacity of this condenser in the aerial lead should be in the neighbourhood of .001mfd. and reference to Fig. 5 will clarify the reason for this, theoretically.

As previously stated, there are many instances where the mains is normally unsuitable for quality radio reception, for example, a country house supplied with 110 volts D.C. would best be suited in the use of an A.C. receiver operated from a rotary convertor and to make more clear this method of operation, a word or two on the systems of current conversion in use to-day will be of help.

(1) A combined motor and generator, mechanically coupled by the same shaft—A.C. motor/D.C. generator or D.C. motor/A.C. generator.

(2) Petrol motor driving A.C. or D.C. generator.

(3) Rotary convertor giving A.C. from D.C., D.C. from A.C., or D.C. and A.C., the convertor being driven from another motor and the two supplies being taken from the input and output terminals.

(4) The rotary transformer, where a high voltage is required from a low voltage.

(5) Rectifiers :—

a. The half- and full-wave valve rectifiers.

b. The half-and full-wave metal rectifiers.

c. The vibrating reed rectifier.

Transformers are used where alteration in pressure (voltage/current) is required and by suitably arranged primaries and secondaries the output power is obtained, governed by a predetermined ratio which gives inversely proportional current and voltage from primary and secondary terminals.

Now it is proposed to deal with the rotary convertor and rotary transformer, since these, from the point of view of installation, have immediate bearing on the subject.

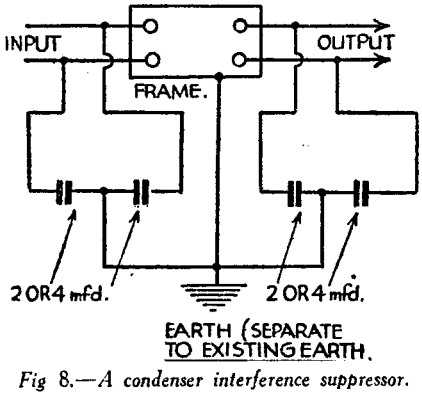


Fig 8.—A condenser interference suppressor.

Those wishing to obtain a higher voltage and different polarity supply from the existing mains for experimental or ordinary radio purposes, find the use of a convertor the most economical and suitable method of doing so. Thus they have the added advantage of a supply not influenced by outside man-made statics, since the direct ordinary supply feeders are not directly employed. The question of noise suppression, however, does arise, but in a less serious nature, and a few points concerning this aspect of the installation will be useful.

The main classes of disturbance can be listed as under.

(a) Electrical radiation from the convertor.

(b) Mechanical vibration or resonance of any fitments of adjacent apparatus.

(c) Rotor hum.

Interference Suppression

Dealing with these in order, the electrical radiation may be overcome by connecting across the output and input terminals of the convertor, two 2 or 4 mfd. condensers centre tapped to earth. (See Fig. 8.)

Mechanical vibration and resonance is usually due to a number of external causes, for example, through fixing the convertor to loose boards or metal work, and the remedy here is self-explanatory.

With regard to (c) it is usual to arrange a "silence shroud" in the form of a metal or wooden cover to completely encase the whole unit including the smoothing condensers, as shown in Fig. 7. The measurements are, of course, not shown owing to the varying degrees of requirements. A number of manufacturers supply the silence cabinet or shroud with the convertor, but occasions do arise when home construction is necessary.

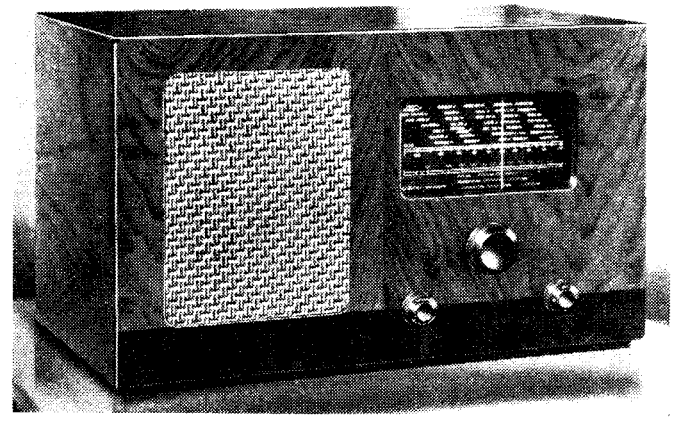
The rotary convertor is available in various types, the most popular delivering 120 watts at 220 volts single or three phase—two phase being almost extinct now—and the output may be regulated as desired, as the input E.M.F. ranges from 24 to 250 volts D.C. Thus it will be apparent that this margin of control permits this type of convertor to be even run from a battery of accumulators, within the voltages quoted.

The rotary transformer is a particularly useful type of unit, being in some cases very small yet capable of delivering power in the neighbourhood of two to three hundred volts, with a very low order of input E.M.F. such as 12 volts, and one model gives 250 volts output at 80 milliamperes with an input voltage of 12; thus this model finds great favour with designers of transportable equipment where anything up to 10 watts output is required.

NOTES from the TRADE

"Stay-a-Lite" Lighting Set

MESSRS. RUNBAKEN announce a new Emergency Lighting Set, designed for A.C. or D.C. use. This differs from others in that it is self-contained as one unit—that is, it requires no separate batteries or wiring and no installation costs; it is portable and can be mounted anywhere; and additional lights for extension purposes may be added merely by plugging in. The unit contains special robust accumulators which are kept fully charged from the mains, and thus in the event of a mains failure the emergency supply is readily available and the emergency lamps automatically come into circuit. When the mains supply is restored the emergency set is switched off and the accumulators are put back on charge automatically. The Junior model will supply up to four lights and costs £15 15s. A larger model at £21 may be used to supply from 6 to 8 lamps.



Cossor's new model 70 receiver referred to last week.

5 New Marconi Models

MARCONIPHONE announce five new spring releases, ranging from an 8-guinea 3-valve 3-waveband T.R.F. battery table grand to an 8-valve 4-waveband superhet autogram for A.C. mains use at 29 guineas. The other models include a 5-valve 3-waveband push-button battery superhet table grand at 12½ guineas, a 5-valve 3-waveband superhet table grand for A.C. use at 10½ guineas, and a 6-valve 3-waveband push-button superhet with A.F.C. for A.C. mains at 15 guineas. Important features included in this range of receivers are the Q.P.P. output stage in the 12½-guinea battery set and the mechanical push-button tuning system, and the special unit form of construction in the R.F. section of the 10½ guinea superhet. Special leaflets describing the receivers may be obtained on application.

New Exide and Drydex Batteries

A NEW series of batteries is announced by Exide, designed especially for the new season's commercial receivers.

For the Cossor model "31," which is marketed without batteries, the Super 120-volt H.T. and Exide DMG with free acid or DMGJ with jelly electrolyte are suitable.

Drydex type H.1050 and Exide accumulators DFG or unspillable type DFGJ are suitable for H.M.V. model "1401" and Marconiphone model "876"; while H.M.V. "1400" and Marconiphone "872" take Drydex type H.1050 and Exide accumulators CZG4-C or JZ4 if an unspillable type is preferred.

Batteries for the Alba model "30" are Drydex type H.1049 and Exide unspillable accumulator JSK2.

All the above Drydex H.T. batteries incorporate automatic grid bias.

Television Test Prods

VERY high voltages are present in modern television receivers, and consequently special precautions are necessary when testing or servicing such apparatus. Messrs. J. J. Eastick announce a special type of test prod designed for use in these circuits. The prods are 13ins. long and are provided with a 2ft. length of 5 mm. cable having a suitable plug at the end for connection to test meters. The prods are supplied normally as a pair—one red and one black—and the price is 6s. For those who require the single prods these may be obtained at 3s. in either red or black.

Everett Edgcumbe World Clock

ASYNCHRONOUS electric clock of novel design is now available from Messrs. Everett Edgcumbe. This clock has an inner dial marked on its outer edge with numerals, and this revolves once in 24 hours. An outer fixed dial has a number of important place-names engraved on it and arrows indicate the appropriate time in any part of the world at a given moment. A central moving hand indicates minutes. The clock is produced in three models—a square metal or desk type with oak base at £1 19s. 6d.; a wall model in black moulded bakelite at £3 (walnut, mahogany or white bakelite at 2s. extra); and a wall model in a black metal case at £2 17s. 6d. The motors fitted to these clocks are self-starting and provided with oil bath, suitable for 200/250 volts 50 cycles supplies.

Claude Lyons' Change of Address

MESSRS. CLAUDE LYONS, LTD., have moved to more commodious premises in London and the new address is Queen's House, 180/182a, Tottenham Court Road, London, W.C.1. The new premises have a floor space of about 2,500 square ft., and special arrangements are being made to provide display and demonstration layouts for test equipment and other gear.

Imported Rectifying Valves

THE Board of Trade has received an application under Section 5 (5) of the Finance Act, 1936, for a licence to import free of duty eight gas-filled 220 kilovolt rectifying valves.

Any representations that similar instruments are made, or are likely to be made within a reasonable time, in the United Kingdom or elsewhere in His Majesty's dominions, should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, London, S.W.1, before March 20th next, furnishing details of such similar instruments and quoting the reference I.M. 538/39.

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 was interested to read the remarks of B. H., of Nuneaton, under the heading of "Reception from an Amplifier," in your issue dated February 11th. This appears to be due to rectified (and therefore "audible") radio-frequency signals being radiated from a straight mains set, and received on an amplifier. This reminds me that some years ago I was demonstrating a small straight battery set to another person who listened on headphones. He then informed me that he could hear the signals in the headphones when they were not connected to the set. As the signals were weak, I could not hear them myself, and I have had no time for further experiments. The set was not oscillating.

To my mind, if reception can be received from an amplifier, it can also be received from a pair of headphones with no apparatus connected to them, provided that the signals are radiated powerfully enough. It would be interesting if some readers would experiment with fairly powerful straight battery or main sets to ascertain whether these "audible" radiations can be received *regularly* under a given set on conditions. If so, would they please give particulars of the experiments concerned.

This would appear to open up possibilities of a new method of communication. Care would, of course, have to be taken not to cause interference with neighbours' sets. It is assumed that this could be avoided by working on wavelengths not commonly in use.—D'ARCY FORD (Exeter).

A 20 and 40 m. Log from Ilkeston

SIR,—I enclose my log from this district, which other readers may find of interest.

20 m.—W1 (48), W2 (50), W3 (30), W4 (15), W5FFX, FHJ; W6 (4), W8 (36), W9 (15); VE1, 2, 3, 4; VO1, 2, 6; HJ, HK, YN, K4, PY1, 2, 8; YV, TI, CE, VP4, 6, 9; HI, CO, CT, SU, HB, LA, I, YR, YT, OK, OH, SP, SM, D, ES, SV, U, HA, OZ, LY, CN1-8; FA3-8; ON, PAO, LX, F, VK, ZB, and ZS2-6.

Altogether, over 400 stations have been identified on 20 metres.

40 m.—F (30), ON4 (15), PAO (12), LX (6), CT (6), SM (3), OZ5BW, I1MT, HB9CZ, FA3FB, YUMAY, SP1RI.

The receiver is a 4-valve superhet and the antennæ are a 66ft. top inverted-L, directed N. and S., and an indoor aerial directed to produce best results from the west.—A. HART (Ilkeston).

Correspondents Wanted

SIR,—As I am thinking of taking up amateur transmitting, I should like to get in touch with any "ham" (A.A. or fully qualified) or a short-wave enthusiast who is interested in transmitting who lives near me.—F. BETHERCOAT, Suningdale House, Suningdale Avenue, Eastcote.

SIR,—I have been a regular reader of your excellent journal for about nine months, and have gained all my radio knowledge from it. I am particularly interested in short-wave amateur logs and amateur transmitting, and I would like to correspond with one of your readers who is also interested in these subjects.—C. M. PARRY, 15, Rowling Street, Williamstown, Rhondda, Glam.

That Friendly Spirit: A Battery S.W. Superhet

SIR,—I have been a keen reader of your journal for many years, and have always derived great pleasure from your "Letters from Readers" pages. Being employed daily in radio service work, it has always given me great pleasure, once a week, to wander through your pages absorbing all the interesting items, both technical and social.

Being very keen on amateur activities I have read with interest the letters published recently on the friendly spirit among amateur transmitters, and also the letter concerning a five-valve battery short-wave superhet.

The letter written by "The Genuine Guy," from Hayes, Middlesex, has my support. Having held an A.A. licence for the past twelve months, it has naturally brought me in contact with many fine fellows, but I am sorry to say this "Ham" spirit is always spoilt by that old bogey—class distinction.

As our friend remarks, all amateurs are not so homely when it comes to showing you their rig. The biggest offenders in my experience are the A.A.'s who have just graduated to full licence.

As long as this unsociable spirit exists there is little help to be got for the learner.

With regard to Mr. C. Heyne's letter, I support his suggestion for the publication of a suitable circuit for a short-wave superhet (battery operated).

The circuit I would suggest is as follows: R.F. amplifier (say, a Mullard VP2 valve), frequency changer and oscillator (Mullard FC2), iron-cored I.F. stage (Mullard VP2), a double-diode second detector, and first L.F. amplifier (Mullard TDD2A), and a pentode output (Mullard PM22A).

The above, I think, would make an ideal receiver, if Mr. C. Heyne would prefer a separate oscillator, which is more stable, then in place of the FC2 I would suggest a PM1HF with a VP2 or a triode pentode such as the Mazda TP23.

I have not mentioned the above valves in preference to any others of British make, but have had such satisfaction from this combination that I can recommend them.

The one trouble I have experienced with mains-operated commercially-built short-wave superhets is that the signal to noise gain is very unbalanced, and my preference is for a battery-operated receiver, for the above reason and also because there is no crackle via the house mains, which at times spoils your search for DX.

Should our friend in Briton Ferry desire, I am prepared to enter into discussion with him or any other short-wave listener who is interested in the design and building of such a receiver.—C. H. WILLIAMS (Tredegar, Mon).

A 20 m. Log from S. Wales: Correspondent Wanted

SIR,—I append my log of 20-m. 'phone stations. My receiver is a short-wave adapter coupled to a three-valve broadcast set. The aerial is an inverted-L, 20ft. high, and 45ft. long.

On 20 m.: VK2NQ, LHA; VK3WA, VA, XJ, KX, WI, BM; PY1FN, GR; PY2CK, ET, DA, BH, GC; PY4EG, CI; PY5BJ; HC1JW; CO2RO. ML, JJ, LY; YV4ABG, AI; YV5AQ; HI5X; K4EMG; LU4AW, BC, CZ; LU5CZ; LU7BK; VE1DK, BB, LC; VE2CT, MC, AA, EE.

I would like to correspond with an amateur in this country or abroad.—CYRIL M. PARRY, 15, Rowling St., Williamstown, Rhondda, Glam.

The "P.W. Service Manual"

SIR,—Many thanks indeed for the "Practical Wireless Service Manual" that you recently sent to me as a prize for solving Problem No. 332. I must say it is a very fine book and should prove a very handy and helpful aid to the professional serviceman or radio amateur.

Regarding PRACTICAL AND AMATEUR WIRELESS I have been a regular reader since number one, and I find it very instructive and of great help in solving my own radio problems from time to time. I also found the transmitting articles of great interest.—F. G. SADLER (Stamford Hill).

CUT THIS OUT EACH WEEK.

Do you know

—THAT not all metal-cased electrolytic condensers have the case as the negative pole.
—THAT a reflector for a short-wave aerial should not necessarily be in a direct line with the transmitting station.
—THAT by moving it about it is possible to reduce interference in many cases.
—THAT some types of rectifier glow when in use due to special gas filling, and they should not, therefore, be thought defective.
—THAT in high-quality amplifiers, oil or similar types of condenser should be used for coupling purposes to preserve insulation in the grid circuit.
—THAT a reduction in losses for short-wave working may be obtained by removing as much dielectric material as possible from between contact points.

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.

Radio Clubs and 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.

THE CROYDON RADIO SOCIETY

Headquarters : St. Peter's Hall, Ledbury Road, S. Croydon.
Meetings : Tuesdays at 8 p.m.
Hon. Pub. Sec. : Mr. E. L. Cumbers, 14, Campden Road, S. Croydon.

THE above society continued its policy of supporting its own talent when on Tuesday, February 14th, a six-weeks old member, Mr. A. W. Graham, gave a lecture-demonstration on "Push-pull Balancing Problems." It took place in St. Peter's Hall, S. Croydon, and Mr. P. G. Clarke presided. After saying how his results had been obtained by his own experiments, Mr. Graham was soon busy explaining the circuits of the receiver and amplifier. The former had two H.F. stages feeding a diode detector, and he soon came to the input volume control and first stage in the amplifier. This was a double triode, or two triode valves in one envelope, after which were two M.4's and finally two P.P.250 output valves. Balancing the output stage was in itself an interesting enough topic, Mr. Graham describing why he preferred a common bias resistor, and why the 400-ohm variable resistance had to be adjusted until a point was obtained at which the currents were balanced in each valve's anode circuit. He also spent some time experimenting with his oscilloscope, so that the shape of waves before and after passing through the amplifier could be seen. The oscilloscope was particularly useful, also, for balancing the amplifier. Next Tuesday, March 7th, the chairman, Mr. P. G. Clarke is bringing his new high quality amplifier, and will discuss the latest improvements incorporated in it.

DOLLIS HILL RADIO COMMUNICATION SOCIETY

Headquarters : Brainteroft School, Warren Road, Cricklewood, N.W.2.
Hon. Sec. : E. Eldridge, 79, Oxgate Gardens, Cricklewood, N.W.2.

ON February 14th a talk was given by Mr. Sedgwick (2DLB) on the theory of A.C. as applied to radio. The president (G6SK) has now started a series of talks on transmitters, during which the power supply, modulator and P.A. will be designed mathematically. The next two talks will be on March 14th and 28th at 8 p.m. Any readers of PRACTICAL AND AMATEUR WIRELESS are welcome.

BRADFORD SHORT-WAVE CLUB

Headquarters : Bradford Moor Council School, Leeds Road, Thornbury, Bradford.
Hon. Sec. : G. Walker, 33, Napier Road, Thornbury, Bradford, Yorks.

A VERY interesting evening was spent on Friday, February 17th, when Mr. H. Milnes came along and demonstrated his gas-operated receiver; he also explained his experiences whilst working on this remarkable piece of apparatus, and demonstrated the working of this thermo-coupler.

The lecture that was to have been given by Mr. Beaumont, of Ambassador Radio, Brighouse, has been postponed until a later date so as to give him time to complete the new receiver which he intends bringing along with him. This should prove to be another interesting lecture. The subject will be "Short-wave Receiver Design," and the new date will be published as soon as arrangements have been completed.

Sunday morning sessions are being continued, with success, the 1.7 mc/s band being the venue of these interesting meetings.

Anyone interested in the club and its activities may obtain further information from the secretary.

EDGWARE SHORT-WAVE SOCIETY

IT is now understood that the above club will help run the National Field Day 20-metre station organised by the Radio Society of Great Britain, as G6ZO. G2QY, G3HT, G6PM are all members of the club. The site, as previously, will be at Mote Mount, just off the Barnet Bypass.

On March 1st Mr. Forsyth, of G6FO, will visit the club and give a chat.

On Wednesday, February 8th, Mr. Langford, of Messrs. Webbs Radio, explained the Hallicrafter SX.17, and demonstrated its operation. Messrs Hamrad described their equipment, and new aerial feeders, on February 1st, and G5FG became a member of the club. Future programme includes a discussion on aerials by G2A1, and members' exhibition of apparatus.

THE MAIDSTONE AMATEUR RADIO SOCIETY

Headquarters : The Clubroom, 244, Upper Fant Road, Maidstone, Kent.
Hon. Sec. : P. M. S. Hedgeland, "Hill View," 8, Hayle Road, Maidstone, Kent.

THE programme arranged for meetings in March is as follows :—

March 7th.—A demonstration of the Voigt Speaker by Mr. O. P. Lowther.
March 14th.—Mr. W. H. Allen (G2UJ) will give the second of two talks on 56 m/c operation.
March 21st.—A Film Night—the R.S.G.B. Films and others.
March 28th.—Practical evening.

Morse practice will be provided before each meeting, and members are asked to bring their own headphones with crocodile clips.

The M.A.R.S. invites all Kent and District amateurs to a social "Ham Evening" in the club-room, 244, Upper Fant Road, Maidstone, at 7 p.m. on Wednesday, March 29th. Mr. J. Clarricoats, the Secretary of the R.S.G.B., will be present, and will talk on "The Amateur Movement, To-day and To-morrow." Refreshments will be provided and there will be no charge whatsoever. Anyone wishing to come along should write to the secretary, at the above address, not later than March 14th. No applications can be considered after this date, as arrangements for seating and catering have to be made.

We hope that as many amateurs as possible from Kent and district will come along to meet Mr. Clarricoats and their District Representative, Mr. W. H. Allen (G2UJ). We think that a meeting of this sort may be the means of promoting greater unity and friendship, or "ham spirit," throughout the amateurs of Kent.

Richard (Stinker) Murdoch, who partners Arthur Askey in "Band Waggon," is here seen during convalescence listening to the "Band Waggon" programme.

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, Sivell Place, Heavitree, Exeter.

AT the meeting of this society held on Monday, February 13th, Mr. Cornish, of the General Electric Company, talked on short-wave aerials. He described many types, including those suitable for television and sketches of these were given on the blackboard, together with accurate measurements, and methods of calculating the total lengths.

Some of these aerials would require considerable skill to erect, and care would have to be taken to ensure mechanical strength. Such points as these were the subject of many questions, all of which were dealt with capably.

All readers interested should get in touch with the secretary.

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. 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 10s.).

Latest Patent Applications.

3732.—Atkinson, T.—Universal wiring clip. February 4th.

3869.—Ashton, F. J.—Radio-receiving, etc., apparatus. February 6th.

4127.—Browne, C. O.—Television-transmitting apparatus. February 8th.

3599.—Cole, Ltd., and Martin, E. W.—Tone correction, etc., in audio-frequency amplifiers. February 3rd.

4118.—Cole, Ltd., and Martin, E. W.—Remote control arrangements of radio receivers. February 8th.

Specifications Published.

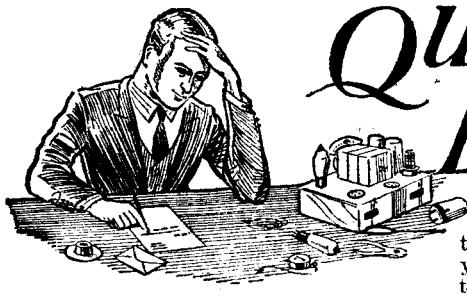
500,036.—Scophony, Ltd., Sieger, J., and Dodingham, S. H. M.—Television receivers.

500,217.—Baird Television, Ltd., and Johnstone, D. M.—Method of amplifying electric signals.

499,891.—Farnsworth Television Inc.—Photoelectric surfaces.

499,971.—M-O Valve Co., Ltd., and Warren, G. W.—Thermionic valves.

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.



QUERIES and ENQUIRIES

Coil or Switch Faults

"I have a five-valver which has been working for two years without any trouble, but a fault has now developed which I am unable to locate. On medium waves performance is as usual, but when switched over to long waves there is a substantial reduction in volume and I cannot get half as many stations as formerly. I have tried the valves with new ones without improvements and wonder if you can give any idea as to the cause of this trouble."—F. E. (Highbury).

AS the set has been working properly, it may be assumed that circuit and values are in order. A fault which causes poor performance on one waveband may, therefore, generally be traced to the tuning circuits. When the standard type of receiver is changed from medium to long waves, the only change made is to open a switch which brings into circuit a coil in series with the medium-wave winding and thus a fault in this loading coil or switch would not be evident on medium waves. We therefore suggest a careful test of the tuned circuits, switches and associated wiring. There are one or two peculiar effects which might be introduced by chokes or wrong values, but generally speaking these are not of he kind which arise suddenly and would be noted when the set is first put into service.

Heater Wiring

"I am making an A.C. mains set with separate amplifier, and in looking through some old books I am rather interested in the method of wiring the heater circuit. I see that in most modern sets you use twisted flex of the ordinary lighting type. In some of the old sets I notice that single wires are used, but in some designs these wires are spaced and run round the chassis edges, whilst in others they are laid side by side. What is the best method, and what accounts for the different methods?"—H. J. Y. (Preston).

IN early A.C. sets it was thought desirable to space the A.C. carrying leads to avoid hum and other troubles. Subsequently it was found that by placing the wires side by side the A.C. field was reduced in size, but with improvements in circuit design it has been found that by using twisted flex the fields surrounding the two wires are cancelled out and thus there is little risk of hum being caused by interaction between normal wiring and the A.C. wiring. The twisted flex is definitely preferable, therefore, in a modern receiver.

Coil Screens

"In making some coils on the lines recently given in your home-constructor articles, I wish to incorporate the best or most efficient scheme for a set of four for a superhet. Do you recommend copper screens, which may be made from the sheet, or aluminium? You appreciate that the latter would be difficult to make at home, owing to the problem of joining the edges, and I wonder if the copper would be as good."—H. T. (Newport).

COPPER is certainly much easier to work, is more efficient (electrically) than aluminium, but is more expensive. If you wish to make up individual screens for the coils you could make cylindrical screens from copper and they would be quite reliable. On the other hand, aluminium is much cheaper, but to overcome the difficulty of joining the screens you could consider making them rectangular, bolting the edges and even making a subdivided box into which all the coils could be included. In any case remember that the screens must make reliable contact with the bases to complete screening and a good tip here is to place some thin copper gauze inside the bases so that when the screens are pushed home there is no unscreened air gap through which interaction might be introduced.

Valve Layout

"I am making up a design as per the enclosed sketch, and in order to reduce H.F. leads I was thinking of using several vertical and horizontal screens mounted on the main chassis with the valves placed in the most appropriate positions, irrespective of heater and H.T. supplies. Do you think the advantage gained from the reduction in length of interconnecting H.F. leads would warrant the work of making and working out the positions and sizes of the various sub-panels?"—W. S. D. (Burslem).

THE idea is a good one, especially as the set is a multi-valver, apparently designed for high performance. The only point will be to watch that the heater leads are kept well clear of all other leads and that decoupling components are mounted right up against the valves to avoid stray fields. Apart from the complication of construction, the idea is a very good one and is, in fact, adopted in certain modern commercial television receivers.

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.

Bleeder Resistance

"My mains unit has been disconnected from the old set and I wish to use it in a new one. The H.T. voltage and other points are in order, but the new receiver only takes 50 mA, whilst the output from the mains section is 95 mA. Will the extra current cause any undue voltage rise, or should I fit some device to absorb the extra current. If so, what do I use?"—O. T. (Bromley, Kent).

A BLEEDER resistance would be desirable across the H.T. output. The value of the resistance may be calculated by dividing the H.T. voltage by 45 and multiplying the answer by 1,000. The wattage of the resistance may be worked out by squaring the current (45 mA), and multiplying by the resistance value. It is wise in this case to use a wattage rating very much greater than this calculation gives you, as the valves will take a short time to heat up and there may thus be an excess of current across the bleeder resistance until maximum emission has been attained.

Super Control Valves

"In an American valve list which I have been looking at I see a reference to Super Control Pentodes for reducing cross-modulation. Are these distinct from any valves on the English market, and if so, why are there no English equivalents? I note that modulation-distortion is also removed when these valves are used, and I am afraid that I do not understand these terms fully."—M. L. (Bilston).

THE valve is merely a variable-mu H.F. pentode. In a superhet a signal can be received on a wavelength different from that to which the set is tuned owing to the fact that the interfering signal is brought in on the carrier of the desired station. This is known as cross-modulation. Modulation-distortion is generally introduced in the I.F. stages of a superhet, and is a distortion of the modulated carrier caused mostly by partial rectification in the H.F. stages. A variable-mu H.F. pentode can avoid these troubles as the amplification factor is modified by altering the applied bias. Another name often given to this type of valve is a "remote cut-off" valve.

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. E. M. (Kilsyth). We are unable to give instructions for modifying receivers which are not of our design. We are not quite clear regarding your modifications on the battery side.

J. McT. (Paisley). We are unable to supply any details at the moment, other than those given in the article in question.

L. J. (E.1). We suggest you examine the products of the Avo people—Automatic Coil Winder Co., of Douglas Street, S.W.1. Alternatively, obtain a good 0 to 1 or 0 to .1 mA meter and make up your own test instrument as described in our Service Manual.

S. A. W. (Long Eaton). The circuit appears in order, but your troubles may be due to the coil or your aerial-earth system.

J. B. H. (Blackheath). Will you please let us have your full postal address, as we have a special letter for you.

D. McL. (Greenock). We cannot describe the device in the form of a query or reply, and can only suggest that you refer to back issues. We may describe a new unit at some future date.

A. E. P. (Birmingham, 24). We have not described a set of this type mentioned, but the Prefect S.W. Three, without the last stage, would be quite suitable.

R. E. & Sons (Llandyssul). The 2½-watt battery amplifier, described in our issue dated June 18th, 1938, is the only one we can recommend in your case.

D. M. (Taynuilt). The set may not be ganged correctly, thus introducing the necessity of using reaction to boost signals. It should not be necessary to adjust this when tuning higher in the scale, but without further details of the set we are unable to advise definitely.

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

Practical and Amateur Wireless
BLUEPRINT SERVICE

These Blueprints are drawn full size.

Copies of appropriate issues containing descriptions of these sets can in some cases be supplied at the following prices, *which are additional to the cost of the Blueprint.* A dash before the Blueprint Number indicates that the issue is out of print.

Issues of Practical Wireless	4d. Post Paid.
Amateur Wireless	4d. " "
Practical Mechanics	7½d. " "
Wireless Magazine	1/3 " "

The index letters which precede the Blueprint Number indicate the periodical in which the description appears: Thus P.W. refers to PRACTICAL WIRELESS, A.W. to *Amateur Wireless*, P.M. to *Practical Mechanics*, W.M. to *Wireless Magazine*.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable) to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS

CRYSTAL SETS.

	Date of Issue.	No. of Blueprint
Blueprints, 6d. each.		
1937 Crystal Receiver	—	PW71
The "Junior" Crystal Set ..	27.8.38	PW94

STRAIGHT SETS. Battery Operated.

One-Valve : Blueprints, 1s. each.		
All-wave Unipen (Pentode) ..	—	PW31A
Beginner's One-valver	19.2.38	PW85
The "Pyramid" One-valver (HF Pen)	27.8.38	PW93
Two-valve : Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)	—	PW36B
The Signet Two (D & LF) ..	24.9.38	PW76
Three-valve : Blueprints, 1s. each.		
The Long-range Express Three (SG, D, Pen)	24.4.37	PW2
Selectone Battery Three (D, 2 LF (Trans))	—	PW10
Sixty Shilling Three (D, 2 LF (RC & Trans))	—	PW34A
Leader Three (SG, D, Pow) ..	22.5.37	PW35
Summit Three (HF Pen, D, Pen)	—	PW37
All Pentode Three (HF Pen, D (Pen), Pen)	29.5.37	PW39
Hall-mark Three (SG, D, Pow) ..	12.6.37	PW41
Hall-mark Cadet (D, LF, Pen (RC))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (Trans))	*June* '35	PM1
Cameo Midget Three (D, 2 LF Trans))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	—	PW53
Battery All-Wave Three (D, 2 LF (RC))	—	PW55
The Monitor (HF Pen, D, Pen)	—	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P) ..	14.8.37	PW64
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) ..	31.10.36	PW69
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	18.2.39	PW72
The "Rapide" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	PW82
F. J. Camm's Oracle All-Wave Three (HF, Det, Pen).. ..	28.8.37	PW78
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.38	PW84
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.38	PW87
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.38	PW89
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	3.9.38	PW92
Four-valve : Blueprints, 1s. each.		
Sonotone Four (SG, D, LF, P) ..	1.5.37	PW4
Fury Four (2 SG, D, Pen).. ..	8.5.37	PW11
Beta Universal Four (SG, D, LF, Cl.B)	—	PW17
Nucleon Class B Four (SG, D, (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) ..	26.9.36	PW67
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	PW79
"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B)	12.2.38	PW83
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) ..	3.9.38	PW90

Mains Operated.

Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen).. ..	—	PW18
A.C.-D.C. Two (SG, Pow) ..	—	PW31
Selectone A.C. Radiogram Two (D, Pow)	—	PW19
Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)	—	PW23
D.C. Ace (SG, D, Pen)	—	PW25
A.C. Three (SG, D, Pen).. ..	—	PW29
A.C. Leader (HF Pen, D, Pow) ..	—	PW35C
D.C. Premier (HF Pen, D, Pen) ..	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)..	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	—	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen))	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (RC))..	—	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	—	PW56
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70
All-World Ace (HF Pen, D, Pen)	28.8.37	PW80
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47
A.C. All-Wave Corona Four ..	6.11.37	PW81

SUPERHETS.

Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three-valve) ..	5.6.37	PW40
F. J. Camm's 2-valve Superhet ..	13.7.35	PW52
F. J. Camm's £4 Superhet ..	—	PW58
F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37	PW75
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve) ..	—	PW43
D.C. £5 Superhet (Three-valve) ..	1.12.34	PW42
Universal £5 Superhet (Three-valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	31.7.37	PW59
F. J. Camm's Universal £4 Superhet 4	—	PW60
"Qualitone" Universal Four ..	16.1.37	PW73
Four-valve : Double-sided Blueprint, 1s. 6d.		
Push-Button 4, Battery Model } Push-Button 4, A.C.Mains Model }	22.10.38	PW95

SHORT-WAVE SETS.

One-valve : Blueprint, 1s.		
Simple S.W. One-valver	9.4.38	PW88
Two-valve : Blueprints, 1s. each.		
Midget Short-wave Two (D, Pen)	—	PW38A
The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.38	PW91
Three-valve : Blueprints, 1s. each.		
Experimenter's Short-wave Three (SG, D, Pow)	30.7.38	PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	7.8.37	PW63
The Band-Spread S.W. Three (HF Pen, D (Pen), Pen) ..	1.10.38	PW68

PORTABLES.

Three-valve : Blueprints, 1s. each.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) ..	—	PW65
Parvo Flyweight Midget Portable (SG, D, Pen)	19.6.37	PW77
Four-valve : Blueprint, 1s.		
"Imp" Portable 4 (D, LF, LF, Pen)	19.3.38	PW86

MISCELLANEOUS.

S.W. Converter-Adapter (1 valve)	—	PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE

CRYSTAL SETS.

Blueprints, 6d. each.		
Four-station Crystal Set ..	23.7.38	AW427
1934 Crystal Set	—	AW444
150-mile Crystal Set	—	AW450

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver ..	—	AW387
Twenty-station Loudspeaker One-valver (Class B)	—	AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)..	—	AW388
Full-volume Two (SG det, Pen) ..	—	AW392
Lucerne Minor (D, Pen)	—	AW426
A Modern Two-valver	—	WM109
Three-valve : Blueprints, 1s. each.		
Class B Three (D, Trans, Class B)	—	AW386
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans) ..	2.12.33	AW412
Lucerne Ranger (SG, D, Trans) ..	—	AW422
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
Transportable Three (SG, D, Pen)	—	WM271
Simple-Tune Three (SG, D, Pen)..	*June* '33	WM327
Economy-Pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans) ..	*Mar.* '34	WM354
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
PTP Three (Pen, D, Pen) ..	—	WM389
Certainty Three (SG, D, Pen) ..	—	WM393
Minitube Three (SG, D, Trans) ..	*Oct.* '35	WM396
All-Wave Winning Three (SG, D, Pen)	—	WM400
Four-valve : Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans) ..	—	AW370
2HF Four (2 SG, D, Pen) ..	—	AW421
Self-contained Four (SG, D, LF, Class B)	*Aug.* '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2 LF)	*Feb.* '35	WM381
The H.K. Four (SG, SG, D, Pen)	*Mar.* '35	WM384
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	*Apr.* '36	WM404
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans)	—	WM320
Class B Quadradyne (2 SG, D, LF, Class B)	—	WM344
New Class B Five (2 SG, D, LF, Class B)	—	WM340

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C. .	—	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C.-D.C. Two (D, Pen) .	—	WM394
Three-valve : Blueprints, 1s. each.		
Home Lover's New All-electric Three (SG, D, Trans) A.C. ..	—	AW383
Mantovani A.C. Three (HF Pen, D, Pen)	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen) ..	*July* '33	WM326
Harris' Jubilee Radiogram (HF Pen, D, LF, P)	*May* '35	WM386

SUPERHETS.

Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
'Varsity Four	*Oct.* '35	WM395
The Request All-Waver	*June* '36	WM407
1935 Super Five Battery (Superhet)	—	WM379
Mains Sets : Blueprints, 1s. 6d. each.		
Heptode Super Three A.C. ..	*May* '34	WM359
"W.M." Radiogram Super A.C...	—	WM366

PORTABLES.

Four valve : Blueprints, 1s. 6d. each.		
Holiday Portable (SG, D, LF, Class B)	—	AW393
Family Portable (HF, D, RC, Trans)	—	AW447
Two H.F. Portable (2 SG, D, QP21)	—	WM363
Tyers Portable (SG, D, 2 Trans) ..	—	WM367

SHORT-WAVE SETS—Battery Operated.

One-valve : Blueprints, 1s. each.		
S.W. One-valver for America ..	15.10.38	AW429
Rome Short-waver	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det., Pen)	*Feb.* '36	WM402
Home-made Coil Two (D, Pen) ..	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver (SG, D, Pen)	*Jan.*19.'35	AW463
The Carrier Short-waver (SG, D, P)	*July* '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World-Beater (HF Pen, D, RC, Trans) ..	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valver Short-waver (SG, D, LF, P)	*Mar.* '35	WM383
Superhet : Blueprint, 1s. 6d.		
Simplified Short-wave Super ..	*Nov.* '35	WM397

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C.-D.C.	—	WM368
"W.M." Long-wave Converter ..	—	WM380
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C. ..	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve, A.C. Short-waver (SG, D, RC, Trans) ..	*Aug.* '35	WM391

MISCELLANEOUS.

S.W. One-valve converter (Price 6d.)	—	AW329
Enthusiast's Power Amplifier (1/6)	—	WM387
Listener's 5-watt A.C. Amplifier (1/6)	—	WM392
Radio Unit (2v.) for WM392 ..	*Nov.* '35	WM398
Harris Electrogram (battery amplifier) (1/-)	—	WM399
De Luxe Concert A.C. Electrogram	*Mar.* '36	WM403
New Style Short-wave Adapter (1/-)	—	WM388
Trickle Charger (6d.)	*Jan.*5,'35	AW462
Short-wave Adapter (1/-).. ..	—	AW456
Superhet Converter (1/-)	—	AW457
B.L.D.L.C. Short-wave Converter (1/-)	*May* '36	WM405
Wilson Tone Master (1/-).. ..	*June* '36	WM406
The W.M. A.C. Short-wave Converter (1/-)	—	WM408

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1939 RADIO

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3-watt A.C. Amplifier	£2 0 0	£2 15 0
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6-watt A.C. „	£5 5 0	£6 0 0
8-10-watt A.C./D.C. „	£4 10 0	£5 5 0
15-watt A.C. „	£5 15 0	£7 0 0

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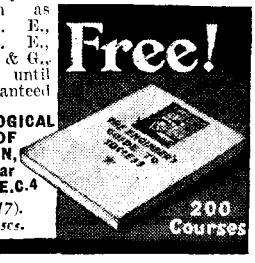

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