

COMPLETE SHOW REPORT INSIDE

Practical ^{3^D} and Amateur Wireless

EVERY
WEDNESDAY

Edited by F.J. CAMM

A GEORGE
NEWNES
Publication

Vol. 12. No. 311.
September 3rd, 1938.

AND PRACTICAL TELEVISION



Building

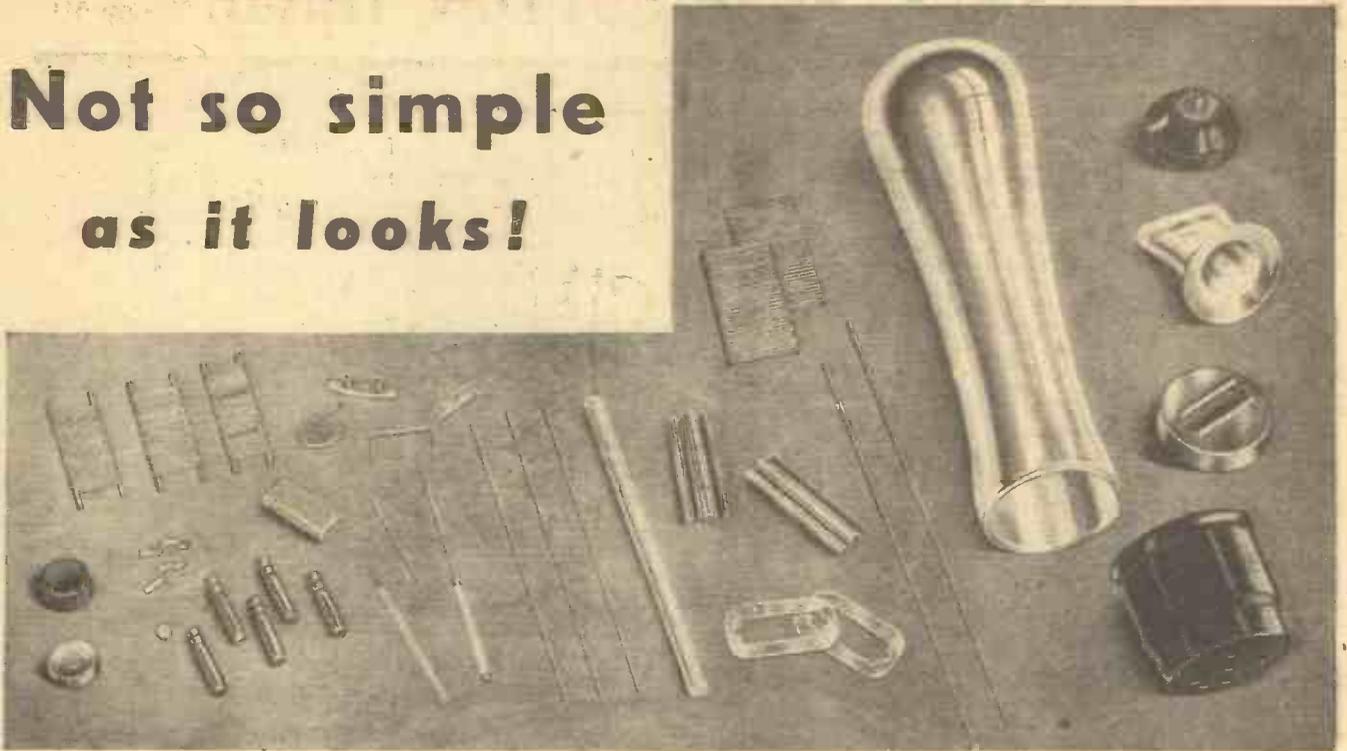
F.J. CAMM'S PUSH-BUTTON 3 · ADMIRAL 4 VALVER ·
PYRAMID 1 VALVER · SHORT-WAVE 2 VALVER · JUNIOR CRYSTAL SET

Many Special Show Features!

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"PRACTICAL WIRELESS" READERS

SEE INSIDE

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to the same exacting standards of
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When re-valving your Set use

COSSOR VALVES

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F. J. CAMM'S PUSH-BUTTON THREE— See Page 611

Practical and Amateur Wireless

Second Souvenir Number

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. XII. No. 311. September 3rd, 1933.

Sets for Everyone

IN this issue we give further details of the five interesting receivers which were briefly described in last week's issue. There is a set for every type of listener, ranging from the simple crystal set to a 4-valve (2H.F.) receiver. The Push-button Three is the first home-constructor receiver to be described in which a standard push-button unit is fitted, and this receiver, together with the other models, remains on view on our Stand at Radiolympia. In this issue we give further details of the exhibits at Olympia and many illustrations of the various receivers which are on view for the benefit of those who are unable to get to the Show. If you have not yet entered for our great Free Competition, hurry and send off the coupon and diagram which was given in last week's issue. Remember, there are twenty-five of the latest W.B. Midget loudspeakers presented absolutely free!

Micro-megaphone

A COMBINED microphone and loud-speaker, built in the form of an ordinary microphone, but delivering a very high output, is now being used by the Brighton police for traffic control and

similar purposes. A portable battery is carried by the officer, and the unit is held and used exactly as an ordinary megaphone. It is illustrated on the next page.

Lost in the Sahara

MR. FILBY, who was involved two years ago in a highly disagreeable adventure in the Sahara, will broadcast an account of his experiences in the National programme on September 9th. This is a further real-life adventure story in the series "Up Against It."

J. E. Randall, a railwayman of Leamington, will talk on sweet peas. Mr. Randall is regarded as one of the most successful growers of this flower in the Midlands, and has won many cups for his exhibits.

English Wild Life

THE West Country possesses some of the remaining herds of wild deer in this country, and on September 9th the Hon. James Best will describe the interests of these animals and the problems connected with their survival in a talk entitled "The Wild Deer of England." Mr. Best is on the Committee of the Bath and West Show, and he farms two hundred acres in Dorset.

ROUND the WORLD of WIRELESS

Notts Radio Exhibition

THIS year's Nottingham exhibition will be held from September 7th to 14th at the Greyfriars Hall, Nottingham. Television will be the main feature, although no plans have yet been drawn up for the supply of a regular programme to this particular district.

Railwayman Florist

HORTICULTURAL fans should listen to a talk to be given in the Midland programme on September 6th; when

London-Cardiff Air Race

A COMMENTARY on this race will be given on September 10th. This is the eighth anniversary of the event, but this year the course has been extended to cover Porthcawl and Swansea. Although the machines will not land at any of these points, spectators who gather there will be able to see the race. Generally about twelve planes take part and last year the fastest time made was 204.5 m.p.h. The slowest was 75.5 m.p.h. The total course is 190 miles and the slowest plane leaves Heston at 2 p.m.

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ROUND the WORLD of WIRELESS (Continued)

Poland's Second High-power Station

WORK on the new 50-kilowatt transmitter destined to replace the 12-kilowatt plant now used by the Katowice station is being hurried forward. The channel to be adopted is 395.9 m. (785 kc/s) as hitherto.

Iceland's Mighty Voice

THE 100-kilowatt Reykjavik broadcasting station was recently formally inaugurated by H.R.H. Crown Princess Ingrid; it may be heard working nightly on 1,442 m. (208 kc/s). The Icelandic Broadcasting authorities now propose to install at Eidar, on the east side of the island, a small 1-kilowatt relay station as,



The Brighton police force are now trying out a new way of educating the pedestrian traffic light dodgers. A new microphone-megaphone, combined with a portable battery carried over the police officer's shoulder, enables the officer stationed at the busy crossing to direct the pedestrians who ignore the lights. The illustration shows a policeman at Brighton using the new microphone-megaphone.

in view of the mountainous character of the country, reception of the Reykjavik programmes is not always consistent.

Drastic Move in the Argentine

THE Post and Telegraph authorities of the Argentine Republic (South America) have cancelled all transmitting licences, and broadcasting stations which have hitherto been granted this concession must now file a new application for a permit to radiate radio programmes. This measure has been taken to enable the Government to examine each individual case on its own merits, and thus secure a better control over the stations. At Buenos Aires, there exists only one official studio, the one owned and operated by the Municipal authorities of the capital, but the city possesses, in addition, sixteen other transmitters, all privately owned. There are also thirty-four stations located in various other cities and towns, but many are of low power, and their service includes unsatisfactory broadcasts and programmes, in some instances, of a questionable nature.

INTERESTING and TOPICAL NEWS and NOTES

Midland Studio Variety

THE artists for a short programme of studio variety on September 6th will be Jim Collier, the Singing Lumberjack; Henry Haynes, the Warwickshire mimic; and the Nuneaton trio, "The Three Hot Notes."

Light Music from Blackpool

RUSSELL SMYTHE and the Imperial Hotel Orchestra will broadcast in the Northern programme on August 31st

from the Pavilion, Torquay, when the solo artist will be Mary Hamlin (soprano). The orchestra was re-started after the War by Ernest W. Goss, who is the conductor. Harold F. Petts, who leads the orchestra, has appeared frequently as a soloist.

Variety from Bristol

VARIETY will be broadcast from the Bristol Radio Exhibition on September 9th. This Exhibition, which is the eighth consecutive one in Bristol, is being held at the Coliseum from September 7th to September 17th. The acts will include: Mario Lorenzi, "The Wizard of the Harp"; Bennett and Williams, "Two Jovial Boys with their Phono-fiddles"; Suzette Tarri, in "Comedy Cameos"; and the Orchestra of the Royal Marines (Portsmouth Division), conducted by Lieut. F. Vivian Dunn.

Stanton Ironworks Band

THIS well-known band, conducted by John Turner, will be heard in a programme of popular music, including a selection from "The Merry Widow," on August 31st. The band first broadcast seven years ago. Its numerous successes at Midland contests include winning outright the James Oakes Challenge Cup at the Riddings. The ironworks, where all the players are employed, is on the borders of Derbyshire and Nottinghamshire.

Southport on the Air Again

MORE outside broadcast excerpts from Southport entertainments will be brought to Northern listeners in a programme on September 2nd. The microphone will visit the "Southport Follies," an Ernest Binns' show, in the new annexe at the Floral Hall, and the Garrick Theatre, where a variety programme will be in progress.

SOLVE THIS!

PROBLEM No. 311

Finding that he had two old coils by him, Jackson decided to make his receiver into a band-pass tuned set. The coils were of different make but both for ordinary medium and long waves, and he therefore obtained a two-gang condenser and connected them up in the usual way with capacity coupling. He found, however, that although he could get stations at one part of the dial he could not obtain satisfactory results throughout both wavebands. Why was this? Three books will be awarded for the first three correct solutions opened. Address your envelopes 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. 311 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, September 6th, 1938.

Solution to Problem No. 310

The output from the pick-up on normal records was great enough to overload the output valve and thus Atkinson should have included a volume control across the pick-up or between the detector and output stages.

The following three readers successfully solved Problem No. 309 and books have accordingly been forwarded to them: J. Craddock, 7, Glendowie, Skipton Road, New Park, Harrogate; H. Holland, 27, Wilnot Street, Heanor, Notts.; G. Davy, 54, Maidenway Road, Paignton, Devon.

Everyman's Wireless Book

3/6, by post 4/-,
helps you to trace that fault!

French Television Enterprise

TAKING its cue from the methods which have been adopted so often with the B.B.C. outside broadcasts of television, the French authorities showed good enterprise on the occasion of the recent visit of the King and Queen to Paris. In selected parts of the capital television receivers were installed so that as many members of the public as could be accommodated looked in upon scenes that took place at some of the functions attended by their Majesties. This was done in London for the first time on the occasion of the Coronation, and there is little doubt that the French efforts of a similar character will in no small measure draw public attention to the new television service which is now making such material progress in France.

Torquay Municipal Orchestra

THE Torquay Municipal Orchestra will make their 250th broadcast in the Regional programme on September 6th,

F. J. Camm's Push-button THREE

Further Notes on the Construction and Adjustment of this New Push-button Receiver

THE details given last week will have enabled a large part of the constructional work to have been completed and this week we give the necessary details to enable the push-button unit, the condenser, and other parts to be mounted. Firstly, the ganged condenser must be mounted on small brackets in order that the dial may be suitably placed. These brackets may be cut from scrap aluminium and the size may be gathered from the panel lay-out given on the next page. Therefore, drill and cut the panel to these details and then place the condenser in position so that the control spindle of the dial protrudes through the centre hole. The brackets may then be made and drilled.

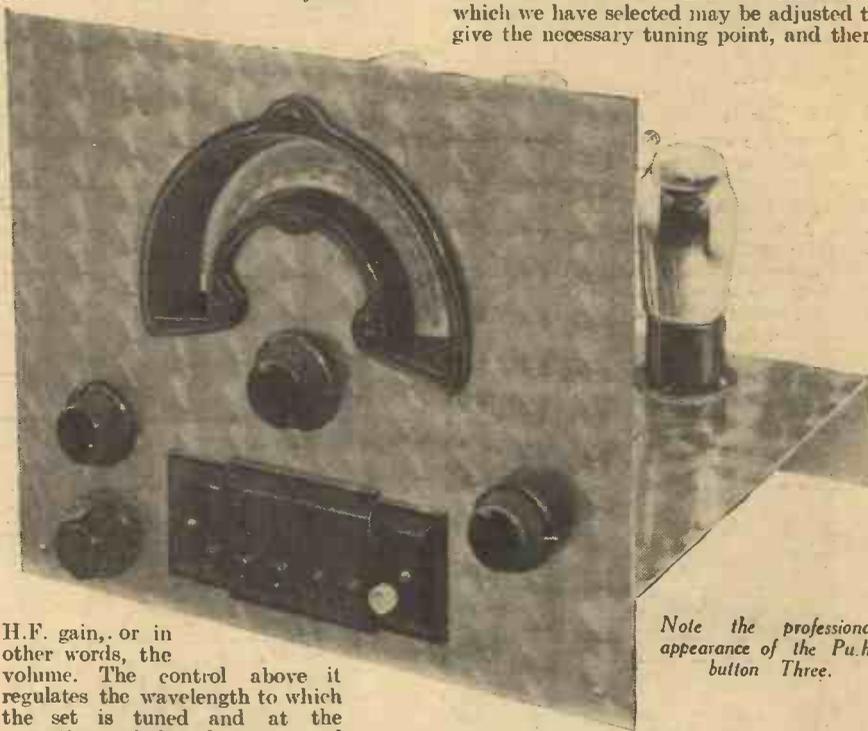
Two similar stand-off brackets about $\frac{1}{2}$ in. high must be made to support the paxolin sheet upon which the trimmers are mounted, and these should be arranged on the sheet in the following order: Looking on the chart on page 573 of last week's issue (that is, viewing the chassis from the panel end), the values reading from left to right are as follows: 600, 600, 600, 300, 160 mmfd. The selection has been made to enable Radio-Normandie, London National, London Regional, Luxembourg, and Droitwich to be obtained, but these may be modified in various localities as desired. It will be noted, of course, that the condensers are arranged in pairs as the two circuits which have to be tuned must be adjusted to the same wavelength.

Testing and Adjusting

The remaining components may now be bolted in position and the wiring completed in accordance with the wiring diagram given in last week's issue, and the receiver is then ready for test. H.T. at H.T.+ should be 120 to 150 volts and at H.T.I from 60 to 80 volts. The grid bias at G.B.—should be 7.5 volts. Connect the speaker, aerial, and earth, and the receiver is ready for test. The white button should be pushed in, so that the normal ganged condenser is brought into circuit, when the receiver may be tuned and adjusted in the ordinary way. The first thing to do is to

make certain that the set is functioning correctly, and therefore a search should be made round the dial to see if sensitivity is up to standard. The lower left-hand control is used for the adjustment of

set for the desired stations, and in some parts of the country those that we have named may not be the best. In this case stations near to the wavelengths of these should be found so that the condensers which we have selected may be adjusted to give the necessary tuning point, and there



Note the professional appearance of the Push-button Three.

H.F. gain, or in other words, the volume. The control above it regulates the wavelength to which the set is tuned and at the same time switches the set on and off. The right-hand control is merely for reaction, and is only used when a weak station is required and the signal strength has to be augmented. Run round the dial on both wavebands, and note the stations which may be received. There should be quite a wide selection available providing that a good aerial and earth are being employed.

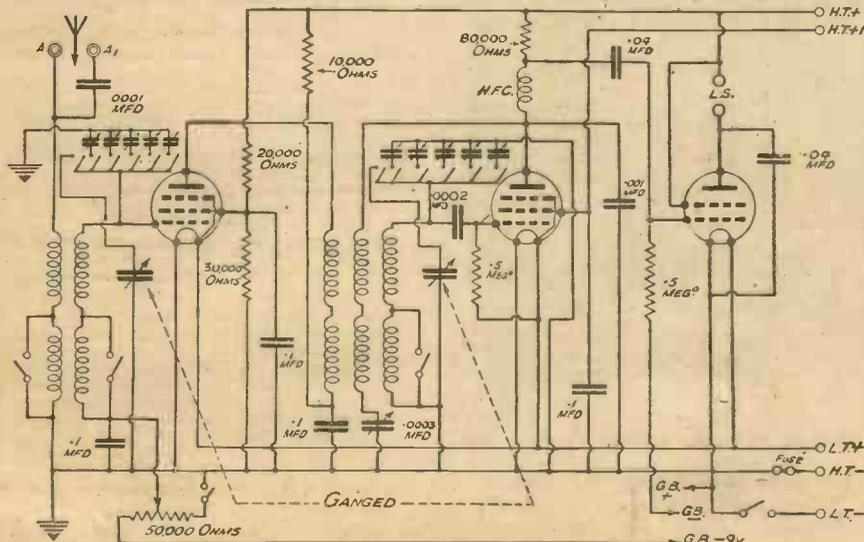
Setting the Trimmers

When quite satisfied that the performance is up to standard the pre-sets may be

is not a great deal of latitude in this connection.

Assuming that the receiver is being used in London or in the South-east of England, then the procedure for adjustment should be as follows: Turn the set on its side so that the trimmers are accessible, and carefully tune in the Normandie programme—if possible without using reaction. When the best setting has been found, push in the second button. The white button should return to its original position and the programme which was being received should disappear. Now with the aid of a sharp-pointed slip of wood or an insulated screwdriver with a long handle, carefully turn the screws on the first pair of condensers, that is, the two end ones. They will both have to be adjusted so that they are equal to the capacities used on the gang condenser, and to facilitate matters it may be found worth while to cut out the H.F. stage. This may easily be done by transferring the aerial to the detector stage. A .0003 mfd. fixed condenser should be inserted between the aerial and the centre D terminal on the coil unit.

Carefully turn the pre-set condenser nearest the rear panel strip until the station is heard. When set, replace the aerial in the aerial socket and adjust the pre-set below the one previously adjusted. The station should now be clearly heard and the two trimmers should be balanced until the signal is as good as was previously obtained on the gang condenser. Checking may be carried out merely by pushing in the white button, and thus the procedure for adjusting each station automatically



Theoretical circuit of the push-button set.

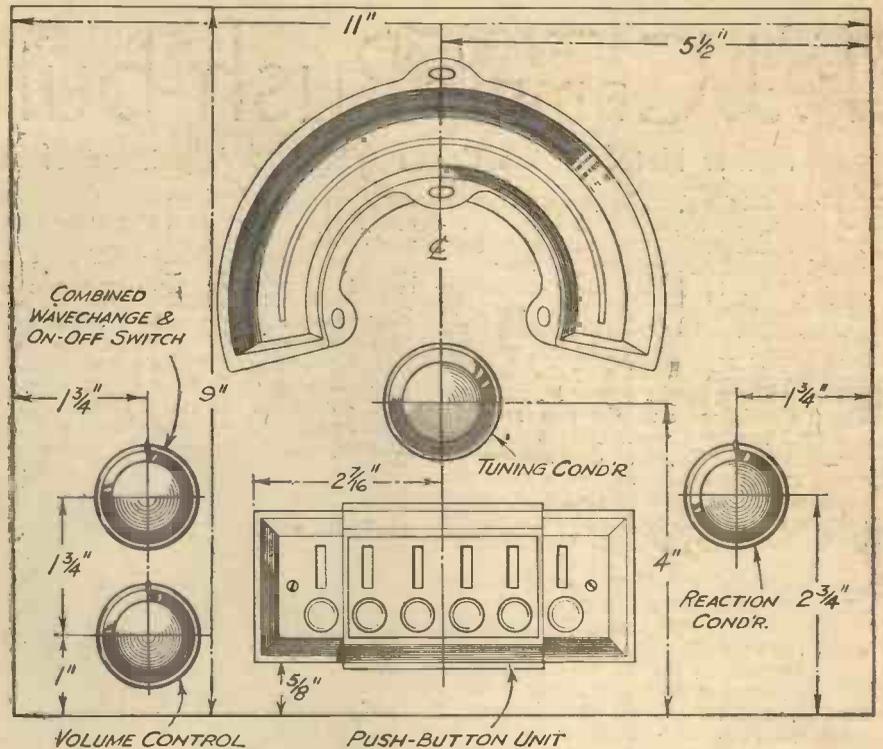
is to find the station on the gang condenser, push in the appropriate button and adjust the trimmers relative to that button. Checking is carried out by pushing the white button, it being assumed, of course, that no readjustments of the gang condenser are made until the station is properly tuned in on the trimmers.

When tuning in the London stations, or your other local B.B.C. station, the volume control will have to be adjusted to keep down the signal to a weak level so that adjustments of the trimmers are more easily carried out. With a very powerful signal it may be found difficult to find the correct setting and a background from another station may then be heard at certain times.

Long Waves

Before the two right-hand trimmers are adjusted the wavechange switch should be operated to bring the long waveband coils into circuit. The two trimmers should then be adjusted as already mentioned for the two powerful long-wave stations. It will be appreciated, of course, that in some districts the adjustment of a trimmer for the long-wave stations may incidentally bring in a medium-wave station when the wave-change switch is operated and this will provide two more stations automatically. It may also be possible in some localities to offset the presets on one waveband so that the alternative programme on the other band is obtained, and this will be particularly so where the station on one band is very powerful and the detuning is not sufficient to give distortion.

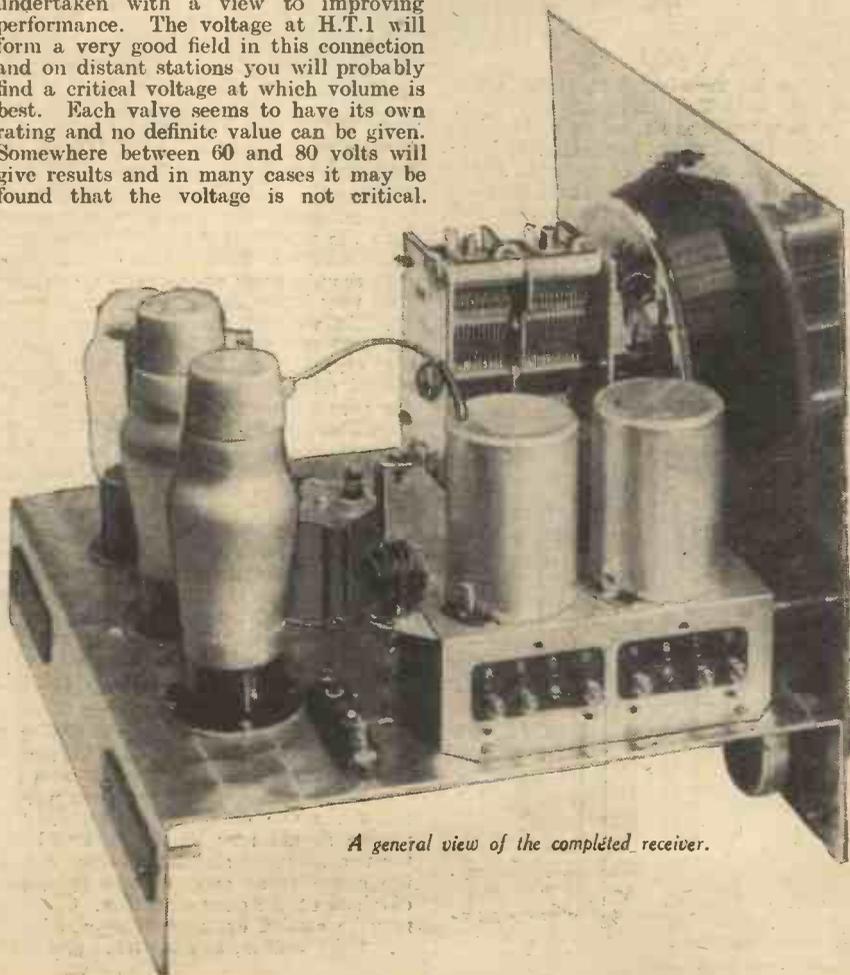
When the receiver has been in use for a short time and the method of handling it has been mastered, experiments may be undertaken with a view to improving performance. The voltage at H.T.1 will form a very good field in this connection and on distant stations you will probably find a critical voltage at which volume is best. Each valve seems to have its own rating and no definite value can be given. Somewhere between 60 and 80 volts will give results and in many cases it may be found that the voltage is not critical.



Use this diagram for drilling your panel.

Similarly, the use of the aerial condenser will show up more on some aerial-earth systems than on others.

With any receiver, the aerial and earth system are of importance and you will be well repaid, particularly if time is spent in improvement. Low resistance, sound contact and short leads are the main features in this part of the equipment.



A general view of the completed receiver.

LIST OF COMPONENTS FOR THE PUSH-BUTTON THREE-VALVE RECEIVER

- One semi-circular dial (Polar).
- One B.P.114 coil (Varley).
- One tuning condenser, 2-gang, .0005 bar type (Polar).
- One reaction condenser, .0003 mfd. Compax (Polar).
- One push-button switch, S.221, with knobs and escutcheon (E10) (Bulgin).
- Ten pre-set condenser (for values, see Editorial) (Bulgin).
- One series condenser, type 451, .0001 mfd. (T.C.C.).
- One grid condenser, type 451, .0002 mfd. (T.C.C.).
- One bias condenser, type 341, .1 mfd. (T.C.C.).
- One anode by-pass condenser, type 451, .001 mfd. (T.C.C.).
- Two screen condensers, type 341, .1 mfd. (T.C.C.).
- One coupling condenser L.F., type 451, .04 mfd. (T.C.C.).
- One tone condenser, type 451, .04 mfd. (T.C.C.).
- One H.F.C. H.F.9 (Bulgin).
- Three valveholders—two 7-pin, one 5-pin (Clix).
- Two grid-leaks, .5 meg. 1 watt (Erie).
- Two screen resistances—one 30,000, one 20,000 1 watt (Erie).
- One anode resistance, 80,000 1/2 watt (Erie).
- One anode resistance, 10,000 1 watt (Erie).
- One on-off switch, S.132 (Bulgin).
- Two terminal strips—A., A.1, and E., L.S. (Clix).
- One panel, 11in. x 9in. alu. (Peto-Scott).
- One chassis, 11in. x 2in. x 9in. alu. (Peto-Scott).
- One bias pot., 50,000 without switch (Erie).
- Fuse, 100 mA (Microfuse).
- Fuseholder (Microfuse).
- One valve, 210VPT, 7-pin metallised (Cossor).
- One valve, 210 SPT, 7-pin metallised (Cossor).
- One valve, O.T.220, 5-pin (Cossor).
- One 120-volt H.T. battery and one 2-volt 40 A.H. accumulator (Exide).
- One Stentorian loudspeaker (W.B.).



ITEMS OF OUTSTANDING
INTEREST DESCRIBED
BY
THE TECHNICAL STAFF

AUTOMATIC tuning and television are the main features of this year's Radio Show, and although very little change is noted in the general design of the television receivers which are on show, the automatic tuning devices are certainly well worth close attention. In its simplest form this arrangement consists of a row of push-buttons, the operation of which brings into circuit a pre-set condenser tuned to a definite station. In the design of the condenser bank, the arrangement of the push-buttons, and even in the shape and disposition of them, there are many interesting points to be seen at Olympia. On this page we show two different models, together with a modification in which a rotary selector dial is employed. This may be seen on the British Belmont Stand (No. 23), and on the Cossor stand (No. 42) another type of "dial" receiver may be inspected. In the latter, the dial rotates the tuning condenser, which is arrested when a pin which is depressed with the finger which

is inserted in the appropriate hole, comes to the end of a slot. In all cases, the settings for individual stations may be changed, in some instances by the owner of the set, and in others by a service engineer.

On the Ekco receivers, a motor is brought into circuit when a button is pressed, and the condenser is rotated until the circuit is interrupted at the appropriate station, and to ensure that accuracy is obtained in the setting an automatic frequency control circuit carries out the final adjustment.

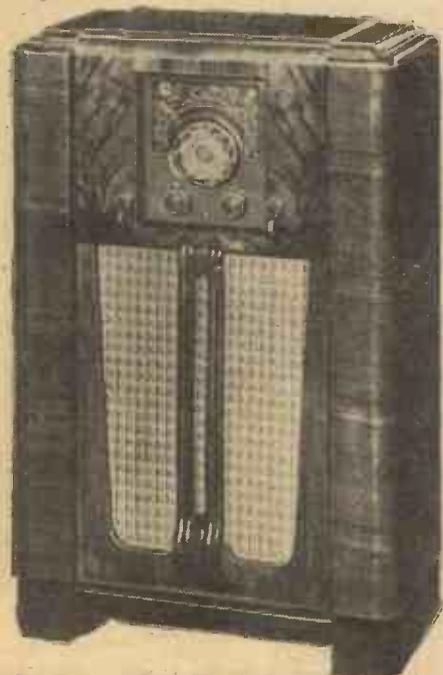
In all of the press-button receivers, manual tuning may be carried out merely by pressing the appropriate button, when the automatic selection device is disconnected and the receiver functions in the normal manner.

TELEVISION

On the television side the most remarkable development is the small television receiver selling at under £30. In these, two examples of which may be seen on the Marconiphone Stand (No. 65) and the H.M.V. Stand (No. 17), the picture which is seen is approximately 4 1/2 in. by 4 in., but nevertheless it is remarkably clear. The individual lines of the picture are lost in this small image and it bears a striking resemblance to the small cinema picture which is obtainable in the home when



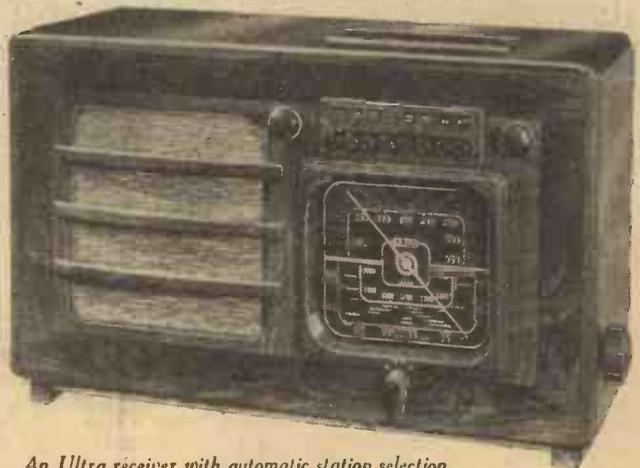
Bush Radio receivers incorporate automatic station selection.



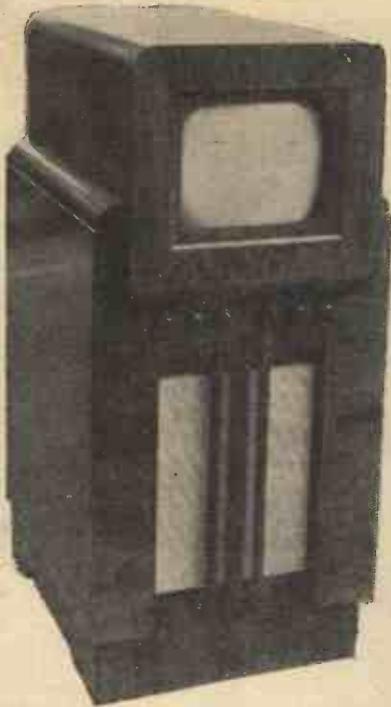
A different type of station selection device is incorporated in this British Belmont receiver.

INGENIOUS SELECTOR

In the majority of cases the push-buttons operate only on a given waveband, but in one or two the operation of the wave-change switch will enable a single push-button to tune to two stations—one on the long waves and one on the medium waves. On one make of receiver an exclusive idea is incorporated in which the buttons provide 7 medium-wave stations, 7 long-wave stations and 7 short-wavebands.



An Ultra receiver with automatic station selection.



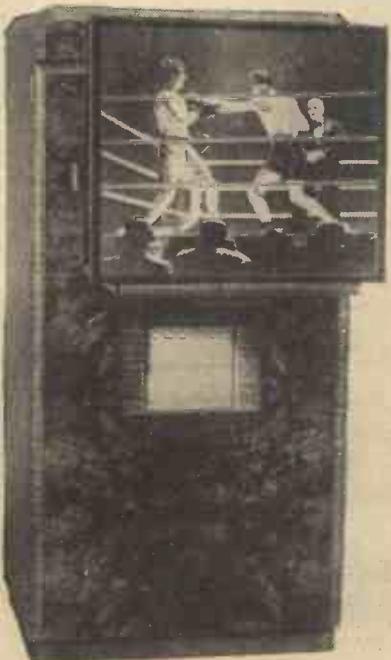
The tube end in this Ferranti set is protected by safety glass.

the screen is placed close to the projector. At the other end of the scale are the large-screen models, providing pictures over 20in. in length, and a very good example is seen on the Philips Stand (No. 51). In this model the picture size is 18in. by 14½in., obtained from a small 4in. tube, the picture of which is projected through a f1.9 lens. The screen is of etched glass, raised into position when the lid of the cabinet is lifted.

So much for the general survey of the exhibition, and now we will deal briefly with the various selected items which may be seen on various stands.]

STAND BY STAND

Assuming that you arrive by the Addison



This is one of the big-screen televisions. An Ekco-Scophony product.

Road entrance, immediately on entering you turn right for the commencement of the stands in numerical order. The second stand is that of Messrs. Heayberd, upon which may be seen the many interesting mains products, such as transformers, chargers, mains-units, etc. The outstanding item here is the newly designed AO3 charger which is of value not only to the radio man, but to the car owner who wishes to keep his accumulators in condition. You will also find a very exhaustive range of transformers for use in any type of mains receiver you may desire to build.

Next comes the Goodman's public-address stand, upon which may be seen various types of loudspeakers. This is an interesting field of development, and the novel means which have been adopted to ensure good distribution of sound with a minimum of power are well expressed in the items shown.



Here is one of the small television receivers—a Marconiphone product.

TELEVISION AERIALS

The next stop of interest will be the Belling-Lee Stands Nos. 4 and 5, where, in addition to the many small items which are already familiar to our readers, may be seen the latest types of television aerials, reflectors and aerial feeders. This firm also specialises in interference suppressing devices and the exhibits will give a very good idea of the many kinds of interference which now spoil radio reception, and the steps which have been taken successfully to overcome them.

On Stand No. 8 you will see some of the work involved in the manufacture of the many types of wire used in "wireless" apparatus. Many listeners little realise the many miles of wire which are actually used in the average radio receiver, and the Scott Insulated Wire Company's stand shows the range of their productions.

GEO. NEWNES, LTD.

The next Stand is No. 9, upon which this paper, and our many associated productions, may be seen. Great interest is shown in the models of the receivers described in this and last week's issue. Chief among these is, of course, the Push-Button Three—the first home-constructor receiver to be produced with this form of automatic tuning. Members of the Technical

Staff are in attendance to answer queries, and a complete range of Blueprints of all the receivers we have described is on sale at the counter. Included in the many text-books which are on sale are our two latest productions, the PRACTICAL WIRELESS SERVICE MANUAL and WIRELESS TRANSMISSION FOR AMATEURS. We take this opportunity of thanking all those readers who visited us during the early days of the exhibition, and for the many interesting suggestions which have been put forward. As usual, we are filing these for future use regarding the policy of this paper.

The next stand is the meeting place of the many transmitting amateurs, and is the stand of the official society of experimental



This is a Baird televisor giving a medium size picture.

amateurs. Many interesting models of transmitting equipment and associated gear are to be seen here.

TEST EQUIPMENT AND REPLACEMENTS

On Stand No. 12 is a wide range of replacement components for every type of



In this Baird receiver the picture is 7½in. by 6¼in. The price is £36 15s.

commercial receiver. Condensers of every type may be seen, including trimmers, mica, and wet and dry electrolytics. In addition, there is a wide range of service gear, including a capacitor analyser at 12 gns., a signal generator at 12 gns., and many sidelines, such as interference suppressors, anti-static aerials, and so on.

The next stand is primarily of interest to traders, exhibiting some of the many different types of cabinet made by D. M. Davies, of Slough.



A neat radiogram with push-button tuning, in the G.E.C. range.

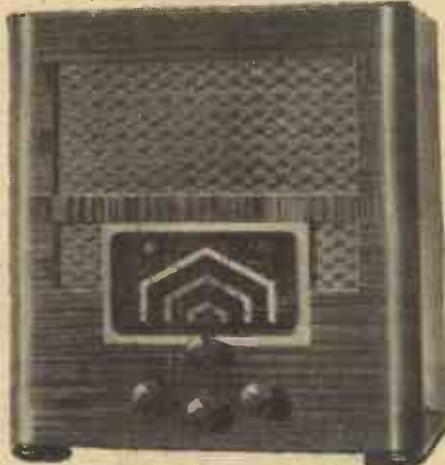
FERRANTI PRODUCTS

Across on the other side of the gangway we come to Stand No. 14, and this is shared with Stand No. 75 by Messrs. Ferranti. On these two stands they are showing the wide range of broadcast and television receivers which they produce, together with

the wide range of instruments and associated equipment. For many years the Ferranti measuring instruments have held a high place among discriminating amateurs, and on the stands will be seen the complete range, from the small simple individual unit to the multi-service test apparatus. The range of receivers includes automatic tuning and television, the latter models being available in two ranges, and in each of them the end of the cathode-ray tube is protected with safety glass.

BATTERIES

Next we come to the Exide Stand (No. 15), upon which is the wide range of batteries—both L.T. and H.T. The former include the novel indicating models, in which a pointer shows the user exactly when the battery needs recharging, and thus avoids over-running and the disappointment which arises when a battery suddenly runs out during an important item. The H.T. batteries include types



Another Pye receiver—without auto-tuning.

for every receiver which has been produced, and some include the grid-biasing section as a separate part. In addition to these are small torch cells and similar types.

The next stand is that of Siemens Electric, and here also may be seen many interesting types of battery, these being sold under the name "Full O' Power." In addition to the recently introduced models and torch and similar batteries, there may also be seen a display of Tungram valves which are distributed by Messrs. Siemens.

MONOMATIC TUNING

On Stand 17, Invicta are showing some receivers, in some of which a form of permeability tuning is incorporated, as distinct from the type incorporating pre-set condensers. In the device which is incorporated here the change from medium-wave to long-wave is automatic.

Next comes the Ediswan



A neat table model with push-button tuning in the Pye range.

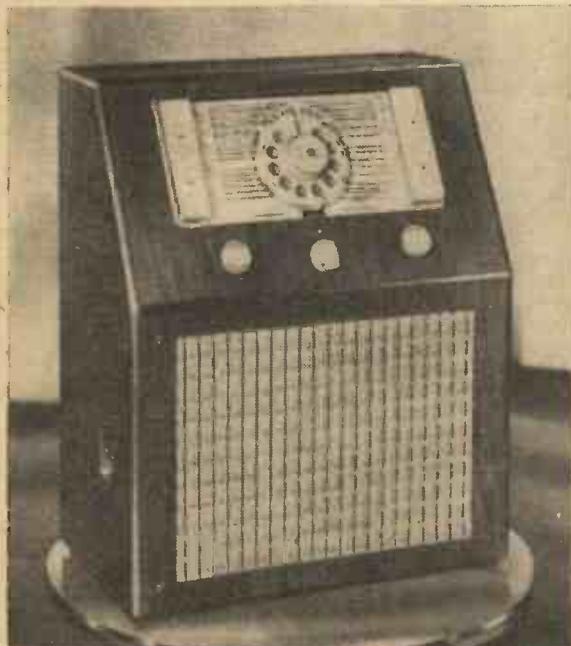
exhibit, with the largest battery of C.R. tubes run from a single source which has yet been seen. Tubes from 9 to 15in. in diameter are to be seen, together with Mazda valves, Tungar chargers, headphones, pick-ups and Ediswan batteries. The intercommunication system is also illustrated by the Loudspeakerphone system which is being demonstrated.

On the next stand the Baird Televisors are displayed, and these models possess many novel features well worthy of inspection. Prices range from £36 15s. for a table model, to a Projection type receiver at £157 10s. Picture sizes range from 7½in. by 6½in. to 24in. by 19in. A particular feature is the incorporation of only two controls in one model—one for vision contrast and the other for volume sound.

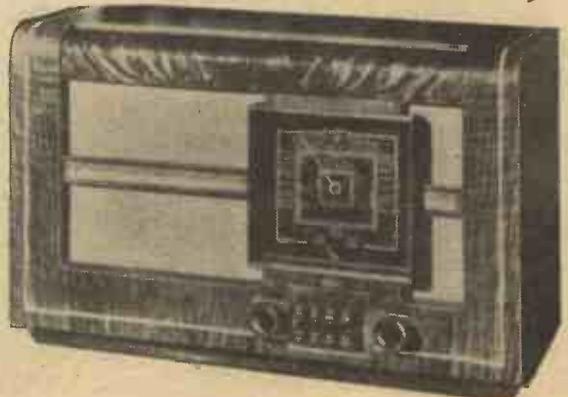
VALVES AND TEST GEAR

The range of Tungram valves is to be seen on the next stand, No. 20, and this includes, in addition to the standard British types of all kinds, the American models and a new range known as "E" valves. Following this stand is that of the Automatic Coil Winder Company, and here is an interesting display of test equipment, in addition to sample coil winding machines suitable for manufacturers. The test instruments include such well-known items as the Avometer, Avominor, etc.

Scophony on Stand No. 22 are demonstrating the big-screen television receivers



The Cossor auto-tuning system operates direct on the tuning condenser without trimmers.



Note the neat appearance of the buttons in this Mullard receiver. A novel form of tuning condenser is used in this.

in which the cathode-ray tube is not employed. The optical-mechanical system which is used is of great interest.

British Belmont receivers, which are shown on Stand 23, incorporate permeability press-button tuning which is entirely independent of the trimmers usually incorporated. The "Belmonitor" Alternative Automatic Tuning arrangement is purely mechanical and claimed to be fool-proof and trouble-free. No knowledge—not even a screwdriver, is needed to change the station settings.

On the McMichael stand, No. 24, a very interesting little portable is shown in company with many other novel receivers. The twin-speaker receiver, with a flood-lit tuning dial, is very attractive, and push-button tuning is also incorporated on two of the new models.

Next comes the Garrard stand (No. 25) with the wide range of spring and electric motors and automatic record changers. Complete tables for incorporation in an existing receiver, and a new radiogram unit costing £2 12s. 6d. are also on view.

W/B SPEAKERS

On Stand No. 26 the complete range of W/B speakers and receivers is to be seen. These are already familiar to our readers, and included in existing models are some novel new cabinet patterns. These are all designed for use with the novel and effective W/B Long-arm—remote control—device and are available in many different cabinet designs to suit existing furniture or receiver schemes. In the range of receivers there is an interesting portable at £7 7s. 6d. and a wide range of public address speakers and amplifiers.

In the Murphy range, to be seen on the next stand, there is only one with automatic tuning, and this is of the type mentioned on page 613. Television receivers are also on show and range from £45, which includes an all-wave radio, to £65.

Bush Radio on Stand 28 are showing over 17 models in which push-button permeability tuning will be featured. Also shown is an extension loudspeaker at £2 12s. 6d. A range of Baird television receivers is also shown.

On Stands 29, 30 and 99 Mullard are showing their range of receivers, valves, cathode-ray tubes and test equipment. The receivers include automatic tuning in which a new type of tuning condenser has been incorporated; this covers a much greater range than existing models for a very small movement and greatly simplifies

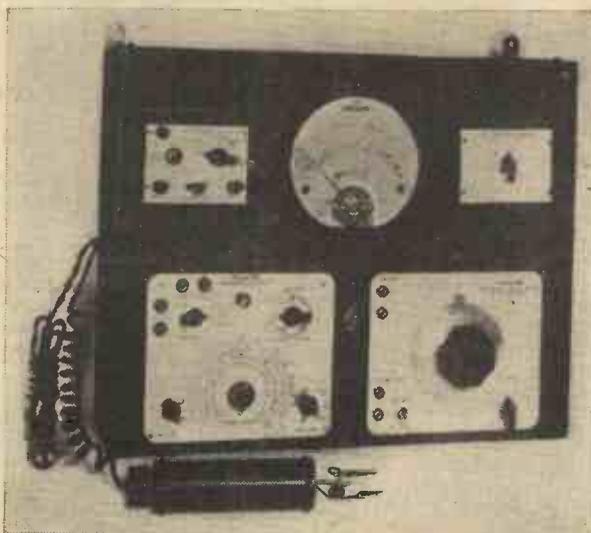


For the experimenter or test engineer. A useful item from the Everett, Edgcombe range. An All-Purpose Tester.

auto-tuning. Valves, cathode-ray tubes and similar items are shown in great variety, and for the service engineer there is a wide range of various types of test apparatus.

S.W. TRANSPORTABLE

Nearly thirty different receivers are



Here is another Everett, Edgcombe test unit with which all receiver tests may be carried out.

exhibited by Pye on Stand Nos. 31 and 100, and the exhibit includes six new receivers, in addition to various types of deaf-aid equipment. Included in the receivers are portables and television apparatus. An interesting receiver in the first range is a transportable with a frame aerial and a short-wave band covering from 13 to 49 metres.

Ferguson Radio on Stand 32 have incorporated auto-tuning in all of their new season's models. In some of these motor-driven apparatus is included, and in others the station selection is carried out by trimmers.

Stand No. 33 is mainly of interest

to the Sound engineer, as it includes high-class scientific measuring apparatus, monitoring devices, etc.

The New London Electric Works, on Stand No. 34, are showing their Electron aeriols, earth wires and similar equipment, and on the next stand will be found the various metal-oxide rectifiers manufactured by the Westinghouse Company. These range from the small trickle-charging units to the large commercial units used in big electrical undertakings. A full range of battery chargers is also on view.

CABINET DESIGNS

On the R.G.D. stand, No. 36, some interesting cabinet designs are to be seen, and all of the receivers here are built to a very high standard. The most elaborate is model 1295, delivering an audio output of 12 watts.

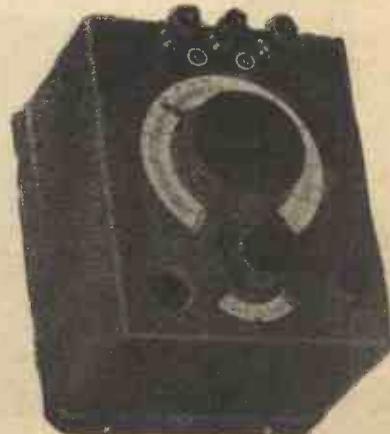
ALL-WAVE EFFICIENCY

The aeroplane over Olympia daily will have drawn the attention of many visitors to the Pilot receivers, and these are to be seen on the next stand, No. 37. Included in these is one with piano tuning, in which keys instead of buttons are employed for station selection. There is also a television to be seen here, in which a 10in. by 8in. picture is obtained.

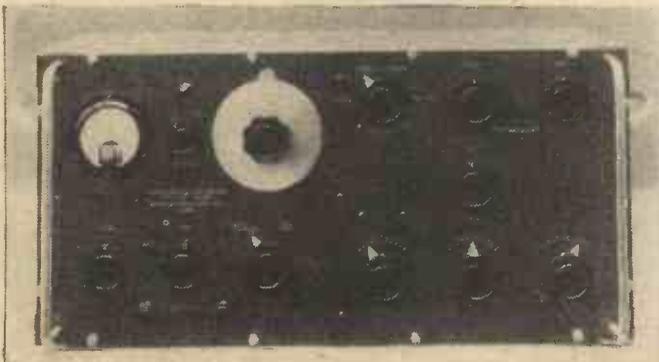
Beethoven, on the next stand, are showing 14 different models, and the automatic station selector device which is incorporated in some of them embraces permeability tuning with a trimmer condenser device. There is an interesting all-mains transportable which covers all waves.

The General Electric Company are exhibiting on the next stand, and also on Stand No. 49, and their exhibits include broadcast receivers, television receivers, batteries and valves. Push-button tuning is included in some of the 21 models, and another tuning feature is known as the Selectalite device. In this a rotary switch takes the place of push-buttons. The television receivers range from table vision units to complete television-radio-grams, the largest of which utilises a 16in. tube and gives a 13½in. by 11in. picture. The range of Osram valves and H.T. batteries for all receivers is also very exhaustive and well worth seeing.

The Alba receivers seen on the stand of
(Continued on page 619)



Here is one of the Mullard aids for the service men. See it on Stand No. 99.



An elaborate modulation tester produced by Marconi-Elco Instruments.

Be guided by the expert

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THE UNIVERSAL AVOMINOR

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A 22-range precision moving-coil instrument for all A.C. and D.C. testing. All readings direct. Total resistance of meter 200,000 ohms.

D.C. VOLTS	MILLIAMPS
0-75 millivolts	0-2.5 milliamps
0-5 volts	0-5 "
0-25 "	0-25 "
0-100 "	0-100 "
0-250 "	0-500 "
0-500 "	
A.C. VOLTS	RESISTANCE
0-5 volts	0-20,000 ohms
0-25 "	0-100,000 "
0-100 "	0-500,000 "
0-250 "	0-2 megohms
0-500 "	0-5 "
	0-10 "

Complete with instruction booklet, leads, interchangeable testing prods **£5. 10s.** and crocodile clips. (Leather case 10/-)

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The D.C. AVOMINOR

Electrical Measuring Instrument
An accurate 13-range moving-coil instrument for all normal radio tests, including H.T., L.T. and G.B. Batteries, D.C. Mains and Eliminator Voltages: Valves and valve circuits, etc.

CURRENT	VOLTAGE
0-6 m/A.	0-6 v. 0-240 v.
0-30 "	0-12 " 0-300 "
0-120 "	0-120 " 0-600 "
	RESISTANCE
	0-10,000 ohms
	0-50,000 "
	0-1,000,000 "
	0-2 megohms

Complete in case with instruction booklet, leads and interchangeable testing prods and **45/-** crocodile clips.

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RADIO SERVICING SIMPLIFIED

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receiving sets mentioned in this issue—The Pyramid One Valve (H.P. 210 Metallised) and the Fleet Short Wave 2 Valve (HP 210 and PP 225).

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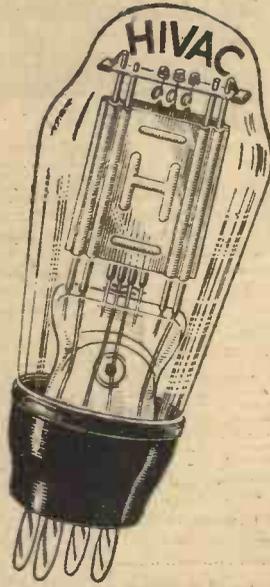
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THE "FLEET" S/W TWO. J.B. components are specified.

- J.B. S/W SPECIAL Condenser.
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For over 16 years our laboratory and factory staff of expert technicians and highly skilled mechanics have designed and produced the famous J.B. Precision Condensers and Tuning Units, which are consistently specified by "Practical and Amateur Wireless."

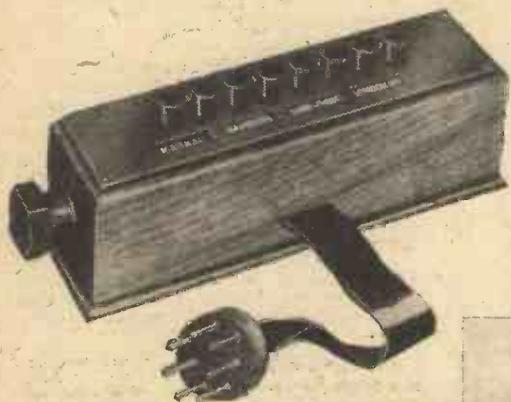


JACKSON BROS. (London) LTD.
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(Continued from page 616)

A. J. Balcombe (No. 40) embrace 25 models, and the automatic tuning device permits the station selection to be modified merely by loosening a screw, tuning in the desired station manually, and then pressing a button and tightening the screw. The models range from small table units to complete automatic radiograms.

Television receivers are included in the K.B. range on Stand 41, and in addition to the various types of receiver, Kolster Brandes are also showing their special anti-static aerial system. In the television receivers the picture size is 10in. by 8in. and the prices for their two models are £46 4s. and £57 15s.



A neat push-button remote control—supplied by R.G.D.

WIDE COSSOR RANGE

Messrs. A. C. Cossor, on Stand No. 42, are showing 27 models, of which two are provided with the "dial tuning" system of automatic station selection. Prices range from £5 5s. to £42, and the television receivers include table models and large floor models. The Cossor tube is employed in these, and a brilliant and steady picture is provided. The complete range of Cossor valves is to be seen, and for the service man and keen experimenter there are several interesting items of service equipment, including special cathode-ray oscillographs.

A neat portable is included in the Burn-dept range on the next stand, and in the remaining 10 models there are types for everyone. A special feature is the large

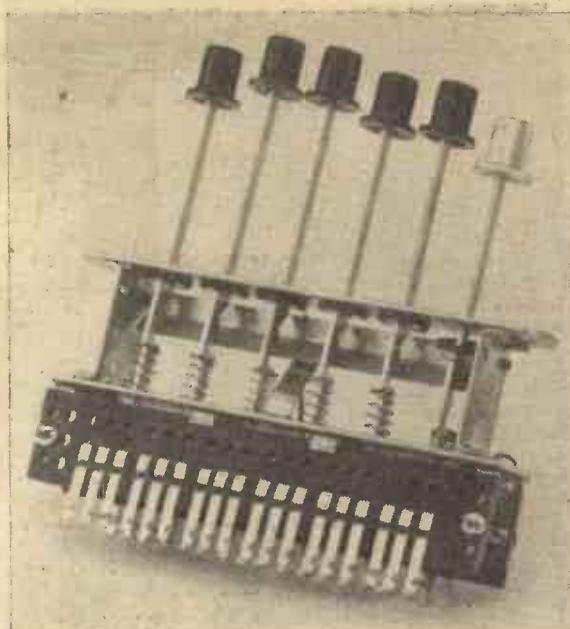
model 290, in which a 10in. auditorium type speaker is fitted and which is rated at 18 watts output.

Regentone Products, on Stand 45, are showing eight receivers in which motor-tuning is to be seen, together with portables and trans-portables. Prices range from £4 19s. 6d. to £13 7s. 9d.

On the Vidor Stand, No. 76, there are ten receivers, including two portables, and a feature of one model is that it tunes continuously from 13.5 to 2,000 metres. It thus brings in many interesting transmissions, such as the trawler band, etc.

H.M.V.

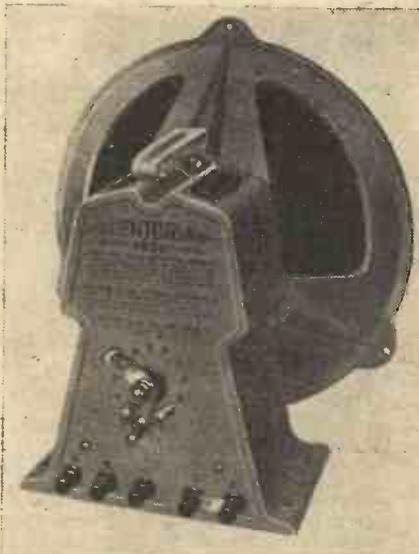
The Gramophone Company, on Stand 47, are showing a wide range of receivers in which automatic tuning is



This is the push-button unit by Bulgin, which is used in our Push-Button Three. See it on Stand No. 72.

mechanical television receivers are also on show here.

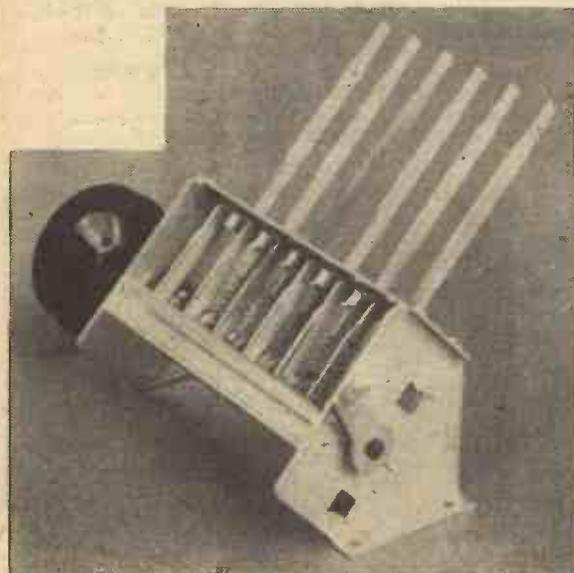
Ultra Electric are also showing a television receiver amongst their receivers on Stand No. 50, one of these giving a 7½in. by 6½in. picture and the other a 10½in. by 8½in. picture. Two of the receivers on view are of the medium- and long-wave type only, and a mechanical system of automatic tuning is included.



This year's Stentorian speaker, to be seen on Stand No. 26.

featured. Two systems are employed, motor tuning and pre-set tuning. Two schools receivers are to be seen in addition to the normal models, and eight television receivers. The latest of these is the small table model giving a picture by 4½in. by 4in. and selling for £30 9s.

On Stand No. 48 the Ekco receivers are to be seen and the motor-tuning device is of great interest. This has been referred to as the "Radio Brain." A de-luxe model to be seen here incorporates a 15-watt push-pull output stage with negative feed-back and twin auditorium speakers. The Ekco - Scophony optical-



Another push-button unit—at present only available to manufacturers. This is of the mechanical type and operates direct on the condenser.



Cut out interference by using an anti-static aerial. This is a Marconiphone product.

Philips Lamps, on Stand 51, are exhibiting 20 models, and in the push-button tuned sets a new type of condenser is employed giving improved performance. Built-in vibrators are found in some of the A.C./D.C. sets, and in addition to the Mono-knob control the new Motoradio car receivers are on view. There is also the large-screen television receiver giving a picture 18in. by 14½in. This costs £126.

BATTERIES AND TEST GEAR

There is a wide range of H.T. batteries

to be seen on Stand No. 52, and the Britannia Batteries exhibit is of great interest.

The service man will find the Everett Edgcombe exhibit on Stand No. 55 of great interest, whilst the experimenter will also be attracted by the range of test gear which is displayed here. A complete laboratory test set is shown, with which all tests for a modern receiver may be carried out.

On the Fuller Stand, No. 57, there are low-tension accumulators, high-tension accumulators, and various types of dry battery kind for all kinds of receivers, and this stand is followed by that of the Tucker Eyelet Company, who are showing many interesting pressed articles, such as eyelets and soldering tags which are incorporated in every receiver.

Sterling Batteries come next with a wide range of H.T. and L.T. units, including some interesting midgets, such as are used in deaf-aid and similar equipment.

On Stand No. 60 the many service aids produced by E. M. I. Service are to be found, and from a simple work-bench these range up to elaborate C. R. tube monitors and similar devices. A complete workshop such as should be used by a reputable service engineer may be seen here.

On Stand No. 67 you may see the interesting add-on gramophone units produced by Comoscord. These enable you to convert an existing receiver into a radiogram, and if you already have such an instrument you will be interested in the pick-ups which are displayed here. These include a crystal unit at 30s., a magnetic unit at 25s., a turntable unit with either crystal or magnetic pick-up and a pick-up head alone at 6s.

Many old friends may be seen on the Dubilier Stand (No. 69), and amongst the range of mica, tubular and electrolytic condensers are several new models. These include wire-end condensers and resistors, and special interference units suitable for all types of apparatus. Electrolytics of all types and in combination are shown, and these are of the dry and wet types.

Public address equipment is the main feature on the Tannoy Stand, No. 70, and most interesting of these is the new type of loudspeaker which resembles a car headlamp and which may be mounted on a car. It is weatherproof and has remarkable sound distributing properties. Some interesting public-address amplifiers are also shown.



One of the new H.M.V. push-button sets.



A modern design in radiograms shown by R.G.D. on Stand No. 36.



A neat table receiver, which also illustrates the cabinet quality of R.G.D. products.

HOME-CONSTRUCTOR COMPONENTS

Every constructor will find something of interest on Stand No. 72, where all the Bulgín components are exhibited. Chief among these is the newly produced push-button tuning unit. A comprehensive range of switches, plugs, sockets, knobs, condensers, transformers and coils are also shown. For the construction of an all-wave set Messrs. Bulgín can supply separate coils, combined coil units, as well as various types of selector switches.

Many similar items are also to be seen on the Premier Stand (No. 74), and in addition to the wide range of receivers, parts for broadcast and short-wave apparatus, there are many items and complete units for transmission. These

include racks, valves, and high-voltage components, as well as microphones and associated equipment. Among the short-wave components the use of Trolitule as a very efficient insulator is to be noted. There is a wide range of short-wave tuning condensers in which this material is employed.

Special mouldings in high-frequency insulating material are also displayed on Stand No. 76, where the various items used in modern receivers and made from the material produced by Statite and Porcelain Products may be seen.

More home-constructor parts are shown on Stand No. 77, where the familiar Eddystone components are exhibited. Messrs. Stratton are noted for these particular items, and among the many old friends to be seen are quite a number of new lines. Although it would be impossible to describe them all, special mention should be made of the knobs and dials which give the modern receiver a very effective appearance as well as providing the user with a certain indication by means of which the operation of tuning and adjusting is simplified.

The Telegraph Construction and Maintenance Company are showing, on Stand No. 78, a range of cables and similar items, whilst the service man will be interested in the demonstration of the moisture resistance properties of insulating tape and similar materials.

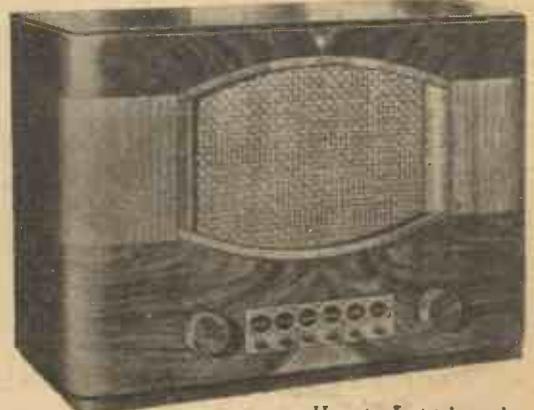
On the Rothermel Stand, No. 80, there are more home-constructor parts, including resistors, volume controls and other items, chief among which is the new crystal pick-up head. This enables an existing receiver to be adapted so that really high quality may be obtained from records.

The T.C.C. range of condensers are shown on Stand No. 81 and again these include many old friends among new or redesigned items. Electrolytics, tubulars, and mica components are shown and these also are obtainable as single units or in combination. There is a condenser for every type of set from the simple crystal to the transmitter or television receiver.

British Pix are showing their aerial and similar items on Stand No. 82, and the Invisible aerial for indoor use is still a great favourite among listeners.

Test instruments are to be seen on Stand No. 83, and although no new instruments are to be seen there are many favourites in the range of service items shown.

Dual-auditorium speakers are included in the custom-built receivers shown by Charlton Higgs (Radio) on Stand No. 85, and Masteradio are showing their car-radio apparatus on Stand No. 86. Service equipment is also featured, together with many replacement components, by Norman (Rose)



Here is Invicta's push-button receiver. Note the absence of a tuning dial.

Electrical on Stand No. 87, whilst the various types of chassis receiver suitable for inclusion in your own cabinet may be seen on the Armstrong Stand, No. 88. These chassis are available in various types and form an interesting guide to modern receiver design.

Deaf-aids and similar items are the main feature of the Radio-Aid exhibit on Stand No. 94, and these include microphones as well as amplifiers.

A wide range of speakers is shown by Celestion, and on Stand No. 95 you may see all types from the simple domestic midget up to public-address units, as well as the new 12in. Model 55.

Small parts are exhibited by Carr Fastener on Stand No. 98, which are primarily of interest to manufacturers.

VALVES, SPEAKERS, AND CONDENSERS

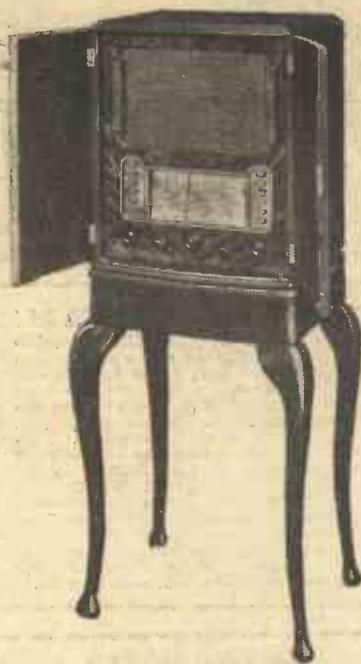
On the remaining stands you may see the range of Rola Speakers (No. 108), available in various sizes and models; the various types of condensers produced by Cyldon on Stand No. 102, and the many Hivac valves on Stand No. 103. These include short-wave as well as standard types, and this year Hivac are showing some new cathode-ray tubes.

The popular Polar components are to be seen on Stand No. 106, and included in these are the Polar N.S.F. items. These include condensers (tuning and tubular), resistors, volume controls and tuning dials. Messrs. Wingrove and Rogers will also be showing on this stand the range of Wearite components, including the very useful range of test instruments which are suitable for either servicemen or experimenters.

The Clix products are shown on Stand No. 107 (British Mechanical Productions), and these include all types of plug and socket devices. Socket strips, valve-holders and connectors are shown in variety, and some of the special short-wave devices are new.

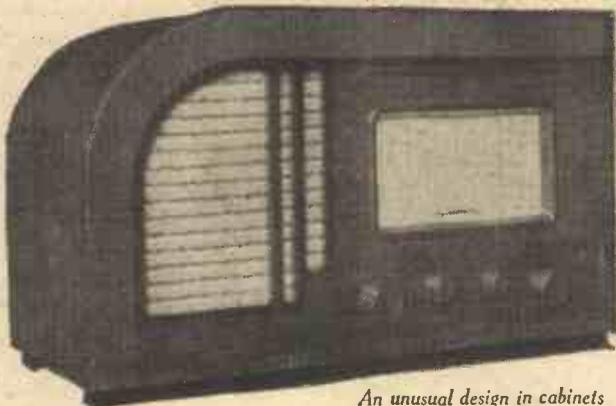
PIANOS AND NOVELTIES

This description covers all the normal stands

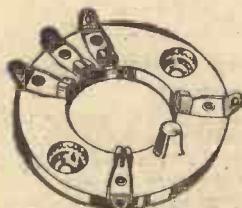


A design with individuality. McMichael's model 802—costing £24 16s. with stand.

which are of main interest to our readers, but as an annexe to the Show there is a special display of pianos and asso-



An unusual design in cabinets shown in a K.B. Model.



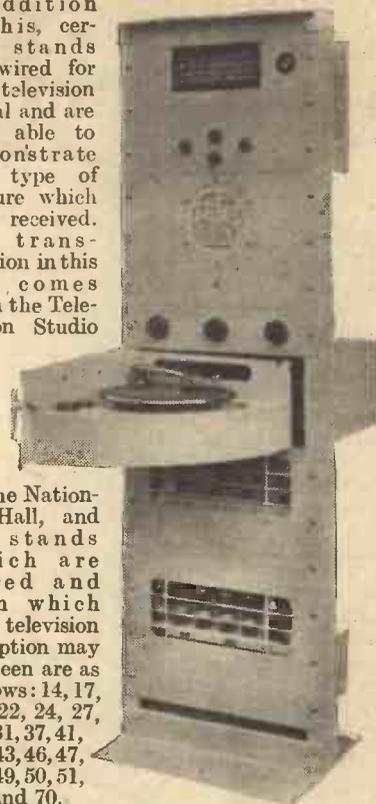
One of the Clix valve-holders to be seen on Stand No. 107.

ciated instruments. Many well-known firms, such as Chappell, Collard, Cramer, Gramophone Company, and so on are exhibiting in the Grand Hall Annexe and there may be seen the various types of piano.

As announced in previous issues, each stand this year is wired for sound on different lines from previous years. Instead of the low-frequency or audio signal which is distributed at a given level to all stands, this year there is a twin transmission of the H.F. type which

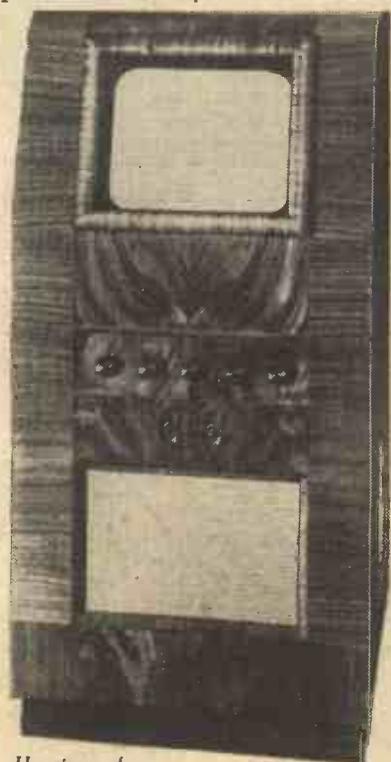
enables the selectivity of a receiver to be judged. One signal represents that which would be experienced from a local station, whilst the other represents a distant signal.

In addition to this, certain stands are wired for the television signal and are thus able to demonstrate the type of picture which is received. The transmission in this case comes from the Television Studio

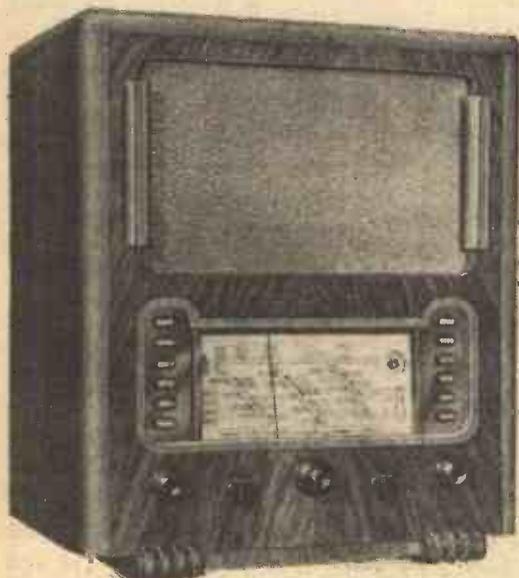


in the National Hall, and the stands which are wired and upon which the television reception may be seen are as follows: 14, 17, 19, 22, 24, 27, 29, 31, 37, 41, 42, 43, 46, 47, 48, 49, 50, 51, 65 and 70.

In the direction of a fine example of rack construction in a Tannoy amplifier. novelties the hand television receiver on the H.M.V. stand is probably outstanding. This may be regarded as the equivalent of an extension loudspeaker on the television side and shows a very small picture, with sound reproduced in an earpiece.



Here is one of the Ekco C.R. tube television receivers.



Note the arrangement of the push-buttons in this McMichael receiver, which delivers 5 watts.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

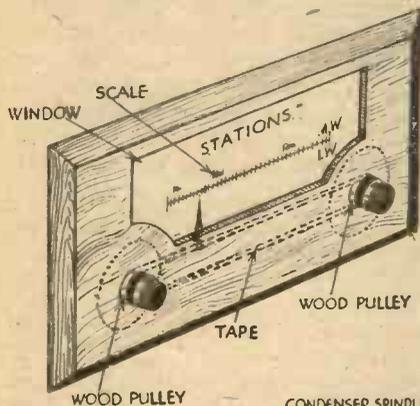
READERS WRINKLES

THE HALF-GUINEA PAGE

A Neat Tuning Device

THIS simple tuning device can easily be constructed with slow-motion drive condensers when the two bulky knobs on each spindle are not desired. In this case, two of these were used, one for tuning and the other for volume control.

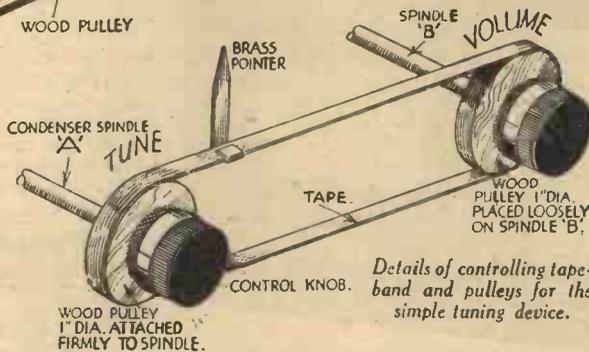
As the "slow-motion knobs" were most used, the large calibrated knobs were removed. Instead a small lin. diameter pulley was made from wood and forced on the spindle A as indicated in the sketches.



Perspective view showing the wooden escutcheon for a neat tuning device.

A similar pulley was placed loosely on spindle B of the second condenser. A band of narrow tape was then stretched taut over the pulleys, and a pointer made of brass strip clamped to the band.

The whole was neatly covered with cigar box wood, leaving a "window" for the scale and holes for the spindles. The small "slow motion" knobs were screwed on, and a scale marked out. The brass pointer moving along it as the left hand knob was turned. With lin. pulleys, the length of the



Details of controlling tape-band and pulleys for the simple tuning device.

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.

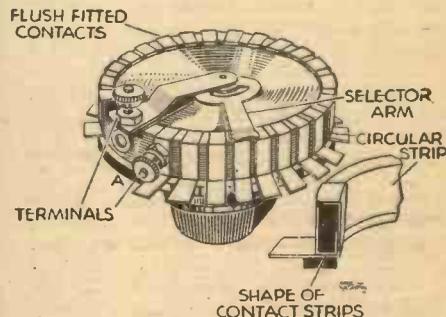
SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page 644.

scale is enough for the station names to be marked in full; medium wave on top and L.W. stations on the bottom of the line. This indicator is very accurate, and is

A Multi-contact Rotary Switch

HAVING recently made a tapped inductance coil, I thought of the following method of making a rotary selector switch to control it. The only materials needed are an old rheostat (2in. diameter) and a piece of tinfole from a cocoa tin.



A useful multi-contact rotary switch.

Originally, the resistance wire was wound on a circular strip of insulating material fitted round the body of the rheostat; this strip was removed, and the old resistance wire stripped off.

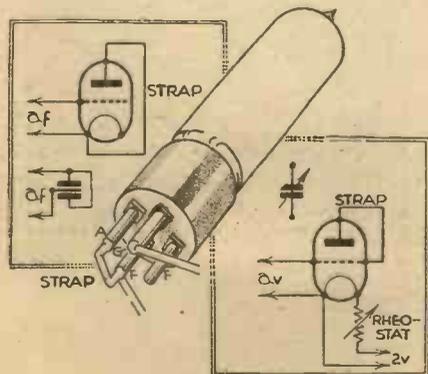
Shallow grooves, 3/16 in. wide, were then cut in the outer edge of the strip, and spaced 1/16 in. apart. Strips of tinfole were cut, 1 1/2 ins. long by 1/16 in. wide, bent as shown in the sketch, and fitted to the insulating strip. The grooves served to countersink, and also to space out the strips. When all the contacts were in position, the end one was joined to terminal "A," and the circular band was replaced. As the contacts were of tinfole, soldered connections to the coil were easily made. With the measurements given, 22 contacts were fitted, for the 22 tappings on the coil. All that remained to be done was to replace the original rheostat dial—calibrated in volts—by another, giving the different switch positions, then the switch was connected up, and finally fixed on the panel.—R. C. BOLT (Leeds).

particularly suitable for home-made portable receivers.—G. DALES (Biddenden, Kent).

Taking Advantage of Inter-electrode Capacity

GENERALLY speaking, the inter-electrode capacities of valves is an undesired factor, but during some interesting ultra-high frequency experiments I have found that this characteristic can be utilised for micro-adjustment of capacity or inductance constants in ultra-short-wave receiver circuit design.

From the accompanying sketches it will be evident that a simple fixed condenser of approximately 20mmfds. can be obtained by connecting the pins as shown, for either a triode or multigrid valve. As shown in one inset the variable characteristic is obtained simply by the contraction and expansion of the filament, brought about by the inclusion in the L.T. circuit of a rheostat. The very small variation becomes an important consideration when working below 5 metres, and those readers who would care to enlarge upon this idea can try their hand at employing multi-electrode combinations.—R. J. JOHNSONE (Belsize Park).



A method of utilising the inter-electrode capacity of a valve.

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ON YOUR WAVELENGTH



Radiolympia

WE all know that as in past years the entire output of every firm exhibiting at Radiolympia was sold within an hour of the Exhibition opening, so trade during the next few months is bound to be good. If you did not order your set, I do not anticipate that you will have to wait three years however, for I am sure that the dealer round the corner will supply you with a set of any make at a moment's notice and be glad of your business. I do not know why the radio trade has been speaking of a slump when last year it informed the Press that orders received at Radiolympia had broken all records. Personally, I would not deal with any radio firm which makes such a nonsensical statement to the Press. Nobody believes it, and even if it were true, it indicates that the firm concerned is either a very small one, or so badly organised that it is incapable of expanding. Whatever orders are received at Radiolympia should be manufactured within the year or the orders declined, and there is not a retail firm in the world which will order sets three years ahead. I cannot understand why these statements are allowed to appear in the Press. We all know that none of the firms exhibiting at Radiolympia will even sell one year's output at the Exhibition. Many of them would be pleased to sell their first three months' output.

I have no doubt we shall read the usual bilge that press-button tuning has taken the world by storm. We shall see the usual pictures of women conversing with salesmen, and the usual pictures of so-and-so's band listening-in in their dressing-room on Bilge & Co.'s receiver. We shall see the specially-posed photographs consisting of half-naked beauties twiddling a knob. I think it is time that the radio industry realised that the public is not hoodwinked by such flappedoodle, which is based on the false idea that by introducing girls into photographs and advertisements you have attracted the reader's attention and will cause him to hasten, run, sprint, or skedaddle to the nearest wireless store and expect to buy that same receiver with unctuous female attached. The Exhibition posters have annoyed me ;

By Thermion

in my view they hired a couple of dozen buck navvies, armed with baskets full of bad eggs, to shy them at plain sheets of paper, for the poster reminds me of nothing so much as that mixture of yellow ochre and sticky white which frizzles about in a frying-pan after you have cracked an egg on the side. For all that, this was one of the most interesting Exhibitions I have visited. The right type of public was there, a more intelligent section of the public than the moonstruck crooner-doting, jazz-prancing, emasculated crew of nitwits who will queue up outside a crooner's hotel the night he lands from America. The more unintelligent and obese the crooner, the larger the public. How they must laugh up their sleeves.

Television receivers were not so inchoate as in former years, and I forecast a popular future for them.

Gas-operated Wireless Sets

I WAS interested in a gas-operated wireless set which was demonstrated under working conditions on the Stand of Milnes, the makers of the H.T. Supply Unit. This receiver made use of the Thermo Electric Generator, and it opens up possibilities for those not yet on the mains.

Not What I Thought

I OPENED a letter the other morning and from it something closely resembling a five-pound note fluttered to the floor. It was not what I thought, but those who sent it—Messrs. Beethoven Electric, Ltd.—told me it was something of far greater value, a note to remind me that I would receive a hearty welcome at Stand No. 38. Well, many people may have considered it of greater value, but a fiver is not an inconsiderable sum of money. If Messrs. Beethoven Electric will send me a genuine fiver I can

assure them I will extend a very hearty welcome to them.

A New Union

I LEARN that during Radiolympia an attempt was made to form a trade union for radio service engineers. I do not yet know how far those arrangements have gone forward, but I do assure radio service engineers that any news they care to send me I shall be glad to publish, for in future issues they will find much of value to them in their work. I also would draw their attention to our new volume, "The Practical Wireless Service Manual," which is the most practical work on the subject of servicing wireless receivers that has yet appeared. It costs 5s., or 5s. 6d. by post.

Wireless Transmission for Amateurs

ANOTHER of our handbooks produced in time for Radiolympia was "Wireless Transmission for Amateurs," which costs 2s. 6d., by post 2s. 10d. Many hundreds of copies have already been sold. If you are thinking of joining the band of amateur transmitters you should certainly obtain this book which is the most practical and certainly the most easily understood book on the subject, which is specially produced for beginners.

The Electric Eel

I CONGRATULATE the Exide people on an original stunt. The Electric Eel was a piece of inspiration, and I do hope that none of my readers got an electric shock by dipping their hands into the tanks.

Cheaper Valves

THE fact that it was rather more than two years ago since the B.V.A. sanctioned a price reduction indicates that a further drop in the price of valves was overdue. The present reduction amounts to about 20 per cent., although this reduction does not apply to all valves, but to most current types and a number of old ones. Some of the non-ring valve manufacturers have moved their prices down in consonance.

The Daily Press

AS usual, the daily papers made a mess of their Radiolympia reports. One newspaper said: "Listeners using these sets (push-button) will no longer have to twirl a dial.

A row of press-buttons is seen at each side of the set. These are directly connected to a pre-selected wavelength. It is the most revolutionary development ever invented since the valve." Perhaps some readers can tell me how you can connect pre-selector buttons to a wavelength? The method of using pre-set condensers in conjunction with a switching system is at least five years old. I wrote an article showing how it could be done that number of years ago.

Radio Auction

I AM informed that on account of the impending demolition of their showrooms at 62, High Holborn, because of the rebuilding of that thoroughfare, the Peto-Scott Co., Ltd., have arranged for an auction sale of the surplus stock at that branch.

Amongst other goods offered at the sale, which commenced on August 25th, are wireless sets by eminent makers, radiograms, components, accessories, and a variety of electrical appliances, including fires, irons, vacuum cleaners, table lamps, etc. The business normally transacted at the Holborn branch of the company will be transferred to the head office at 77, City Road, E.C.1, where details of the auction sale may be obtained, and the address of a new West End showroom will shortly be announced.

The B.B.C. Exhibit at the Show

THE B.B.C. have given me the following particulars of their exhibit at Radiolympia this year which is housed in the National Hall on a site 63ft. by 12ft. by 22ft. high. The main features of the stand consist of three large pylons on which many activities of the Television Department are displayed in photographic and diagrammatic form, the subjects being:

Behind the Scenes: Showing much of the preliminary work necessary before the programme is presented.

Brings to You: Popular events and personalities.

Outside Broadcasts: Description by photographs and diagrams of the functions of the Mobile Television Unit, together with a typical broadcast.

The London Television Station: A pictorial journey from the studio to aerial showing the intermediate stages.

Evolution: A chronological survey.

How it Works: A simple pictorial description of television from studio to viewer.

The lay figure, known as "Tilly," used from earliest days as a

Notes from the Test Bench

Soldering Materials

THE only satisfactory way of making connections in a modern radio receiver is to adopt the process of soldering. The type of solder to use is quite as important as the selection of components, as it is possible under certain circumstances to damage components due to the use of the wrong type of solder. The type known as "Tinman's" contains a large percentage of tin and accordingly melts quickly, even with an electric iron which is being under-run. Thus, when making connection a small "blob" of solder may be applied to the joint and the iron immediately removed. If, however, solder containing a large percentage of lead is employed, it will be found that the iron has to be very hot to melt it, and when applied to the joint it will have to be left in contact for some time so that it runs to a neat joint, and the heat may travel along the connecting leads, and if these are very short the component to which they are attached may be damaged. These remarks apply particularly to wire end condensers and resistors.

Screening Problems

THE modern ultra-efficient receiver often calls for judicious use of screened leads and components, but it is often possible to overdo the work of screening. For instance, some modern valves have the cap connected to the grid, and if a long screened lead is connected to this and the internal connecting wire is thick enough to run close to the screening material, there will be a capacity loss to earth which will reduce efficiency. A top-cap connector may be all that is needed in this type of valve. Even when a screened lead is adopted, the lead itself should be as thin as possible and the screening cable diameter as large as convenient so as to reduce the capacity coupling between the two.

Band-pass Coils

WHEN designing a two-H.F. receiver with band-pass tuning there are two alternative positions for the band-pass coil unit. It may be used before the first H.F. stage, or as the coupling between the two H.F. stages. If a simple S.G. valve is employed in the first stage the band-pass coils may precede it and will thereby avoid cross-modulation due to overloading the valve. A modern H.F. pentode will not be susceptible to this trouble, however, and the coils will give the best performance when used as coupling between the H.F. stages.

"stand in" and model for make-up and costume, is on show in one of the original dresses that she wore for television.

Some model stage sets are displayed against a photomontage of productions in which these sets were used. There is also a display of all B.B.C. publications which are on sale. The stand was designed by Richard Levin in collaboration with the B.B.C. Display Department.

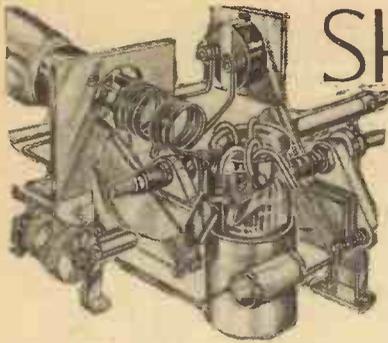
"What Happened at 8.20?"

I AM told that the B.B.C. have commissioned four well-known detective-story writers—Anthony Armstrong, John Rhode, Arnold Ridley, and Eric Maschwitz—to write the scripts for a series of mystery-story shows which, under the title "What Happened at 8.20?" will be launched in October and will continue through the autumn and winter. The programmes, to be broadcast fortnightly on Fridays, will combine light entertainment with a strong mystery element, and a novel method of keeping the listener guessing.

James Langham, of the Programme Organising Department, had the ingenious idea on which the programmes have been built. Each show will begin at 8 p.m., and the listener will be taken in imagination for the first twenty minutes to some place where an entertainment is going on—a theatre or cabaret, for example. A number of musical "turns" will be heard. Then, at exactly twenty minutes past eight, something sensational and unexpected will stop the show; it may be a murder, or the arrest of the star entertainer, or a theft, or somebody turning the lights out as a practical joke.

From 8.20 to 8.40 the mystery will be unravelled. Each programme in the series will vary in its method, but it may be, for instance, that a detective will arrive on the scene, and for twenty minutes will carry out an examination of those who were present at the scene of the mystery. It will be remembered that Eric Maschwitz was the author, with Val Gielgud, B.B.C. Drama Director, of "Death at Broadcasting House"; appropriately, his contribution to the "What Happened at 8.20?" mysteries will again have its setting in a B.B.C. studio.

Arnold Ridley (author of "The Ghost Train") has set his story on board a liner, John Rhode ("The Motor Rally Mystery") in a road-house, and Anthony Armstrong ("Ten Minute Alibi") at a private party in a London hotel. The producer of these programmes will be Ronald Waldman, who recently joined the B.B.C. Variety Department.



SHORT-WAVE SECTION

STRAIGHT Versus SUPERHET

Circuits Suitable for the Ultra-short Waves are Discussed in this Article

THIS year's radio show at Olympia is largely featuring television, and, it is hoped, will bring about a great deal more interest in the reception of vision programmes than has been shown so far since the opening of the Alexandra Palace station. The great majority of broadcast receivers are of the superheterodyne type, and rightly so, for this class of set is very efficient both on broadcast, and the normal short-wave bands. It will, nevertheless, be interesting to see whether the superhet will come out as well on the ultra-short waves for the reception of sound and vision.

Now, on those wavelengths below 10

using different types of valves, and in each case results have been remarkably consistent.

The frequency changer is of the electron-coupled autodyne type, the suppressor and screen grids are connected together and taken to the slider of a 50,000-ohm potentiometer. The anode resistance R is 30,000 ohms, and the output is taken through a .0001 condenser and a .25-megohm grid-leak to feed the single I.F. valve. Resistance R_1 should have a value of 50,000 ohms and feed through values similar to the first stage to the second detector, which is coupled to the output pentode with a

values already given will suit most valve types, but if necessary, a little experimenting in this direction can easily be carried out.

Tuned Anode Coupling

It is possible also to replace R and R_1 with a tuned circuit, as Fig. 2. This will give the tuned anode type of I.F. coupling. The coil may consist of 40 turns of No. 30 D.S.C. wire on a lin. diameter former and tuned with a .0001 pre-set condenser. Alternatively, R_1 may be replaced with a broadcast type H.F. choke. Both these latter methods of coupling will give a somewhat higher degree of amplification. If required a triode hexode frequency changer

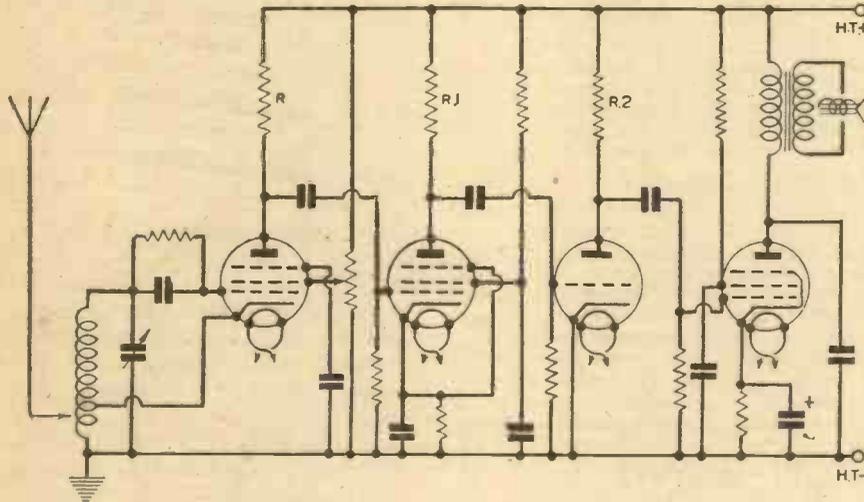


Fig. 1.—Theoretical circuit diagram of a 4-valve superhet using resistance coupling throughout.

metres the design of a superhet calls for special attention to the I.F. amplification stage, as it is not yet necessary, or desirable, to have a high degree of selectivity from the I.F. circuits; tuning will be sharp enough as it is. Indeed, if the receiver is required to tune in amateur 'phone on the 5-metre band, that is not crystal controlled, a very wide band width for the I.F. stages will be necessary. It is partly for this reason that many amateurs still use the super-regenerative type of receiver, which, although efficient enough for local signals is completely insensitive to weaker and more distant stations.

A 4-valve Superhet

Fig. 1 shows the circuit of a 4-valve superhet that has a band width nearly as great as that of a super-regenerative receiver, and is very much easier to tune. It will be seen that resistance coupling is used in all stages. A commercial receiver of this kind was introduced a year or so ago, but for some reason this type of set does not seem half so well known to ultra-short-wave experimenters as it deserves to be. The writer has built many versions of resistance-coupled superhets

100,000-ohm anode resistance, .1 grid condenser and .25-megohm grid resistance. All the other circuit constants have conventional values. It should be noted that a condenser of .001 microfarads is connected between the anode of the output pentode and earth. The resistance and condenser

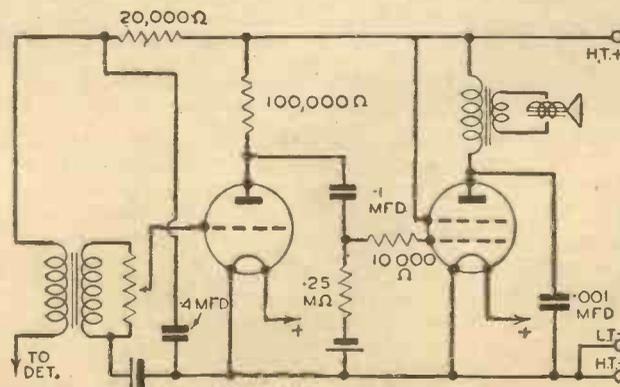


Fig. 3.—Circuit diagram of a high-gain L.F. amplifier to follow an ultra-short-wave detector.

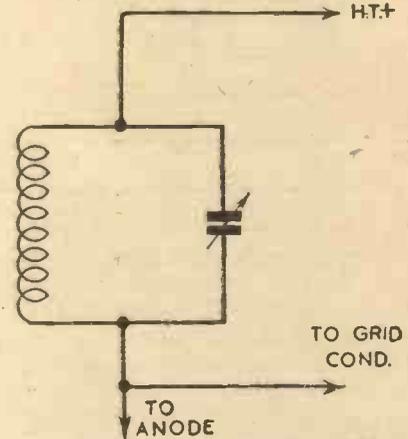


Fig. 2.—Resistances R and R_1 (Fig. 1) may be replaced by this tuned anode circuit.

may be used in place of the electron-coupled autodyne circuit, so it will be seen that the resistance-coupled superhet provides a basis for a great deal of experimenting for the ultra-short wave enthusiast. As a matter of fact vision receivers are designed along similar lines, except that much greater band widths have to be obtained from the interstage couplings.

Choke-resistance Coupling

In the circuit of Fig. 4 several I.F. and L.F. stages could be used, but, in doing so, noise level rises very rapidly, and it will soon be noticeable that amplified valve noise has risen out of all proportion to the amplification of a weak signal. When this occurs the superhet has just about reached its limit of usefulness; only an increase in field strength or signal input will effectively reduce the noise level, hence a high gain superhet on the ultra-short wave sounds very much like a super-regenerative receiver working. This is not noticeable on local transmissions as the gain control is usually kept back, and the carrier is sufficient to suppress amplification noises.

High-gain L.F. Amplifier

Amplifier

Turning from the superhet to "straight" receivers it will now be seen that a multi-valve set using several H.F. and L.F. stages can provide as much signal-gain on the ultra-short waves with a quieter background level. The problem of H.F. amplification is, of

Problems of Receiver Installation

How to Decide on the Best Position for the Receiver, to Fit Neat Wall Connectors and to Carry Extension-speaker Leads - - - By FRANK PRESTON

IT is not only those who have just built their first set who are often in doubt as to the best method of arranging it in the house. Very often those who have been using a receiver for years find that it can well be moved to a new position with advantage, either to obtain better reception or to reduce the lengths of various connecting wires. In many cases it will be found well worth while to spend half an hour or so in trying different positions and connections.

One of the first maxims is that the set should be placed as near as convenient to the aerial lead-in and the earth wire. If the two are themselves some distance apart it is generally better to place the set near the earth connection, thus making the aerial lead the longer. But if an outside aerial is used in conjunction with an earth connection from a buried plate or copper tube an attempt should be made to have them situated so that both are close to the same window. In that case, as long as the set can be fixed near the inside of that window, maximum efficiency should result.

Speaker Position

When the set has a built-in speaker—and the majority are so constructed nowadays—most pleasing reproduction will generally be ensured by placing the set in a corner so that it faces the position normally occupied by the easy chairs. If possible, the centre of the speaker should be approximately in-line with the level of the ears of the listener when seated. Alternatively, when using an external speaker, the speaker can be tilted so that a line drawn parallel to the axis of the centre magnet pole would meet the ears of the listeners. It is usually wise to place the set so that it is not close to a door, the panels of which might act as undesirable sounding boards. For similar reasons, it should be placed on a rigid table or shelf, preferably on a felt mat if the cabinet is not provided with soft rubber feet.

Aerial Lead-in

If for any reason the aerial lead must of necessity be fairly long it might be worth while to test a few alternative set positions before making a final decision and fitting permanent mains leads and plugs. This suggestion is made because it sometimes happens that a certain amount of mains hum is induced into the lead-in due to the fact that it runs near to, and parallel to, mains leads embedded in the plaster of the wall. Hum can also be induced into an earth lead if it is long and of comparatively high resistance. But the earth wire should always consist of stout-gauge wire or multi-strand connector. When it is very short there is no need to insulate it, but it is occasionally found that insulation is desirable when the lead is several yards in length.

The aerial lead-in, if of good quality insulated wire, can be taken through a

hole in the window frame and stapled to the upper edge of the picture moulding or skirting board, whichever is the more convenient. If the wire has to be carried for a fair distance along a wall it will generally be better to take the lead-in through the top corner of the window frame and to

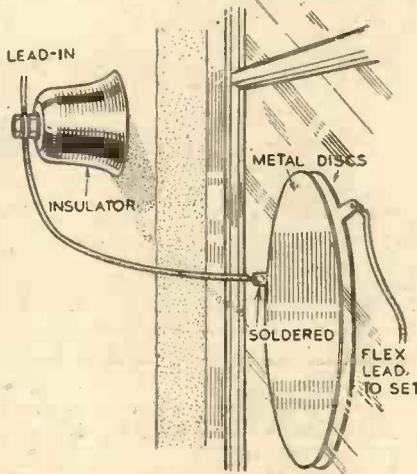


Fig. 1.—An effective lead-in arrangement when it is not wished to bore through the window or frame.

run it along the picture moulding. The down-lead from there to the set can be made in a corner by soldering to the actual lead-in a length of coloured flex which matches the wallpaper. When using an indoor aerial consisting of "Pix" or similar material, the adhesive tape with metal inside which forms the aerial itself can also be used for the down-lead. This material can be bought in a variety of shades to match the wall colouring.

A difficulty sometimes arises with regard to the method of bringing the aerial lead-in

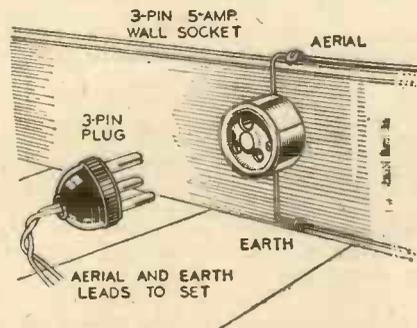


Fig. 2.—A neat arrangement for aerial-earth connections.

through a window frame. In most cases where the frame is wooden a small hole can be bored through it with a 1/16 in. auger bit; this should be inclined downward toward the outside of the house to prevent the entry of rain water. If desired, the hole can be filled, after threading through the

insulated lead-in, with putty or beeswax. When bare wire is used for the lead-in the proper procedure is to use an insulated lead-in tube, of which various patterns are available. Before drilling the window frame for this, test the size of the drill by making a hole through a piece of scrap wood; the hole should be such that the tube is a tight fit.

Metal Window Frames

With metal-framed windows it is not always easy to make a hole, even if the frame is of sufficient width. But an insulated wire can sometimes be wedged between the frame and one of the hinged windows. Another method is to find a joint in the brickwork on the outer edge of the frame, and then to bore a hole part-way from the outside of the house, and then a second hole to meet it from the inside. Both holes will probably have to be at an angle to each other, but the lead-in can be threaded through by using a length of stout iron wire with a small hook at one end.

Should drilling of the frame be out of the question, a perfectly effective lead-in can be provided by attaching a 4 in. disc of aluminium sheet or metal foil to each side of the glass. With the glass as dielectric they make a good fixed condenser. (See Fig. 1.) Thus it is necessary only to solder a lead to each "condenser plate" to ensure a good H.F. connection between the aerial and the set lead. The aerial lead-in outside and inside the house should, of course, be anchored to prevent any strain being thrown on the metal discs. The discs can be "glued" to the window with gold size or shellac varnish.

Socket Connectors

Having found the most suitable position for the set it is desirable to fit a wall socket with twin connectors to receive the aerial and earth leads. By following this arrangement the set can be removed at any time without leaving untidy wires straggling about. A three-pin irreversible five or ten amp. wall socket can be used, as shown in Fig. 2. After neatly fixing the wires to the skirting board with insulated staples, they are attached to the back of the socket before it is screwed down; any loose parts of the wires can then be firmly secured with insulated staples, taking care that these are not allowed to pierce or break the insulated covering of the wires.

It will seldom be found that the best position for the set is adjacent to a mains power point, and it will, therefore, be necessary to arrange an extension lead from this. The best arrangement is to fit a 15-amp. three-pin socket near to the aerial-socket (15-amp. is specified, because there can then be no risk of transposing the aerial and power plugs). The wire from the original wall socket to the new one should be first-quality flex, preferably of the type in which the twin leads are encased and appear as a single flat lead. At one

PROBLEMS OF RECEIVER INSTALLATION

(Continued from previous page)

end a plug should be fitted for attachment to the original mains point, and the other ends are connected to the two smaller sockets of the extra point connector. If the mains socket is used for feeding, say, a standard lamp at the same time as the set is in use it will be necessary to use a two- or three-way adapter, as shown in Fig. 3. Another method sometimes adopted, although not recommended to those not having experience of electrical wiring, is to remove the cap from the switch forming part of the mains socket and to make direct connection to the two "input" terminals, taking care to turn off the main power switch before exposing the switch contacts.

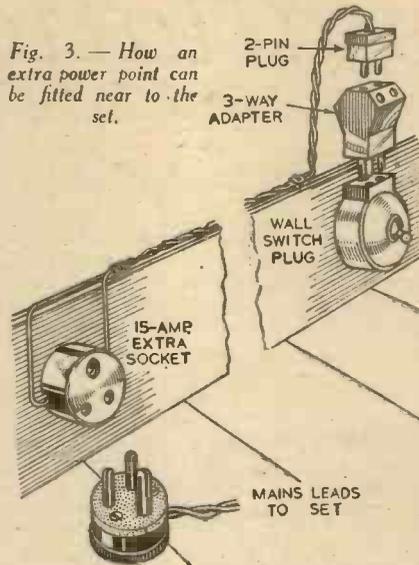
Extension Mains Leads

The lead between the two sockets may be attached to the skirting board with insulated staples—taking extraordinary care that the staple points do not pierce the insulation—or simply run under the carpet and underfelt. In any case, it should be made quite sure that the lead is completely out of the way and cannot be tugged or pressed so that it is detached.

When it can conveniently be arranged, it is even better to raise a floorboard near each of the two sockets and thread the wire underneath the flooring. Provided that stout, high-grade flex is used, it may be of any reasonable length, since a few ohms resistance is of little consequence when the leads have to carry only a fraction of an

amp. (50 watts at 200 volts represents a current of .25 amp.).

The position is entirely different when the set is battery operated, and it is not convenient to store the batteries in the same cabinet as the set. Two wall sockets can be used, one for H.T. and one for L.T.,



but the L.T. leads should not be more than a few feet long, and even then should consist of stout, multi-strand flex. The

current might well exceed one amp.; and one ohm resistance at one amp. represents a voltage drop of one, which would render the set inoperative.

Speaker Points

It is often wished to run extension-speaker leads to other rooms. Provided that choke-capacity speaker feed is employed and that the speaker used has a matching device, the leads can be of considerable length without disadvantage. Thus, it might be thought fit to carry them along the picture moulding, between the door and its frame and into the next room. A neater job can be made, however, by drilling a hole through the partition wall. This is usually one-brick thick or made of breeze blocks in houses built during recent years. Consequently, it is not very difficult to pierce it. Unless the walls are soon to be redecorated it will be wise to ask a builder to make the necessary hole. Otherwise, a joint between the bricks or blocks can be found by driving in a 6in. nail. It will easily drive through the plaster, but will stop when the face of a brick is encountered. After a few attempts a joint should be found, when a hole can be knocked through the wall with a wall drill, or even with the nail.

When taking an extension lead to an upstairs room the plaster can be pierced with an ordinary centre bit. A floorboard must then be raised above the hole so that the lead can be drawn through. If the hole is fairly near to a corner of the room it will not be very conspicuous, and it should not be difficult to tell which board to raise in the upper room.

Important Broadcasts of the Week

NATIONAL (261.1 m and 1,500 m.)

Wednesday, August 31st.—Concert party programme from the Isle of Wight.

Thursday, September 1st.—Promenade Concert from Queen's Hall, London.

Friday, September 2nd.—Vocal Girl Makes Good; musical comedy.

Saturday, September 3rd.—The Tourist Trophy Race, organised by the R.A.C.; a microphone-impression of the early stages of the Race and a running commentary on the closing stages, from Donington Park.

REGIONAL (342.1 m.)

Wednesday, August 31st.—The Streets of Bristol, No. 1, King Street. (West of England.)

Thursday, September 1st.—Lorely, act 2 of Alfredo Catalani's opera, from The Turin Studios of E.I.A.R.

Friday, September 2nd.—Cabaret Cruise: Radiolympia television.

Saturday, September 3rd.—Tchaikovsky: Promenade Concert from Queen's Hall, London.

MIDLAND (297.2 m.)

Wednesday, August 31st.—Band programme.

Thursday, September 1st.—Songs I Like: Roy Henderson.

Friday, September 2nd.—Kington Ewe Fair: A recorded impression of one of the great annual sheep sales of the Welsh Border.

Saturday, September 3rd.—The Tourist Trophy Race, organised by the R.A.C., at Donington Park (recorded summary of the programme broadcast in the National programme this afternoon).

NORTHERN (449.1 m.)

Wednesday, August 31st.—Organ music from the Tower Ballroom, Blackpool.

Thursday, September 1st.—Scots v. English: one more Border Incident, a discussion on Scotland and England.

Friday, September 2nd.—Southport: Concert party from the New Annexe Floral Hall, and Variety from the Garrick Theatre.

Saturday, September 3rd.—Water Polo: a commentary on the Lincolnshire County Championship, from the Grand Parade Bathing Pool, Skegness.

WEST OF ENGLAND (285.7 m.)

Wednesday, August 31st.—The Streets of Bristol, No. 1, King Street.

Thursday, September 1st.—Fête and Gala,

a story short by L. A. G. Strong, read by the author.

Friday, September 2nd.—Soccer Coaching, No. 1, a talk.

Saturday, September 3rd.—Sports Special: a feature for fans, Season 1938-9, No. 2.

WELSH (373.1 m.)

Wednesday, August 31st.—Concert Party programme from the King's Hall, Aberystwyth.

Thursday, September 1st.—An Eisteddfod Winners' Programme.

Friday, September 2nd.—Hwyddydd Haf: Summer Eve, a light music programme.

Saturday, September 3rd.—Review of Saturday's sport in Wales, including eye-witness account of the Final of the Gibson-Wall Cup Competition at the Rock Park Green, Llandrindod Wells.

SCOTTISH (391.1 m.)

Wednesday, August 31st.—Trawlers: The day's work of the North Sea Fishermen.

Thursday, September 1st.—A Visit to the Empire Exhibition.

Friday, September 2nd.—Scots Songs: Orchestral concert.

Saturday, September 3rd.—Exhibition on Parade (3rd Edition): A Revue of floodlight and fancy.

NORTHERN IRELAND (307.1 m.)

Wednesday, August 31st.—Choral programme.

Thursday, September 1st.—Dance music from the Ritz Cinema, Belfast.

Friday, September 2nd.—Death at Newtownstewart: a reconstruction of a famous Ulster crime in the 'seventies.

Saturday, September 3rd.—Chamber music.

"PICTURE PAGE"

TELEVISION'S weekly topical magazine, "Picture Page," will be produced again in its entirety at Radiolympia on September 1st under the editorship of Cecil Madden. The visitors will be introduced by Leslie Mitchell and Joan Miller.

Fashion Parades organised by the Fashion Group of Great Britain will bring more than 120 mannequins before the television cameras at Radiolympia, and well-known designers will show dresses of their own creation and describe them in conversation with a B.B.C. commentator.

PERCIVAL MACKAY
A BRIEF BIOGRAPHY

MOST of our popular dance band leaders seem to take up music at a very early age. Percival Mackay is no exception. His father had a music business, and consequently the son amused himself by reading every book on music he could find, and acquired a great knowledge of music when he was quite young. In music Percival is entirely self-taught.



Percival Mackay.

He left school at 14, commencing his career in the mechanical side of dentistry, but soon left this to go on tour as assistant to an entertainer and illusionist, it being his job to disappear from cabinets and sealed-up sacks.

Just over a year later he became a solo pianist and accompanist for a concert party. Next year he joined a concert party at Clacton, playing the piano, doing his own small conjuring show, appearing in sketches, and going round with the hat! After this he travelled to Ireland, where he remained for nearly three years as musical director to a picture and variety circuit.

He spent another season on the beach at Clacton after he left Ireland, but at the end of this war broke out. Mackay returned to London to join up, but he was turned down on account of eyesight, the standards then set being very high. Later, however, he was able to join the Durham Light Infantry.

Talk with Jack Hylton

Back in London in 1919, Mackay undertook the management of a small music publishing firm. A visitor, who occupied the flat above the shop, heard Mackay playing, and offered him a permanent job in a band at Brighton. He was there for nine months. Subsequently he joined the famous band known as "The Broadway Five." It was while he was with this combination that he met and talked with Jack Hylton and the following morning was offered a job as pianist with Jack Hylton's band.

Mackay assisted arranging and orchestrating the show for Jack Hylton when his band made its first appearance on the music-hall stage at the "Bedford Theatre."

Later, Mackay was offered and accepted the conductorship of the new musical comedy, the famous "No No Nanette!" which ran for nearly two years. Since then he has conducted many popular shows.

New Times Sales Co.

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B.T.S. SHORT WAVE ADAPTOR

LIST PRICE £2.12.6 **BARGAIN**
Brand-New and Ready for Instant Use. Nothing to Assemble **39/6**



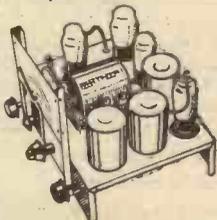
America Direct on your Present Receiver! This amazing unit simply plugs into your battery or A.C. Mains set. No alterations necessary. 100-1 ratio aerial tuning and slow-motion reaction: for use either as Plug-in or Superact Adaptor. Walnut finished Cabinet. **2/6 DOWN**

inset (illustrated). With 2 plug-in coils: 12-26, 22-47 metres. Ready assembled. Yours for 2/6 down and 10 monthly payments of 4/-.

NEW 4-Valve ALL-WAVE BATTERY CLASS "B" CHASSIS

LIST VALUE £7.4.0 **Bargain** £3.19.6
Wave range 18 to 2,100 metres.

Amazing Super Band-pass All-wave circuit with Class "B" output giving range and volume equal to a powerful mains set. Wave range: 18-62; 200-550; 800-2,100 metres. Station name and Wavelength illuminated dial as illustrated. Low H.T. Consumption. Chassis Size: 10.5" high, 11 1/2" wide, 9 1/2" deep. Complete with four matched valves, knobs and escutcheon. Guaranteed fully tested. 23 19 6 Cash



5/- DOWN secures balance in 13 monthly payments of 7/6.
Or with matched Speaker £4 19 6 cash, or 5/- down and 15 monthly payments of 7/11.

AMAZING BARGAIN ALL-WAVE S.G.3 CHASSIS

Complete with matched valves, knobs and escutcheon. LIST VALUE £4.15.8 **OUR PRICE** Cash or C.O.D. **52/6**
or 5/- down and 12 monthly payments of 4/6.

ALL WAVE S.G.3 CHASSIS. Exceptional purchase. Pentode output. Wide choice British, foreign and short-wave stations, 18-52 metres. Engraved dial 200-2,000 metres. Amazing tone and volume. Matched valves, assembled and fully tested. Dimensions: 10" x 7 1/2" d. x 8" h. to top of scale.



S. T. 900 5-Valve BATTERY ALL-WAVE

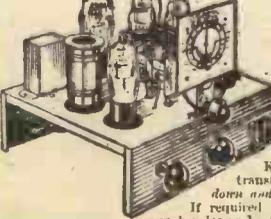
LIST PRICE £6.2.6 **BARGAIN** 4^G 8^S
Cash or C.O.D.



A splendid offer which cannot be repeated. Send now for this wonderful bargain and save 22s on your S.T.900. Assembled strictly to the designer's Circuit on Peto-Scott panel and slide-plate with B.T.S. coil holders, 3 valves and Collold dial fitted. Less Batteries, Coils and speaker. Fully tested. Yours for 5/- down and 12 monthly payments of 7/6.
COMPLETE RECEIVER. Housed in handsome Peto-Scott Table Cabinet with lift-up lid, matched valves and 10 coils, 9-2,000 metres. Bargain 26 : 6 : 0, or 9/9 down and 14 monthly payments of 9/9.
SPECIAL OFFER. 10 B.T.S. self-locating one-shot coils, 9-2,000 metres, suitable for S.T.900 or WORLD S.G.4 kits, list price, 27/-, N.T.S. price, 17/6 cash or C.O.D.

WORLD S.G.4 ALL-WAVE KIT

WITH NEW STATION CALIBRATED SCALE LIST VALUE £4.17.6 **BARGAIN** 4^G 17.6 **4 VALVES GIVEN FREE!**



This N.T.S. S.G.4 is ideal for the short-wave enthusiast and provides an unsurpassed performance on the medium and long waves. Efficient circuit comprises Pre H.F., S.G., Detector, Screened Grid Audio and Pentode output stages, 2-gang condenser. Slow-motion tuning. Station-named dial for Broadcast and calibrated for short-wave bands. Designed specially for B.T.S. 6-pin One-shot Inductor 9-2,000 metres. Kit with highest grade components only, with drilled metal chassis, transformer, condensers and all instructions. Less coils, 42/- only or yours for 2/6 down and 12 monthly payments of 3/9. Valves FREE.
If required with 3-pairs of coils for short-waves only or all-wave work add 12 6 to each price or 1/- to deposit and each monthly payment.

COMPONENT BARGAINS

VALVEHOLDERS, Chassis type parolin, 4- and 5-pin, 2/4, 7-pin, 3/4, Octal, 6d.
GANG CONDENSERS, Plessey type, shielded 3-gang condensers, 0.005 mfd. with Trimmers, 2/11.
BARGAIN PARCELS, Value 25-30/-. Bargain 4/11, post 9d. Exceptional opportunity for "Practical Wireless" readers. Huge stocks must be cleared of components, well-known makes, for Mains and Battery sets, building and repairs, comprising Mains and L.F. Transformers, Tuning condensers and coils, fixed and variable resistances, fixed condensers, switches and chokes, etc. Assorted parcels, our selection—but leave it to N.T.S. to give amazing value. 4/11, post 9d. extra. Order Early.
STEEL CHASSIS. Ready drilled for 1-9 valveholders, Electrolytics and mains transformer. Size 15 1/2" x 9 1/2" x 3 1/2", grey enamel finish. Bargain, 2/- each.

TRICKLE CHARGER, 2v. 4 amp. Model, Metal Rectifier, 10/-.
VALVE SCREENS, 3 portion. latest type, 1/- each.
TUNING CONDENSERS, .0005 mfd. Airspaced, 1/9.
OUTPUT CHOKES, Benjamin, Universal Class "B" tapped output chokes. List, 11/-. Our price, 2/6. Taps tapped Pentode output choke, 2/6.
TRANSFORMERS, Teleon, 5/1 and 1.75/1, 2/-.
JACKS AND PLUGS. B.T.S. Single and Double Circuit Jacks. List 2/3. Bargain 1/- each. Jack Plugs, 1/- each.

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Practical Television

September 3rd, 1938. Vol. 3. No. 116.

Big Screen Television Abroad

BIG screen television work is making good progress abroad, particularly in Germany, where every important television development is fostered by the government. Although intermediate film and certain mechanical systems have been tried with a measure of success, the best results portrayed recently have been through the medium of the projection type cathode-ray tube. A marked advance was noticed over those seen last year in the same country, the screen size being approximately 12ft. by 10ft., while up to a thousand people were able to watch the results in a suitably designed hall. The compact form taken by the actual projection receiver itself will be evident by reference to Fig. 1. Built in this way the operator is readily able to make adjustments to the controls when required, while improvement in picture quality has been attributed to two causes.

in this connection were that if it is assumed that in a modern cinema the screen illumination is approximately fifteen times higher than the illumination produced by the projection tube, then theoretically this can be compensated for if the total influx of light is concentrated in the reflection into one fifteenth of the space angle which is used on a normal cinema screen. In spite of the directional effect it has been found that a hall of, say, 70ft. by 60ft. can be uniformly supplied with the available light at the chosen picture size. By using these improvements a large screen picture has been produced, the brightness of which was considered unattainable a year ago. As evidence of the resulting picture quality reference can be made to Fig. 2, which is an unretouched photograph of a 12ft. by 10ft. picture as seen on the screen. The detail shown is of quite a high standard, and there seems little doubt that before long full cinema screen size pictures will be forthcoming.

French Standards

FOLLOWING on British practice the Minister of the P.T.T., after a series of experiments, has fixed a standard for the Eiffel Tower television transmissions for a period of three years terminating on July 1st, 1941, so as to enable manufacturers to develop receivers for sale, and avoid any risk of early obsolescence. There is a 4-megacycle separation between the vision and sound carriers, the former being 46 megacycles and the latter 42 megacycles, while the polarity of the transmitted signal is positive. That is to say, from black to white corresponds to an increase in modulation, and this conforms to the method which the B.B.C. service has proved satisfactory. Fifty frames per second are transmitted,

these being interlaced to give 25 complete pictures, while the picture format ratio is 5 to 4. Unfortunately, the number of lines per picture is not fixed at one figure, being given as 440 to 455, but it is possible that the French will fall into line with the Germans and select finally the figure of 441. It is conceivable that anyone on the South Coast capable of receiving both the Eiffel Tower and Alexandra Palace transmissions

will experience a measure of interference, for the carrier separation on vision and sound for the two services is only 1 and 0.5 megacycle respectively, but until the French station is operating at full power this is unlikely to cause any serious inconvenience. It is a matter for regret that uniformity of picture standards cannot be agreed upon by the European countries at least, but the Germans have said that in their opinion 441 lines is the best compromise between attainable quality and technical and economical requirements. While sufficient at the moment for the relatively small home screen, for large screen projection the necessity for a higher standard is recognised. The public will always be prone to compare the quality of large television pictures with that seen in the cinema, and already 720 line definition has been demonstrated in short circuit in Berlin. The ultimate figure is still a matter of conjecture among the experts, and in any case it will be some years before very material changes are made.

A Film Co.'s Link with Television

A SHORT time ago a description was given in these columns of an interesting new method of television transmission and reception which had been developed in America by the Dupont Manufacturing Co. The actual television receiver, in so far as scanning was concerned, was driven from the transmitting end, and not controlled as in the more usual system. It was claimed that the methods adopted not only gave a flickerless picture as a result of multiple interlacing but required a smaller frequency sideband width for the same picture definition. That the idea merited a very close consideration is borne out by the recent announcement that Paramount has acquired an interest in the Dupont Laboratories. This is the first major American film concern to link itself directly with television, whereas in this country two such co-operations already exist. The method by which this merging of interests would operate is not yet known, but there is no doubt that at the back of the move is visualised a televised news service for use in cinemas, coupled with the production of films expressly for television transmissions.

New Mobile Film Unit

WITH the idea of becoming as self centred as possible, the B.B.C. have now acquired a complete mobile film unit



Fig. 1.—The compact form taken by a German big screen projection receiver

First of all, the cathode-ray tube itself has increased efficiency due to the fact that the anode volts have been increased to between 60,000 and 80,000 volts, this giving a much brighter picture on the fluorescent screen. Furthermore, the chemical composition of the screen powder used is better, so that there is reduced disintegration due to the enormously high electron impact velocities. Added to this, the reflection efficiency of the remote crystal-type screen on to which the picture is projected has been improved by concentrating the reflected light into an angle which is considered suitable for the particular hall to be employed. The underlying considerations



Fig. 2.—A 441-line big screen projection picture as shown recently in Berlin.



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Leadership of the Component Industry is once again clearly indicated in the new edition of our 120-page Catalogue. Fully illustrated, contains all information and technical data relating to modern components employed in Push Button Tuning, All-wave Sets, Television and Home Constructed Apparatus.

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DISTRIBUTING VISION SIGNALS AT RADIOLYMPIA

READERS will remember that last year all the demonstrations of television receivers were segregated in one section where twelve manufacturers showed their sets in operation in darkened rooms. This year the situation was changed completely by having sets in operation on exhibitors' stands. To make this possible a very complicated but efficient scheme of distribution was devised which in broad outline worked in the following manner. An aerial survey carried out on Olympia's roof about eighteen months ago enabled the best aerial position to be found. At this point the Baird Company's engineers erected a 45ft. mast at the top of which was fixed an efficient reflector aerial beamed accurately on the Alexandra Palace station. A 300 ft. run of high grade television feeder cable passed from this aerial to the amplifiers provided by E.M.I.-Service for the R.M.A. These were positioned in the main hall gallery immediately above the Addison Road entrance. The measured signal at the termination of the aerial feeder cable was found to be of the order of 4 millivolts for both vision and sound, and gave a very satisfactory signal to interference ratio.

Amplification and Distribution

The amplifiers employed not only had a very wide frequency response but were capable of feeding a signal amplified to one volt into each distribution line passing to a stand requiring signals. A total of 20 stands made use of this service and terminating the distribution cable was a pad box or resistance network which enabled the signal to be split equally into four local feeder cables for joining to the separate television receivers. In this way every set received a signal on an 80-ohm unbalanced feeder cable which gave 25 millivolts for full white or maximum carrier modulation on the vision wavelength. That is to say, the input to each set simulated exactly the conditions of direct feeding from an aerial and enabled the pictures shown to be reproductions by radio from Alexandra Palace irrespective of the source, of emanation of the signals, i.e., Alexandra Palace, Radiolympia or the outside broadcast van. Approximately 80 television receivers were in operation at Olympia; but with the distribution system it was possible to check each point accurately and also prevent signal feedback down the line, an occurrence which causes beat interference on the vision screen and which must therefore be avoided at all cost.

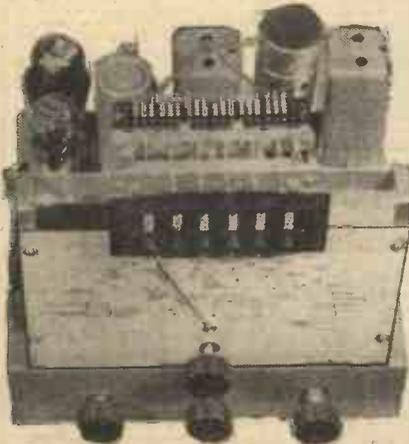
Proper Checking

For test purposes, or to be used in the event of a breakdown, the local Olympia distribution could be made to operate as a self-contained unit and in this way the exhibitors were safeguarded against a cessation of programme. Sound and vision emanating from the glass-walled Olympia studio passed to the B.B.C. mobile control room vehicle and then to Alexandra Palace via Broadcasting House through a special balanced television cable. This is the cable used as a "ring" round London, and was extended to Olympia by the Post Office because of the trouble experienced in the past when a 5-metre directional radio link was employed. Interference has been so bad that picture quality has been reduced very materially and the R.M.A. very wisely adopted the cable link to remove this source of trouble. Constant supervision and monitoring was necessary to maintain this ultra-high-frequency distribution line network at its full efficiency.

ARMSTRONG 7-STAGE

All-Wave Radiogram Chassis incorporating Push-button and Manual Tuning, supplied complete with 8in. Matched Moving-Coil Speaker, model A.W. 3PB. Price £7 18s. 6d. complete. Call at Stand 88 at Olympia and See and Hear this latest chassis.

Specification: New method of Push-button Tuning incorporating genuine Silver Mica Condensers to obviate station drift, principal Medium Wave Stations and Luxembourg can be obtained by the Push-button method. All latest refinements, including large Tuning Scale calibrated in degrees and station-names on all wavebands. Short-wave covers all principal bands from 15.9 to 50 metres. Volume and Tone Controls work on Gramophone as well as Radio, Pick-up Leads may be permanently connected. Moving-coil speaker made especially for chassis.



Packing and Carriage Free. 7 Days Trial. Carriage Paid. Armstrong 12 months guarantee. The above is only one of many attractive models and full details will be sent on application. 8 New Models, send for Catalogue. **ARMSTRONG MANUFACTURING Co.** 100, ST. PANCRAS WAY (Formerly King's Road), CAMDEN TOWN, N.W.1. 'Phone: GULliver 3105.

PRACTICAL MECHANICS

Special Contents for September include:

THE MONTH IN THE WORLD OF SCIENCE AND INVENTION

THE "CARDIOPHONOSCOPE"
Constructional details of an ingenious apparatus.

PHOTOGRAPHING SOUND
An interesting article on the audiometer.

PREDICTING THE WEATHER
How science aids meteorological experts.

HOW MARGARINE IS MADE
Sunshine vitamins for everyone.

MODEL AERO TOPICS
Current news from the world of model aviation.

STAR-GAZING FOR AMATEURS

IN THE SEPTEMBER PRACTICAL MECHANICS

The Magazine of Modern Marvels.

OF ALL NEWSAGENTS AND BOOKSTALLS.

6^d

The "Fleet" S.W. Two

Final Constructional Details and Operating
Notes for this Short-wave Receiver

LAST week we gave the main constructional details of the "Fleet" Two and on this page we give the panel drilling dimensions for those who are constructing their own panel. The wiring diagram given on the next page will enable you also, if you desire, to drill the chassis. These may be obtained, ready drilled, from Messrs. Peto-Scott and this will save quite a considerable amount of time. Assuming that these are being made at home, the chassis should be drilled first, the holes for the valves and coils being cut with $1\frac{1}{2}$ in. drills. At the rear runner the socket strips have to be mounted and you can drill $\frac{3}{8}$ in. holes to clear each socket, or drill a $\frac{1}{4}$ in. hole at each end and cut away the intervening space to leave a clearance slot. The small holes for the fixing bolts should then be drilled and the strips bolted in position.

On the surface of the chassis it will be noted that several holes are needed through which connecting leads are fed, and these holes may be $\frac{1}{4}$ in. to $\frac{1}{2}$ in. in diameter. Two similar holes are needed through which bolts are passed to hold the aerial series condenser in position, whilst the H.F. choke is similarly held in position by a bolt. Do not mount the choke until wiring

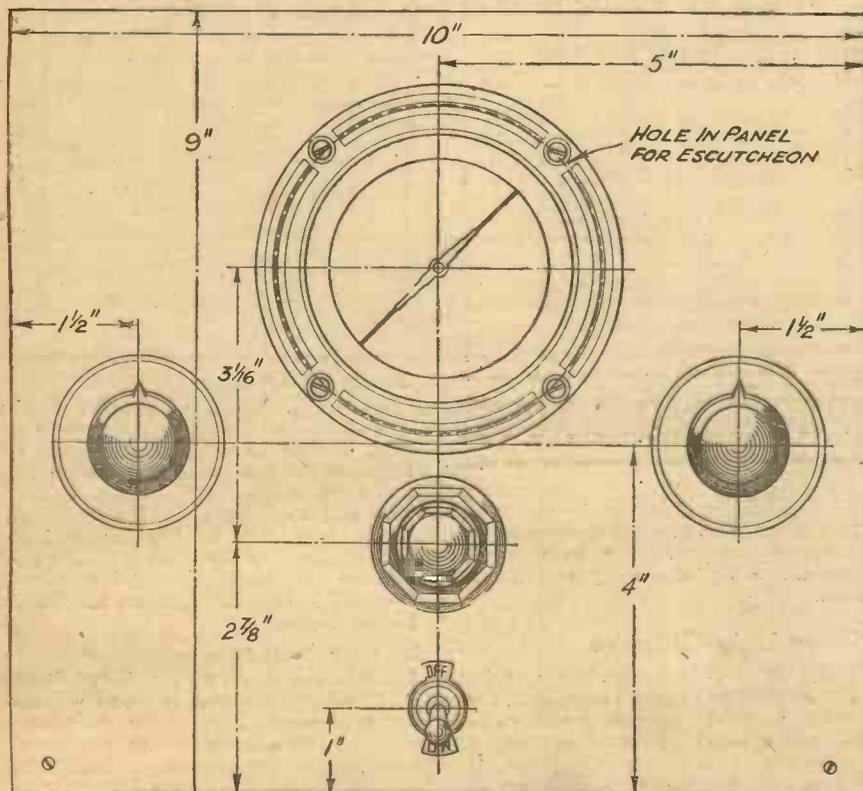


This rear view shows the neat arrangement of the component parts. The aerial trimmer may be seen between the coil and tuning condenser.

is practically finished in order to avoid damaging it.

Mounting the Condenser

The band-spreading condenser which is used for the main tuning and which occupies the central position is mounted on a bracket, and in order to make certain that this is correctly placed the panel should be placed



Panel drilling dimensions for the "Fleet" 2-valve.

LIST OF COMPONENTS FOR THE "FLEET" S.W. TWO-VALVE RECEIVER.

- One Airplane degree marking dial—dual ratio (Jackson).
- Two tuning condensers—.00015 S.W. Special, and .000015, Midget U.S.W. (Jackson).
- One .0002 Dilecon reaction condenser (Jackson).
- One .00005 aerial series condenser (Jackson).
- One S.P.3 coil and holder (B.T.S.).
- One .0001 type 4601/S grid condenser (Dubilier).
- One .5 type 4608/S H.T. condenser (Dubilier).
- One .0001 type 4601/S anode by-pass condenser (Dubilier).
- One .25 type 4606/S coupling condenser (Dubilier).
- One .04 type 4601/S tone condenser (Dubilier).
- One .1 type 4603/S screen condenser (Dubilier).
- One .5 type $\frac{1}{2}$ -watt grid leak (Erie).
- One 80,000 ohms 1-watt anode resistance (Erie).
- One S.K.T. L.F. transformer (B.T.S.).
- Two valveholders—one 7-pin V2, one 5-pin V1. Chassis type (Clix).
- One switch, S.102 (Bulgin).
- Two scales, J.P.7 (Bulgin).
- Two terminals trips—A, A1.—and E, L.S. (Clix).
- H.F.C., S.W., (B.T.S.).
- Panel: 10in. x 9in. alu. (Peto-Scott).
- Chassis: 10in. x 2in. x 7in. alu. (Peto-Scott).
- Fuse: 100 mA (Microfuse).
- Fuseholder (Microfuse).
- Two valves, H.P.210 and P.P.225 (Tungsram).
- One pair earphones (Ericsson).
- One 120-volt H.T. battery and one 2-volt, 40 A.H. accumulator (Exide).
- One Stentorian loudspeaker (W.B.).

in position, the bracket placed on the chassis and the condenser put in with the spindle in the dial and the entire assembly then pushed up to the panel. When the dial is seen to be close enough to the panel the fixing holder of the dial and the bracket may be marked and drilled. Next, mount the valveholders and underchassis components and carry out as much of the wiring as possible before mounting the aerial condenser and the remaining parts.

Wiring

The panel may now be placed in position and attached at the lower edge with two bolts. Attach the on/off switch and the band-setting condenser, as well as the reaction condenser, and note that the latter has one connection only. The remaining contact (to earth) is taken via the panel and chassis. Complete the wiring, and the receiver is ready for test.

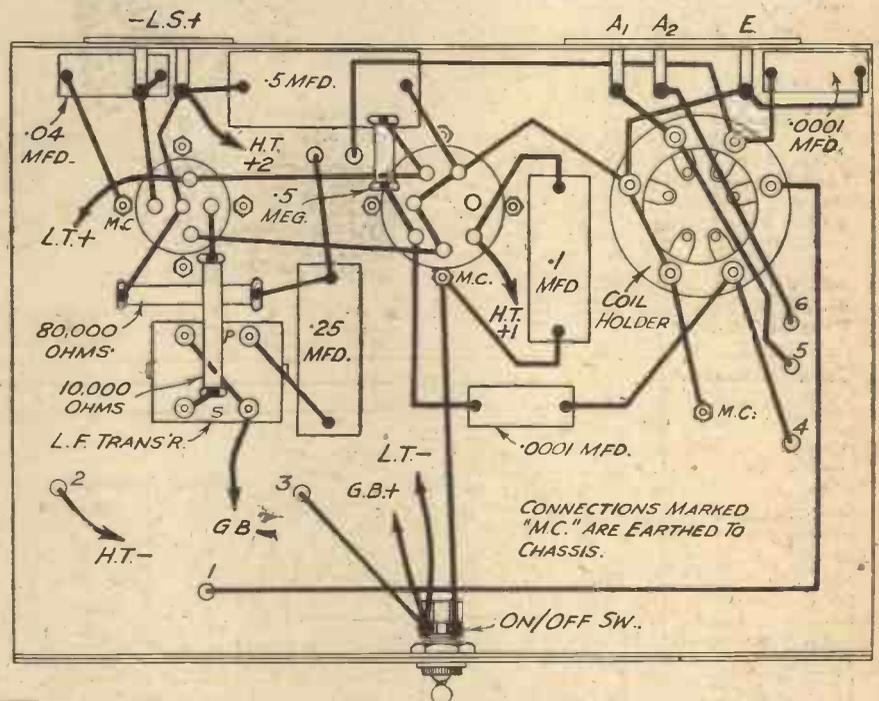
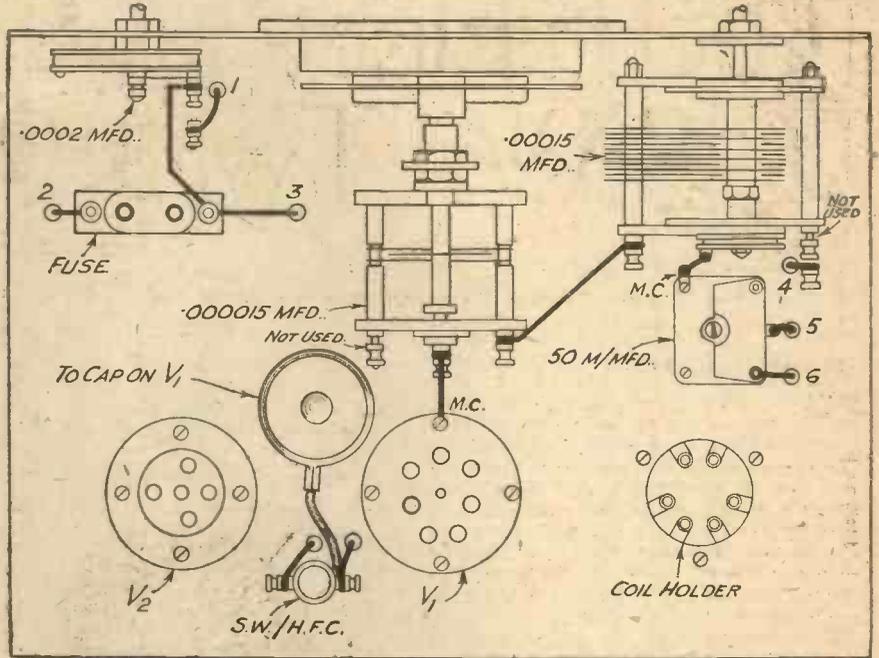
The H.T. at H.T.1 may be 120 to 150 volts, but at H.T.+ experiments may be made with voltages from 50 to 80. The main aim should be to obtain a value which will give a smooth control of reaction without any erratic behaviour, and without overlap. The G.B. should be 6 to 7.5 volts, the higher value being preferable in the interests of H.T. economy.

Testing

Connect the aerial to terminal A for preliminary tests and plug in the coil. Now as the left-hand condenser is slowly turned a station should be received, although it is highly probable that it will be found exceedingly difficult to get the correct setting, owing to the very sharp tuning which is experienced. The centre control then comes into use and acts as a vernier, splitting the settings obtained on the left-hand condenser. The readings on the two dials should be carefully noted so that settings may be reproduced as desired. The right-hand control should only be needed to bring up the strength of weak stations.

The transfer of the aerial to terminal A1 brings into circuit the pre-set condenser, and this may be adjusted to improve selectivity and to assist in obtaining smooth reaction on the lower wavelengths, where the damping effect of the aerial-earth system becomes noticeable.

Wiring Diagram of the "Fleet" S.W. Two



THE WIRELESS CONSTRUCTOR'S ENCYCLOPEDIA
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 Wireless Construction. Terms and Definitions explained and illustrated in concise, clear language.
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Ten Years in Canada

IN a "Seeing Life" talk on September 16th, from the Midland Regional, A. B. Johnson, of Northampton, will tell of his experiences during ten years in Canada. He worked on a farm, stooking, as long as he could stand it, then trained as a teacher for prairie schools in Saskatchewan. He also worked in a fruit warehouse, and as an accountant. Finally he came home as a stowaway.

Concert from Leamington

FROM the Midland Regional, on September 11th, Jan Berenska and his Orchestra, with Charles Gellion (tenor), will give a programme of popular music from the Jephson Gardens Pavilion, Leamington Spa. Fred Adcock will be the soloist for the saxophone Rhapsody by Eric Coates

PROGRAMME NOTES

which will be included in the programme, Mr. Gellion, who first broadcast over eight years ago, was formerly with the Birmingham Grand Opera Society and the Carl Rosa.

Clifton Light Orchestra

THE Clifton Light Orchestra, led by Joan Allen and conducted by J. Leslie Bridgmont, will broadcast a concert from a Bristol studio on September 11th. The soloist will be Hilda Blake (soprano), who was an early broadcaster from Savoy Hill, and has taken part in many West Country programmes.

Tunes of the Day

A PROGRAMME of popular English tunes of the day, from stage and film, will be heard in the Midland and Regional programmes on September 12th, and will also be relayed to Italy. The compère will be Martyn C. Webster. Those taking part will include Harry Porter (tenor), Marjorie Westbury (soprano), and a close harmony trio, "We Three." Reginald Burston will conduct the Midland Revue Orchestra.

Theatre Variety

FROM the stage of the Royal County Theatre, Bedford, listeners will hear, on September 15th, forty minutes of variety, including probably the popular duettists Moreton and Kaye. This theatre was opened in 1899; famous stars who have appeared there include Charlie Chaplin, Gracie Fields and Pavlova.

LETTERS FROM READERS

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).

The Overseas Market

SIR,—I read the letter entitled "The Overseas Market," published in PRACTICAL AND AMATEUR WIRELESS dated January 15th, 1938, and agree that the purchase of American valves is easier than buying British ones; also the price of British valves is much greater than the American equivalents. Owing to the higher efficiency of the British valve their sales would go up by leaps and bounds if more standard types were available and the price was lower. I think it would undoubtedly pay British manufacturers to look into this matter.—D. H. FRAME (Bulawayo, S. Africa).

Component Construction

SIR,—I have been a keen reader of your journal for nearly a year, and I owe every bit of my wireless knowledge to it. I heartily agree with Mr. V. T. C., of Blackheath in his plea for more articles on component construction. I am one of your youngest readers, being only 14 years old, and I find it rather difficult to obtain money to buy components; making them would be much cheaper for me.—F. PYGRAM (Leeds).

Tone Control

SIR,—I have often seen in PRACTICAL AND AMATEUR WIRELESS various methods of tone control, but all of them seem to cut one end of the band to allow the other end to be heard, mostly cutting the top notes to allow the bass notes to sound louder. I am wondering if any other readers, like myself, would like to know more about the parts of the circuit, say of an H.F., D., L.F., and Power, that control the high and low tones. There may be many other readers besides myself who like to experiment in tone but do not really know enough about frequencies, etc., to know which are the best parts of the circuit to alter. For instance, what components really bring out a good bass tone without cutting the top notes.

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.

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I also would like to say that I think V. T. C.'s letter from Blackheath voices a request for something that many readers would enjoy.—E. J. COOPER (Leamington Spa).

A Scottish Reader's Appreciation: Correspondent Wanted

SIR,—At long last I am taking the opportunity of expressing my appreciation of publication PRACTICAL AND AMATEUR WIRELESS.

I find it very interesting and helpful. The recent articles which have appeared in your periodical as under have proved very helpful to me:

Technical Fundamentals, Trouble Tracking Made Easy, Radio Fault Tracing, The Amateur Set Designer, and Valve Characteristics.

I would be very pleased to get in touch with any young man in or near my district who is interested in radio generally. I am sure we could get on much better if we could exchange ideas with one another. I have a good radio library, and also a good supply of meters, etc. Wishing PRACTICAL AND AMATEUR WIRELESS the best of luck.—ROBERT MCEWAN (Glasgow, E.2.).

(Continued overleaf)



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(Continued from previous page)

Readers' DX Logs

SIR,—I would like to thank your various readers who were in agreement with my letter regarding DX logs, which you kindly published in your issue of PRACTICAL AND AMATEUR WIRELESS dated July 9th. In the issue for August 20th appears a log from A. Knowles, of Barnsley, which is really a non-DX list of N. American amateurs. In it he lists SUICK; this I feel sure should have been SUICH, the well-known Egyptian amateur.

I append my 14 mc/s fone log for the week August 6th to August 13th:—
VK2ABC, AHA, NQ, HF, NO, BZ, DL, VV, NS, XU, UC, JQ; VK3BM, HV, HG, ZL, BE, WA, ES, PG, OL, PE, ZX; VK4KO, BB; VK5BF; VK6MW. (All between 06.30 to 09.00 B.S.T.).

W7BVO, ATB, AMQ, ESK. (06.40 to 07.30 B.S.T.); VU2DR (18.00 B.S.T.), PK1VY (16.00 B.S.T.); PK4CB, JD (20.00 B.S.T.); PK2WL (18.00 B.S.T.); VS7GJ (20.30 B.S.T.); KA7ES (21.00 B.S.T.); YV5ABY, ABQ (23.00 B.S.T.); HK3AG, LC; HK5DB (07.00 B.S.T.); XEILT, GQ; XE2IK (06.00 B.S.T.); CE1AA; CE3BK, BH (06.30 B.S.T.); K4EMG; K6OQE, NFY (08.00 B.S.T.); TG9AA (08.20 B.S.T.); VE5EF, ES, JK, ABD (07.00 to 08.00 B.S.T.).

The above are the best from my log for the period mentioned, but Cuba, Argentine, and Brazil, although fair DX, are far too numerous to list here.

The receiver is an 0-v-2, with headphones, operated from an A.C. eliminator; the aerial is an inverted "L"; 33ft. top, 30ft. high, and pointing N.E.-S.W.

Thanking you for publishing readers' logs once again, and I hope they will keep to DX, or give news of any unusual station, and so be of help to their fellow readers.—ERNEST J. LOGAN (Hertford).

SIR,—I was very pleased to note that you intend to publish DX logs in future, and so here is a DX log from this part of the country. All are 14 mc/s phone, and were received within the last month.

W1DMV, W2IKV, W3FII, W4BZX, W4DCR, W5FIY, W5FNH, W6OCH, W6FUO (Nevada), W7BVO, W7EKA, W7EGV (Oregon), W7EOI (Montana), W8CUO, W9TOO, VE1EI VE2FK, VE3GS, VE5ACN, VU2DR, VQ4KTB, FA3HC, CN8AM, VK2VV, VK2HS, VK2AHA, VK3BM, VK3PE, VK3HG, VK3OI, VK3ZX, VK5BF, LU8AC, CX2CY, PY4CT, CE1AO, HC1JW, VP3AA, YV1AP, TG9AA, CO2WZ, VP5IF, HH5PA, HI7G, K4EMG, and VP9L.

My receiver is an H.F.-det.-2L.F. battery set with headphones. The aerial is 20ft. outdoor, 30ft. high, running N. and S.

Readers may be interested to know that Radio Martinique on 9,700 kc/s sends a very highly coloured verification card. I did not enclose a Reply Coupon.—J. STEWART (Alexandria, Dumbartonshire).

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ITEMS OF INTEREST

Using a Cable Link

DURING the course of the outside broadcast transmissions from Olympia to Alexandra Palace in connection with the B.B.C.'s co-operative effort during the Ideal Home Exhibition in April, and also when the circus was televised at the beginning of the year, very serious forms of interference were experienced. The pictures seen on television receivers on these occasions were markedly inferior to those which were a direct transmission from the Alexandra Palace studios. The actual cause of this is unknown and although special forms of directional aerial have been employed, the trouble has not been cured. This factor has no doubt influenced the decision of the authorities concerned that for Radiolympia a cable link will be employed to transfer the signals from the glass walled studios in the National Hall to the control room at Alexandra Palace. The R.M.A. are anxious that the results seen on every television set at this year's radio show will give no cause for criticism, but will show the public exactly the type of picture which they can see in their own home under conditions of complete comfort. The distribution scheme for supplying signals to each stand is a very complicated one this year, and it is hoped that there will be no breakdowns. It is interesting to record that, as was the case last year, the Baird Company have been entrusted with the supply and erection of the mast and aerial for receiving the Alexandra Palace signals. This is being positioned in a selected position on the flat roof with a feeder cable to the distribution amplifier in the Main Hall gallery.

Malaya on the Air

THE two Singapore stations owned and operated by the British Malaya Broadcasting Corporation, Ltd., have been officially opened. ZHO works on 49.9 m. (6.012 mc/s), and ZHP on 31.48 m. (9.53 mc/s), both with a power of 500 watts. Local time is equivalent to G.M.T. plus 7h. 20m., the distance between London and Singapore being roughly 6,780 miles.

THE "PYRAMID" ONE-VALVER

Constructional Details and Operating Notes of a Simple and Efficient Single-valve Set

THERE is very little constructional work in a simple set of this type, and as we have used a baseboard type valveholder the amount of metal cutting on the chassis has been reduced to a minimum. Clearance holes for the connecting wires are the main details, with clearance holes or slots for the terminal strips on the rear runner. For these you can drill either single holes for each socket, or a slot to

may be placed sufficiently high to enable the control knob to clear the push-pull switch below it. The first job, therefore, is to cut the panel from the diagram given at the foot of this page, and then to place the dial in position with the condenser behind it. The spindle should, of course, be placed in the socket on the dial. This will give the height of the condenser above the chassis and the size of the feet may therefore be measured. The three panel controls may then be placed on, and the panel bolted to the chassis. Mount the tuning coil, noting carefully that the terminals are in the correct position, which may be judged from the wiring diagram given on the next page.

earth and tune in. For preliminary tests it may be desirable to use terminal A, the remaining aerial terminal bringing into circuit the pre-set condenser which will give sharper tuning. This should be used when it is desired to cut out a station working on a nearby wavelength although it should be appreciated that with a simple set of this type a very high degree of selectivity cannot be obtained. For all normal purposes, however, selectivity is adequate, the primary winding on the coil, which is switched for medium-waves, sharpening up tuning without loss of signal strength.

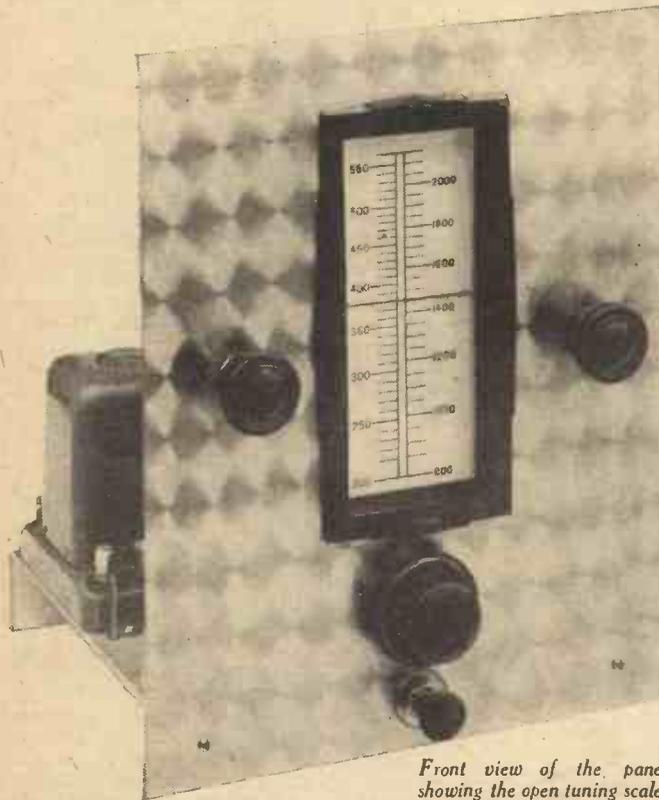
Remember that a good aerial and earth are essential with a simple receiver, and results are in the main dependent upon the efficiency of these accessories. Under all normal conditions, with a good aerial and earth you should be able to obtain quite a good selection of stations on both the medium and on the long waves.

Operating Notes

For the local station reaction should not be needed, and therefore the right-hand control should be turned to its maximum position in an anti-clockwise direction. Next, the main tuning control should be slowly turned until the rising pointer gives an approximate indication on the scale of the wavelength of your local. It may not be exact when first put into use, but will give a guide as to the approximate position of the station. When accurately tuned in, note whether the reading is incorrect, and if so, the screws holding the scale to the condenser may be loosened and the drive moved until the pointer shows the correct wavelength, taking care not to turn the condenser in doing this. The setting on

Wiring

Wiring should be carried out with heavy insulated wire, clearing off the insulated covering where the wire is joined to terminals. Soldering will have to be adopted in certain places such as on the switch, as terminals are not provided on this particular component. In the interests of reliability it is also advised that

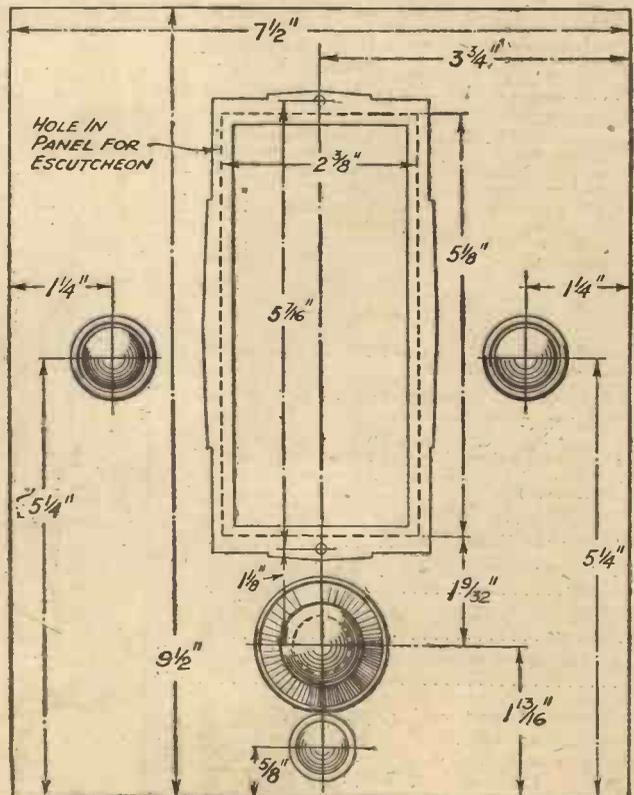


Front view of the panel showing the open tuning scale.

accommodate all of the sockets on each strip. The condenser will have to be mounted on small feet in order that the dial

the leads to the valveholder be soldered, tags already being provided on the base for this purpose. A word of warning may be offered here not to use pliers to tighten up the terminals on the coil unit as, if undue force is used, there is a possibility that the terminal may be loosened and poor contact may develop.

When wiring is completed it should be carefully checked, preferably following the theoretical circuit as a cross check. Connect the H.T. battery with 120 to 150 volts at H.T.2 and 60 to 80 volts at H.T.1. The latter voltage should be adjusted when the receiver is put into operation so that smooth reaction is obtainable over the entire waveband. Connect the 'phones, aerial and



Panel drilling dimensions.

- LIST OF COMPONENTS FOR THE "PYRAMID" ONE-VALVE RECEIVER**
- One vertical C.K. dial (Polar).
 - One No. 5 tuning condenser, No. 5 .0005 (Polar).
 - One reaction condenser—Compax differential, .00015 (Polar).
 - One Unigen coil (Wearite).
 - One valveholder—V.H.22 (Bulgin).
 - One grid condenser—type 451, .0002 mfd. (T.C.C.).
 - One anode condenser—type 451, .0003 mfd. (T.C.C.).
 - One coupling condenser—type 451, .04 mfd. (T.C.C.).
 - One series condenser—type 451, .0001 mfd. (T.C.C.).
 - One screen condenser—type 341, .1 mfd. (T.C.C.).
 - One grid leak—5, 1/2-watt (Erie).
 - One anode resistance—1 meg., 1-watt (Erie).
 - One switch—S.114 (Bulgin).
 - One switch—S.22 (Bulgin).
 - Two terminal strips—1.3 sockets—A, A.1, and E., 1.2 sockets, L.S. (Clix).
 - One panel—9 1/2 in. x 7 1/2 in.—Alu. (Peto-Scott).
 - One chassis—7 1/2 in. x 6 in. x 1 1/2 in.—Alu. (Peto-Scott).
 - Fuse—100 mA. (Microfuse).
 - Fuseholder (Microfuse).
 - One H.P.210 metallised valve (Tungsram).
 - One pair earphones (Ericsson).
 - One 120-volt H.T. battery (Exide).
 - One 2-volt 40 A.H. accumulator (Exide).
 - One Stentorian loudspeaker (W.B.).



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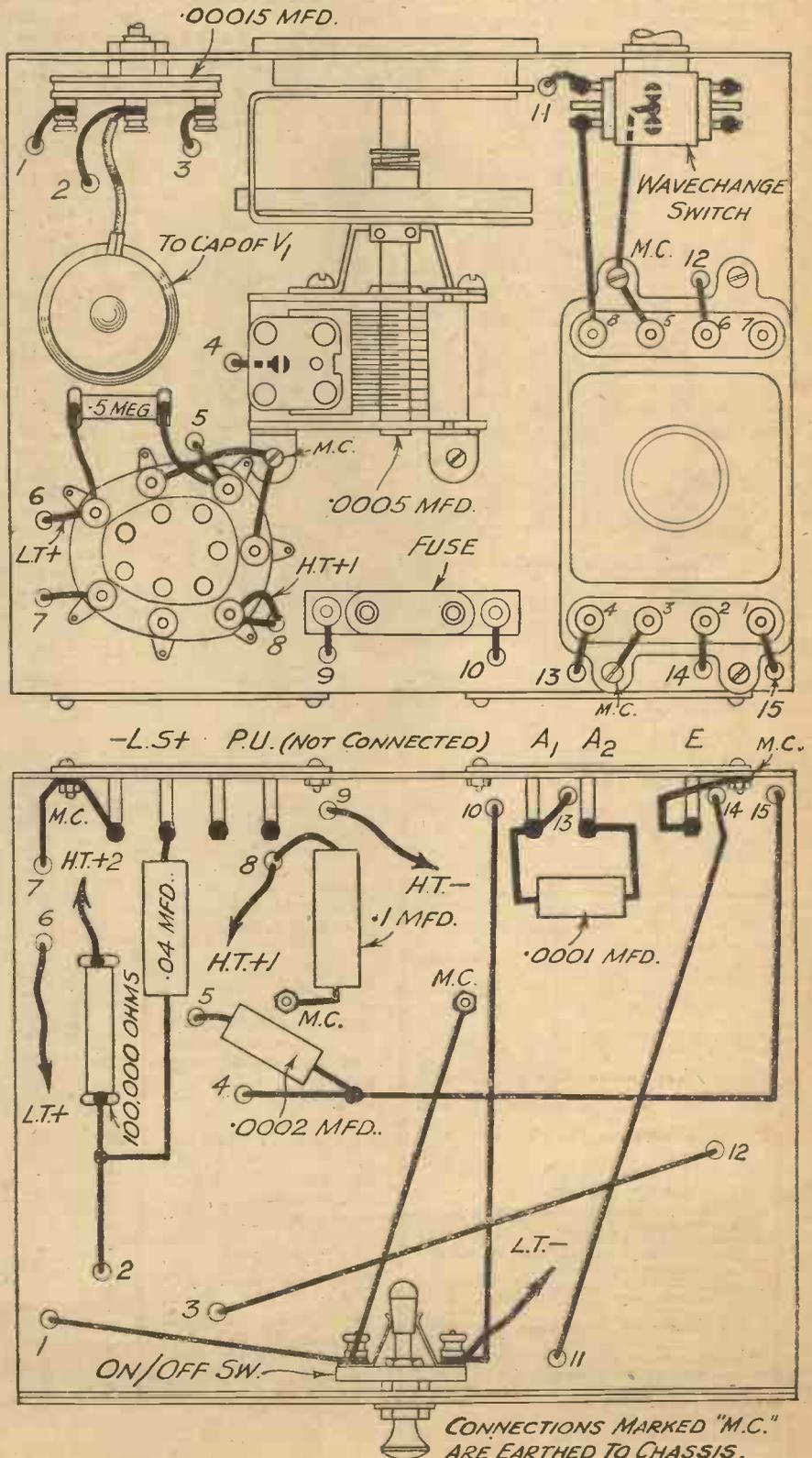


(Continued from previous page)
the dial should then hold over both wavebands. A slight difference will be noted when the other aerial terminal is used due to the effects of the series aerial condenser.

When locating a distant station the right-hand control should be slowly turned until a breathing sound is heard in the 'phones. This gradually turns to a rushing noise, and is followed by a "plop" as the receiver goes into oscillation. If this occurs, turn the

condenser back, and it should plop again at the same point as the receiver comes out of oscillation. The voltage applied to H.T.1 will control the degree of overlap experienced and an attempt should be made to obtain a setting when the set goes into oscillation and comes out of it at exactly the same position. When the control is set just off the oscillating point, the main tuning control should be operated and distant stations should be heard.

Wiring Diagram of the "Pyramid" One-valver



CONNECTIONS MARKED "M.C." ARE EARTHED TO CHASSIS,

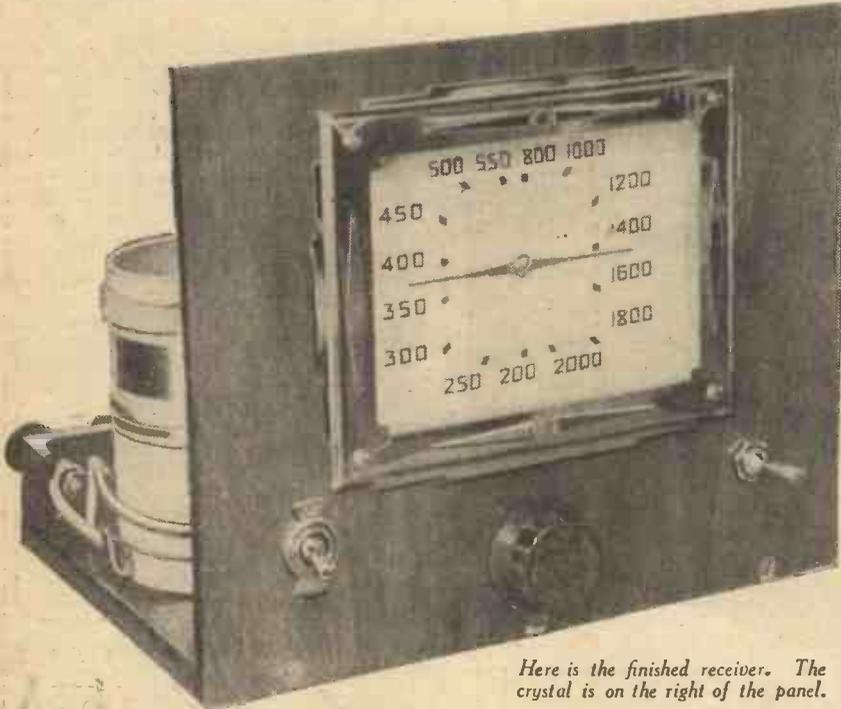
The "JUNIOR" CRYSTAL SET

Notes on the Construction of this Receiver, and Hints on the Method of Operation.

LAST week we gave the main essentials underlying the design of this receiver, and this week we give the panel-drilling dimensions. These details will enable you to cut out the opening needed for the large tuning dial, and also the holes

positioned in the opening, the mounting bracket for the tuning condenser should be fitted to the condenser and the dial then placed on the spindle. The bracket may then be moved until the dial is suitably placed, and the bracket then held in

is firmly locked to the bracket so that it will not turn when the drive is operated. Tuning is very simple, and is carried out by turning the lower knob. Before locking the drive to the condenser spindle the point must, of course, be placed so that it will give a true indication of the approximate wavelength to which the coil is tuned. Therefore, the vanes of the condenser should be fully intermeshed and the pointer turned round to indicate 550 and 2,000 metres. The drive may then be locked. The two ends of the pointer give a simultaneous indication of wavelength, and it is thus necessary to remember to which band you are switched when trying to find a station. The switch specified has an indicating plate on it, and if you wire as shown in the wiring diagram last week, this will enable you to see exactly which band is in use. The local stations should be easily found, and the signals should be obtained without any manipulation of the crystal. Remember, however, that the crystal is not of the same degree of sensitivity all over. When a station has been located, therefore, the knob of the crystal should be carefully lifted, turned through a small movement and carefully lowered back. Do not permit the spring to return the crystal with a bang. This will fracture the crystal. Do not permit the crystals to grind together. That is, do not turn the crystal control knob without first lifting it so that the two crystals are separated. When a good spot has been found it should be left and not tampered with. If you do this, you may find it difficult again to find the same spot, and the crystal is sufficiently stable to enable a good setting to remain without alteration for weeks.



Here is the finished receiver. The crystal is on the right of the panel.

for the switch, crystal and tuning control. At the lower edge three additional holes are needed so that the panel may be screwed to the baseboard. Care is needed when drilling these holes, as the top layer of veneer may split off if the holes are not drilled slowly and carefully. In view of the thickness of the baseboard very thin screws should be used—No. 4 will be suitable, and they should be $\frac{1}{2}$ in. in length and of the countersunk type. These are available chromium plated from the popular stores at quite a reasonable price. If desired, small angle brackets may be cut and used at the sides to make the panel more rigid, but this is not essential.

Note that the connections to the coil and switch have to be soldered, and remember that the iron should be really hot and not permitted to remain in contact with the solder tags longer than is necessary to permit the solder to run to a neat joint. To ensure that the dial is accurately

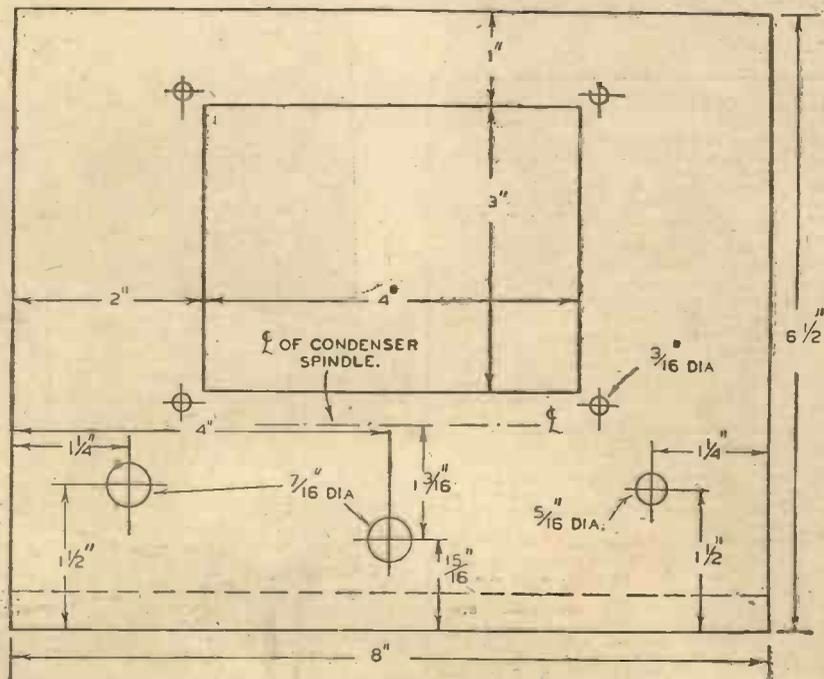
position whilst the holes are carefully marked.

Operating Notes

Make quite certain that the condenser

Practical Wireless Service Manual
By F. J. CAMM.
Price 5/- net. 5/6 by post.

- LIST OF COMPONENTS FOR THE "JUNIOR" CRYSTAL SET**
- One tuning condenser, without dial or slow motion. Popular log, .0005 (Jackson).
 - One tuning dial, square plane, degree and scale (Jackson).
 - One coil, C.69 (Bulgin).
 - One crystal detector, R.D.40 (Jewel Pen).
 - One switch, S.98 (Bulgin).
 - Two terminal blocks, A.E. output (with terminals) (Belling and Lee).
 - One panel, 8 in. x 6 in. walnut (Peto-Scott).
 - One baseboard, 8 in. x 5 in. (Peto-Scott).
 - One fixed condenser, .001 mfd., type 4601/S. (Dubilier).
 - One fixed condenser, .0001 mfd., type 4601/S. (Dubilier).
 - One pair earphones (Ericsson).



Panel drilling dimensions for the "Junior" Crystal Set.

F. J. CAMM'S "ADMIRAL" 4-VALVE RECEIVER

Further Constructional Details of the 2-H.F. Broadcast Receiver

AS mentioned last week, this receiver is designed to cover the broadcast band only, for which purpose three standard screen coils are utilised. These are complete with a self-contained wave-change switch and are easily mounted on the chassis with 4 B.A. bolts. The condenser is similarly mounted, three holes being tapped in the base for this purpose.

the escutcheon, the panel should first be drilled and the escutcheon plate attached. A fully-dimensioned diagram for this purpose will be given next week, together with the Wiring Plan.

Stability

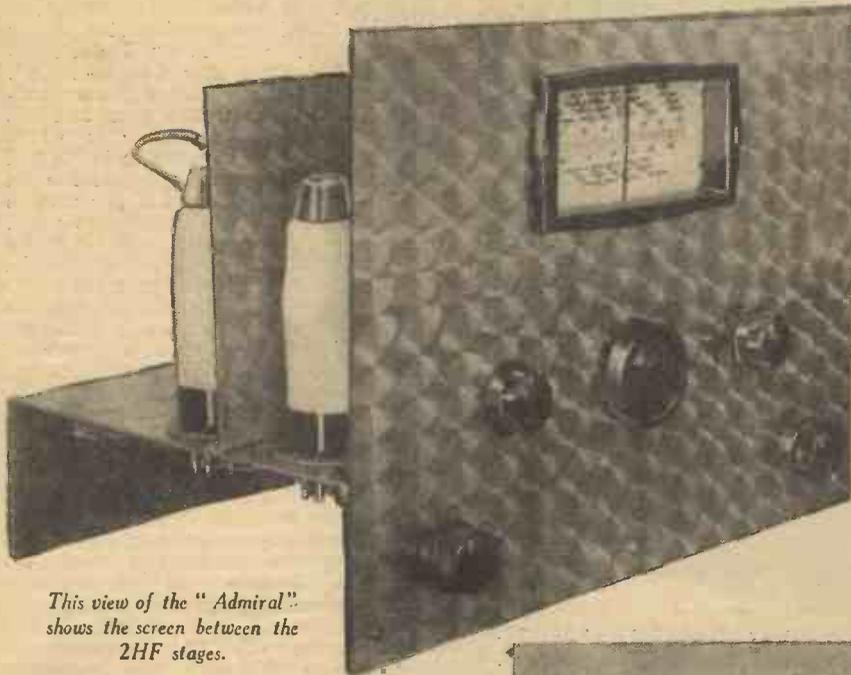
In a receiver of this type instability in the H.F. stages must be avoided. The

this beneath the lug provided on the caps the valves are totally screened, the metallised surface completing the screening.

It will be noted from the circuit diagram which was given last week that the potentiometer for the supply of the H.T. to the screens is also provided with a decoupling resistance in each screen lead; and this also adds to the stability. In accordance with modern practice the tone control for this receiver is included in the anode circuit of the detector stage, so that the tone is modified before subsequent amplification. A fixed corrector in the form of a condenser from anode to earth in the output stage acts as a final device in removing background noise due to static which sometimes prevents listening on distant stations.

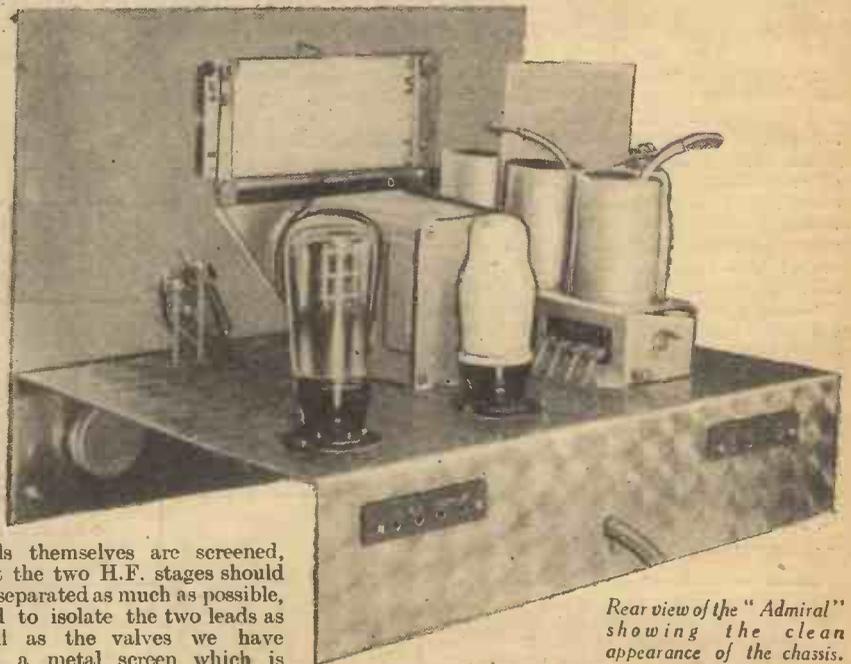
Volume Control

As there is only one L.F. stage a volume control on the L.F. stage has not been considered necessary. Overloading may be prevented by controlling the H.F. stages, and this is preferable as it prevents the risk of distortion which can arise when the detector stage is overloaded. Thus there is only one volume control, and this reduces the total number of controls mounted on the panel. These are wave-change switch, reaction, tone control, tuning and volume control. Next week we will give final constructional details and operating instructions, together with the Wiring Plan and details for drilling the panel.



This view of the "Admiral" shows the screen between the 2HF stages.

The holes will have to be very accurately placed, and the best way of doing this is to place the condenser on a thin sheet of paper and press it heavily. The embossed tapped holes will mark the paper which may then be placed on the chassis and the positions indicated. As the condenser has to be mounted slightly in rear of the chassis in order to permit the dial to clear



Rear view of the "Admiral" showing the clean appearance of the chassis.

LIST OF COMPONENTS FOR F. J. CAMM'S ADMIRAL 4-VALVE RECEIVER.

One coil unit—B.P.116 (Varley).
 One variable condenser—Baby gang, 3-section (Jackson).
 One micro-horizontal dial (Polar).
 Four valveholders (Clix).
 Terminal strips, A., A.1. and E., L.S., P.U. (Clix).
 H.F.C., H.F.10 (Bulgin).
 One switch—S. 139 (Bulgin).
 One aerial series condenser, type 451 (T.C.C.).
 One reaction condenser—Compax.0002 (Polar).
 One volume control, 50,000 type B (Dubilier).

Fixed resistances:
 Three type F. 30,000 1 watt, three type F. 20,000 1 watt, two type F. 1,000 ½ watt, one type F. 1,000 1 watt, two type F. 1 meg. ½ watt, one type F. 50,000 ½ watt, one type F. .5 meg. ½ watt, one type F. 1 meg. ½ watt, one type F. 5,000 1 watt (Dubilier).

Fixed condensers:
 One 2.0 mfd. type T.C.C. 50; one 1.0 mfd., type 341; six 0.1 mfd., type 341; two .05 mfd., type 341; one .005 mfd., type 451; one .0002 mfd., type 451; one .0001 mfd., type 451 (T.C.C.).

Tone-control potentiometer, 25,000 type B (Dubilier).

Chassis—14in. x 9in. x 3in. Alu. (Peto-Scott).

Panel—14in. x 10in. Alu. (Peto-Scott).

Four valves—Two VP210, one HL2, one Pen220 (Mazda).

Fuse—100 mA (Microfuse).

Fuseholder (Microfuse).

One 120-volt H.T. battery and one 2-volt 40 A.H. accumulator (Exide)

One Stentorian loudspeaker (W.B.).

coils themselves are screened, but the two H.F. stages should be separated as much as possible, and to isolate the two leads as well as the valves we have cut a metal screen which is mounted between the first two valveholders. It was not found necessary in the original model to continue the screen between the underside of the valveholders, although it should theoretically be necessary to do this. Certain leads will have to be encased in screened sleeving, and for connection to the top caps of the two valves in question we have adopted the metal screened cap connectors supplied by Bulgin. By using a length of screened sleeving for the connection, and clamping

NEWNES' TELEVISION AND SHORT-WAVE HANDBOOK

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TELEVISION NOTES

Inter-office Television

APPARENTLY the Americans are anticipating the day when inter-office telephonic communication will be supplemented by television, for a patent has already been taken out in this connection in Washington. Its main purport is for use in the same building, but it is hoped later to adapt the equipment to be suitable for long-range working. The equipment at

time the pains subsided to such an extent that the doctors decided to postpone the operation, and are now carefully watching developments. It is known that hospital patients convalescing have secured great benefit from watching transmissions where a set happens to be installed, but this appears to be the first known instance where an operation has been postponed, and perhaps averted.



This photograph of June Malo, the well-known radio crooner, and Felix Mendelssohn, the band leader and concert entertainer, was taken recently at Blackpool.

the moment has a bell-shaped horn which houses the transmitting scanner as well as the picture reconstituting scanner, microphone and loudspeaker. Its main novelty is the compactness of the arrangement. It differs very materially from the instrument featured on the German Reichspost stand at the Berlin Exhibition. Here, a disc scanner was employed with the light spot method, while the definition was 180 lines, 25 pictures per second. The cabins are illuminated when in use, and everyone was impressed with its small dimensions, reliability, mobility and the convenience of operation.

Another Use for Television

VERY many novel uses have been suggested for television and although some are still the subject of experiment, others have been found impracticable. The latest idea has come from the medical world, however, and some doctors are examining the results of television upon the nervous system of people. It is claimed that in some cases by combining sound and vision the nervous system is calmed and certain bodily pains alleviated. For example, one doctor reports a quieting effect produced by television on a patient about to undergo an operation for appendicitis. The lady in question was by chance left alone while being prepared, and during this period watched a television set in operation in the ward. After a short

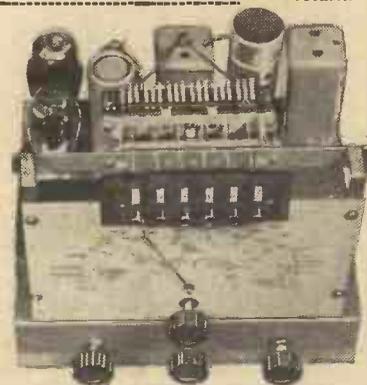
Camera Amplification

IN every form of television camera the requirements of a "clean" television signal necessitate the highest possible ratio between the vision signal voltage and the "noise" resulting from the so-called Schrott effect. There are several ways in which this can be accomplished, and new ones are repeatedly being developed. In one of the latest, a special form of electron multiplier of the reciprocating type is coupled electrically to the mosaic signal plate of an iconoscope type of camera. The generated signals are fed to a control electrode through which passes a stream of electrons. These electrons are not generated by a heated cathode, however, as in a normal type of tube, but are produced from a photo-electric cathode surface which is activated by a light source focused externally. These electrons pass through a solenoidal winding for electrical focusing purposes, and after modulation and reflection subsequently from an "image" cathode position pass through an orifice in a disc electrode. Between the internal face of this electrode which is capable of secondary emission and a similar plate positioned opposite to it, this modulated electron stream reciprocates rapidly. In this way the original signal magnitude is increased many times in the fundamental electron multiplier fashion, with the result that the final collected signal derived from the output electrode is of high magnitude and possesses a good signal to noise ratio.

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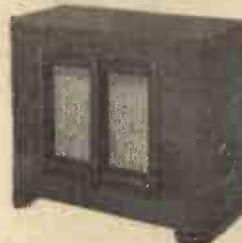


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RADIO CLUBS & SOCIETIES

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

INTERNATIONAL SHORT-WAVE CLUB (LONDON)

A VERY interesting meeting took place in the club-room at 80, Theobalds Road, W.C.1, on Friday evening, August 19th. It was attended by short-wave listeners and amateurs from all over London. Mr. F. R. Scott (Chairman of the Chapter) described the progress made so far with the club's transmitter, which is at present operating under closed circuit, call 2CLR. The 6L6 Tritet crystal oscillator was operated and subjected to test under various power voltages. The C.O., as well as the power pack, was constructed by the members. Two power amplifiers are in the course of construction. They will use RK 25's and T 20's. All readers of PRACTICAL AND AMATEUR WIRELESS are invited to attend our Friday meetings. They are also invited to send for a copy of the Club's "News Letter," in which our transmitting experiments are being described. A 1d. stamp will bring a copy by return. Sec., Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

THE EASTBOURNE AND DISTRICT RADIO SOCIETY

A VERY interesting 5-metre evening was held by the members of this society on August 8th, 1938, at 7 p.m. Those interested in joining should write to the Hon. Secretary, T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

ROMFORD AND DISTRICT AMATEUR RADIO SOCIETY

THERE is not much to report this week as the last meeting was given over to a general discussion after the code class. The latter part of the meetings shows great improvement, and at the present rate of progress several of the AA members will soon reach the standard required for the full G call test. It is to be hoped that soon some of the manufacturers will be approached with a view to giving demonstrations of their products. The meetings in the past which have been devoted to these demonstrations have always been a success, and have proved helpful. Meetings are held at the Red Triangle Club, North Street, Romford, on Tuesday evenings at 8.30 p.m. Sec., R. Beardow (G3FT), 3, Geneva Gardens, Chadwell Heath.



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.

G. S. (Poole). The coils were designed for a receiver which was not described in our paper. We have no details and doubt whether they are now obtainable.

J. M. I. (Whitehaven). A metal chassis could certainly be used. The type 80 would be suitable.

G. T. (Sheffield). You do not say what type of meter you used. It should be a low-resistance reading type for the tests mentioned.

D. M. (Edinburgh 9). We can only suggest that you select a receiver from our Blueprint list and then use the parts which we specify. We cannot guarantee performance if you use old parts.

K. M. (Bradford). We cannot advise without a circuit diagram. If the receiver is a commercial model the makers would be able to be of most assistance in this particular case as there may be certain precautions which have to be taken to avoid loss on the radio side.

J. H. H. (Leeds 9). We cannot send blueprints C.O.D. Select the print you require and back number, if obtainable, and upon receipt of a remittance the items will be dispatched.

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have held special meetings in a praiseworthy effort to make constructive suggestions for (Continued at top of column 2)

SHORT-WAVE NOTES

The Eight Stations of Managua

THE Federal Capital of the Republic of Nicaragua (Central America) now possesses eight short-wave stations of which the power ranges from 30 to 800 watts. Topping the list are YNOP, *Radio Bayer*, on 52.1 m. (5.758 mc/s), and YNPR, *Radio Pilot*, on 34.92 m. (8.59 mc/s), both 800 watts. YNLF, *La Voz de Nicaragua*, on 31.06 m. (9.66 mc/s), and YNLG, *Ruben Vario*, on 45.39 m. (6.61 mc/s), work with a power of 500 watts, and have been logged in the British Isles. The smaller transmitters are YNIGG, *La Voz de los Lagos*, 45.91 m. (6.535 mc/s), 200 watts; YNOD, *Onda Latina*, on 41.63 m. (7.206 mc/s), 70 watts; and YNGU, *Alma Tica*, 3236 m. (9.3 mc/s), 30 watts. YNLF, YNLG, and YNOP relay their programmes from medium-wave studios.

Two Newcomers in Dominican Republic

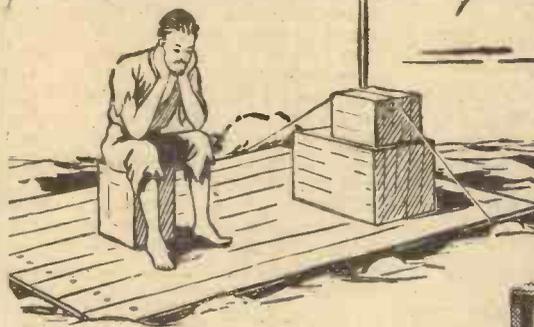
OFFICIAL lists give details of two new broadcasting stations in the Dominican Republic; they are HI5P, Puerto Plata, on 45.7 m. (6.535 mc/s) and HI8J, La Vega, on 47 m. (6.383 mc/s). Both advertise a power of 30 watts. On a slightly higher wavelength than the latter you should find HI4D, Trujillo City, *La Voz de Quisqueya*, an older established station on 25 watts which is sometimes heard on 45.77 m. (6.555 mc/s). It broadcasts daily (Sundays excepted) from G.M.T. 16.50-18.40, and from 21.40-00.40. Address: Radiodifusora Comercial HI4D, Señor Dr. Luis Santamaria, Ciudad Trujillo (Dominican Republic).

(Continued from column 1)

the improvement of the present B.B.C. television service. After all, it is the group of dealers in any one district who have the problems associated with their own locality to contend with, and collated data of this character is all the more important because it bears a more authoritative stamp. One thing which has emerged from the reports of these meetings is that quite frequently there is more trouble experienced on the sound channel than the accompanying vision. Whereas local electrical interference has produced a few white splashes on the vision receiver screen, the sound has been ruined completely with the high noise level. The B.B.C. have therefore been asked to examine the possibility of increasing the power radiated on the sound channel or, alternatively,

radiate sound on a wavelength above 100 metres, this being additional to the ultra-short-wave "signals." While the North and Midlands are, quite rightly, rigorously pursuing their claims for television stations in their own areas, the South have not been slow in pointing out that they are by no means satisfied with their service, and have asked for a transmitter south of the present one to give a really worth-while signal to south coast towns. Another important item which needs to be recognised is that too frequently the good television programmes clash with star sound broadcasts. Closer co-operation between the Alexandra Palace and Broadcasting House staffs should readily rectify this, and the suggestion merits the serious attention of the B.B.C.

In the International Code of Signals, the Flag "G" has 3 alternate Yellow and Blue stripes.

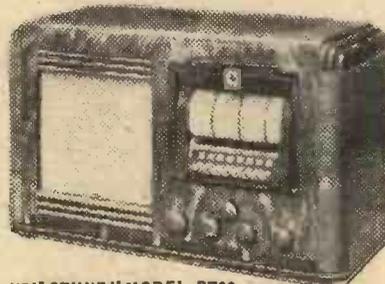


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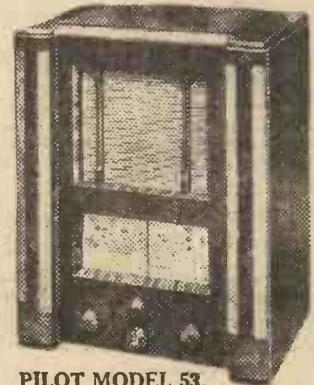
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SIGNAL KEYS. Royal Air Force model, balanced action. All solid brass-bar, tungsten contacts, indicator lamp. Type KBSL, a guinea key for 7/6. Other keys from 4/6 to 30/-; Special Illustrated Key List.

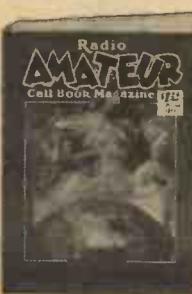
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of amateur wireless transmitters can be found in the RADIO AMATEUR CALLBOOK. This book is essential to owners of short-wave, or all-wave sets. Contains complete lists of amateur transmitters (with names and addresses) from Alaska to Zanzibar, also short-wave commercial stations, lists of International Abbreviations (the "Q" code), International Prefixes etc. Price 6/- per copy, post free. Send for lists of other books dealing with amateur transmitting.

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QUERIES and ENQUIRIES

Parafeed L.F. Coupling

"I am interested in the Experimenters' Short-Wave Three recently described, but am uncertain regarding the coupling unit used in the L.F. stages. This is a parafeed unit and I cannot obtain one from my local dealer. Can you explain what this is, and whether there is now any alternative for it?"—H. F. (Bristol, 7).

THE component consisted of a standard L.F. transformer and additional components mounted in a single case. The extra parts consisted of a coupling condenser, anode resistance and decoupling resistance, thus enabling the transformer to be paralleled and at the same time permitting the valve with which it is used to be decoupled. An additional 2-mfd. condenser is used to complete the decoupling circuit. A similar component is obtainable from Messrs. Bulgin, but it is quite in order to use the separate components—that is, the L.F. transformer (3 to 4 to 1 ratio), a coupling condenser having a capacity between .004 and .01 mfd., a coupling resistance of 10,000 ohms, and a decoupling resistance of 5,000 ohms.

Making Coil Formers

"I am going to make some short-wave coils for use in an experimental receiver, but to save expense wish to make my own coil formers. What is the best way of doing this, as I understand that there are many possibilities open to the home-constructor in this particular field?"—G. R. E. (Hampstead).

THE simplest and least troublesome method is to use thick brown paper gummed strip, such as is used for parcel-wrappings. This may be rolled round a solid former of the desired thickness and stuck down at the end. When dry, it may be slipped off and will form quite a good foundation. An alternative method is to use ordinary thick cartridge paper, well smeared with glue, rolled round a former in the same manner. Excess material may be cut away for use on the lower wavelengths. A more robust former may be made up from old gramophone records, softening these by immersing them in hot water, and moulding them to the desired shape. They may be cut and drilled and mounted on a standard valve base.

Coil Winding

"In winding short-wave coils, what is the best position for the primary winding? In some I have seen the winding is below the secondary, in others it is interwound, and in others it is on a separate former inside the secondary. As I should like to make some coils as efficient as possible, I should like to know the merits of the various methods."—P. S. M. (Canterbury).

THE idea underlying the use of the primary winding is to provide a coupling link with the secondary, and this coupling should be as far as possible inductive—with a minimum of capacity-coupling. Consequently, the primary must be so disposed that a tight inductive coupling is provided and this may be carried

out by interwinding the two coils. To reduce the capacity-coupling in this arrangement, thin wire may be used for the primary. (The capacity-coupling exists then in respect of the side surfaces of the two coils which are adjacent to each other.) If the primary is wound below the secondary, it will not form such a tight coupling, but the capacity-coupling will be less. Probably, the best arrangement is that where the primary is inside the secondary, as the coupling is very tight and capacity-coupling is reduced to a minimum.

Untuned Aerial Circuits

"In looking through some short-wave circuits recently, I have noted that instead of a tuning coil an H.F. choke or a resistance

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.

is sometimes used between aerial and earth. Do these work as well as a tuned circuit, and if so, which is the better method to employ—the resistance or choke? What types of component are needed in each case?"—C. T. A. (E.5).

IT is quite in order to use the resistance or choke, and this will often give better results than a tuned circuit, besides being more economical. When a tuned circuit is employed, difficulty is sometimes experienced on the grounds of instability, and the resistance or choke avoids this. The resistance would probably be effective over a wider band than the choke, but should be of the non-inductive type—preferably a moulded resistance.

Metal Rectifier Details

"I have a metal rectifier taken from an old set, and should be glad if you could tell me the output and input for which it is designed. The type is H.T.15 as far as I can make out."—L. C. (Blackpool).

THIS rectifier is rated to deliver 200 volts at 30 mA. The input, as a half-wave unit, is 250 volts at 80 mA., but as a voltage doubler the input may be 140 volts at 120 mA. Care should be taken that the current taken from this rectifier does not rise above 40 mA.

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

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

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MISCELLANEOUS

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EVERYMAN'S WIRELESS BOOK, by F. J. Camm, 3s. 6d. An invaluable book of reference, explaining the operation, upkeep and overhaul of all types of wireless receiver. 200 illustrations. From all Booksellers and Newsagents, or by post 4s. from George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, Strand, London, W.C.2.

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MANUFACTURERS' surplus cabinets for Radiograms. Radio sets and Loudspeakers. Large and varied stock. Inspection invited, or send particulars of your requirements, with measurements of chassis. Photos sent for selection. (No catalogue.)—H. L. Smith & Co., Ltd., 287-289, Edgware Road, London, W.2. (Pad. 5891.)

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NEW SEASON'S TELEVISION SETS — See page 654

Practical and Amateur Wireless

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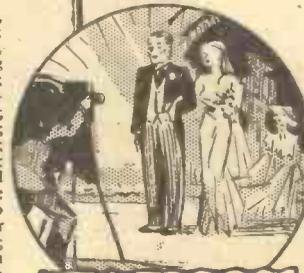
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CIRCUIT BALANCING—See page 658



Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:

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

VOL. XII. No. 312. September 10th, 1938.

ROUND *the* WORLD of WIRELESS

The Loudspeaker

THE modern radio receiver has now reached such a stage of development that there is very little more that can be asked for from a general point of view. Probably the weakest link in the chain of modern equipment is the loudspeaker, and many listeners are still using speakers designed some years ago. Modern broadcast quality, coupled with modern circuit design, definitely warrants the use of a modern speaker, and the changes which have taken place in the design of this unit are quite marked when comparisons are made. However, it still appears that there is room for development and we should like to see some change in accepted ideas regarding design. Is the cone diaphragm the best method of energising the air and re-creating the sound of the broadcast? Elliptical diaphragms have been tried and given a good account of themselves, whilst flat diaphragms have also been found very good when certain initial difficulties have been overcome. In this issue we give a brief account of the principles of speaker design, and this is the first of a series on the subject of the reproducer.

Popular Set in Norway

FOLLOWING the success of the German "People's" set, a similar receiver has been placed on the Norwegian market with the support of the State broadcasting organisation. It is a two-valve combination of the simplest form and is stated to have proved very popular.

Loudspeaker Nuisance

FOLLOWING complaints from various sources regarding the nuisance caused by loudspeakers being operated at a high level, a by-law has been put into effect in Dunstable whereby if the nuisance continues for a period of more than a fortnight after the receipt of a complaint from three neighbours, prosecution may take place.

Mountain Transceivers

WITH a view to protecting climbers in the Alps a proposal has been put forward to install short-wave transceivers at various points, all working on a common wavelength. It is claimed that when climbers become lost or injured, they would speedily be able to summon assistance

where working apparatus of this type was readily available.

Puzzle Corner

THE popularity of this feature in past programmes has resulted in the B.B.C. devoting more time to it in forthcoming autumn programmes. It will be allotted twenty minutes, and instead of being part of "Monday at Seven" it will immediately precede it each week.

New H.T. Battery

IT is announced that a new type of H.T. battery will shortly appear on the British market. This is to be made under licence from an American company and is

and-thunder. The plot must not be disclosed, but nervous listeners should not listen to it alone in the dark.

Soccer Coaching

IN the West of England programme on September 16th, F. N. S. Creek, the Corinthian and amateur international footballer, will explain the latest ideas in coaching technique. He will deal with ball-control, heading, tackling, throwing-in, captaincy and off-side. Mr. Creek is an official lecturer to the Football Association.

Morecambe Again

IN the Northern and Regional programmes on the same day (September 16th) listeners will hear an hour's entertainment from Morecambe, including Reginald Williams and his Futurists Dance Band from the Winter Gardens, an excerpt from the "Arcadian Follies" presented from the Empire, an excerpt from the "1938 Frolics" from the Palace Theatre, and an excerpt from Frank A. Terry's "Pierrot on Parade" at the West End Pier.

Tunny

H. R. JUKES will speak in the Northern programme, on September 19th, of his experiences on a trawler, on the far side of the Dogger Bank, which was accompanied for some days by upward of two hundred tunny. These fed on schools of mackerel and the small fish thrown out of the trawl and, except when they were threshing it to foam as they fed, were easily visible in the clear water.

Griff Colliery Band

F. W. LOCKER, formerly a famous cornetist, will conduct the Griff Colliery Band in a popular Midland programme on September 21st. The colliery is near Coventry and all the players are employed there. In the interludes there will be two groups of songs. The vocalist is Bernard Dudley (baritone), of Birmingham, who first broadcast last year.

Water Polo Match

A RUNNING commentary on the Warwickshire County Finals at Water Polo will be given on September 21st by Harry R. Walker, an old Coventry player and referee. One of the competing teams, Coventry, has had a long record of successes and includes some famous players.

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to be produced and distributed by a new company. A lower internal resistance, a seamless can and a high efficiency factor are the main essentials of this battery.

Money! Money! Money!

THIS is the title of a play which will be heard in the National programme on September 10th. The author is an American who has attained wide fame in his own country as a specialist in broadcast blood-

ROUND the WORLD of WIRELESS (Continued)

Marconi Summer School

WITH a view to giving wireless lecturers at Universities and Technical Colleges first-hand information on the latest application of communication theory to wireless practice, a Summer School is to be held at the Marconi College, Chelmsford, from September 7th until September 9th. Representatives of 15 of the principal Universities and Technical Colleges in England, Scotland and Wales have signified their intention to be present.

The curriculum includes lectures, followed by discussions, embracing some of the more important aspects of the practice of wireless communication, and visits to the Marconi Works, Chelmsford, and some of the Marconi Research and Development Sections.

G.E.C. Public Address Equipment

A FACTORY P.A. system is being installed at the G.E.C. Osram lamp works at Hammer-smith. A 100 w. amplifying system will be employed with provision for microphone and gramophone amplification. This installation is a model of its kind since the factory provides every variety of noise level, and the loudspeaker system has been chosen to provide the ideal form of reproducer under each set of conditions.

Borough Polytechnic Radio Engineering Course

A FIVE-YEARS' Course, including Radio-Communication, Television, Acoustics, Electrical Engineering, etc., has been arranged for Ordinary and Higher National Certificates, City Guilds Examinations, etc. Special attention is given to the latest developments in television. There are also part-time day and evening courses for radio service engineers.

The session commences on September 26th, and enrolment nights are September 19th, 21st and 23rd. Sessional fees are:

Students under 18, 8s. 6d. to 12s. 6d.
Students over 18, 10s. to 30s.

Further details are obtainable on application (quoting reference No. 301) to the Secretary, Borough Polytechnic, Borough Road, London, S.E.1.

"Queens" Inspire 2,000th Tune

HORATIO NICHOLLS, the song writer, has written his 2,000th tune. It is a waltz, "Queen of Loveliness," inspired by the search for 12 girls to represent British industries at Woman's Fair, Olympia, in November.

"As soon as I saw the words 'Queen of Loveliness' already in a newspaper, it struck me that there was an ideal song title, so I set to work at once," says Mr. Nicholls.

Hundreds of girls employed in 12 of

INTERESTING and TOPICAL NEWS and NOTES

Britain's biggest industries are competing for the titles of "Queens of Loveliness," and the 12 industries that will be represented by "Queens" are cotton, silk and rayon, shoes, millinery, perfumery and cosmetics, linen, stockings, hairdressing, woollens, furs, knitwear, and corsetry.



Max Miller, the popular film and radio comedian, photographed with a bevy of beauties from Lawrence Wright's "On With the Show," at the North Pier, Blackpool, doing the latest dance sensation called the "Blackpool Walk." Also in the picture is the world-famous composer, Horatio Nicholls, who was responsible for the "Blackpool Walk."

Soccer to be Televised

THE B.B.C. announces that, through the courtesy of the Football Association and the Arsenal Football Club, arrangements are being made to televise two important football matches from the Arsenal Stadium. The first of these is for the Football Association Charity Shield on September 26th, between the Cup winners and the League winners, Preston North End and Arsenal. The second match is that between England and the Rest of Europe, which takes place on October 26th.

Radio Set-back in Denmark

WE understand that the production of the new season's receivers in Denmark has been severely retarded by a serious accident at the Torotor condenser factory, when a huge pressing machine crashed through one of the floors causing much damage to several departments.

Musical Comedy Hour

MARION BROWNE (soprano) and Haydn Adams (tenor) will take part with the B.B.C. Welsh Orchestra, conducted by Mansel Thomas, in "Musical Comedy Hour" on September 14th, in the Welsh Regional programme. Selections will be played from "The Lilac Domino," "Veronique," and "Yvonne."

B.B.C. Midland Orchestra

ERIC WARR will conduct the B.B.C. Midland Orchestra on September 13th, in a programme which will include Four Ballet Airs, by Moszkowski.

Variety in Miniature

LESLIE BRIDGMONT will produce another programme of "Variety in Miniature," on September 12th. The artists will be Evans and Monelle, "In original songs at the piano"; Reg Wotton, "Impressionist"; Stan and Jan, "Two Devonshire Rustics"; Edgar Hawke and the Phantom Five.

New "Paul Temple" Serial

THE Midland serial thriller, "Send for Paul Temple," by Francis Durbridge, of Birmingham, which was broadcast in the Spring and drew over 7,500 letters of appreciation from listeners, is to be followed in the late Autumn by another serial, "Paul Temple and the Front Page Man."

This will be produced by Martyn C. Webster and will be broadcast in eight weekly instalments in the Regional as well as the Midland programmes on Wednesday evenings beginning on November 2nd. Each instalment will be repeated on the

Saturday following at about midday.

SOLVE THIS!

PROBLEM No. 312

Jackson made a simple three-valve set in which a variable-mu H.F. valve was employed. He used a 9-volt grid-bias battery with a 5,000-ohm potentiometer for control, but found that the action was far too sudden. The slightest adjustment made a big jump in volume and he therefore decided to modify the design. He accordingly obtained an 18-volt battery which he used as a substitute for the 9-volt battery, thinking that the higher voltage would give a smoother adjustment of volume, but he found that this was not so. What should he have done? Three books will be awarded for the first three correct solutions opened. Address your envelopes to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. All envelopes must be marked Problem No. 312 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, September 12th, 1938.

Solution to Problem 311

The inductance value of the two coils which Jackson used were not matched and thus the two-gang condenser would not tune to the same frequency at different parts of the dial. The following three readers successfully solved Problem No. 310 and books have accordingly been forwarded to them: E. Sutton, 134, Wistaston Road, Crewe; F. R. Taylor, Ingleswood, Beech Hill Avenue, Mansfield, Notts.; O. Greenfield, c/o T. W. Holme, 7, Grimsworth Avenue, Manchester, 16.

F. J. Camm's Push-button THREE

Further Notes on the Modern Three-valve Battery Receiver

TO avoid further correspondence on the subject, and in reply to queries which we have already received, we take this opportunity of stating that a mains version of this receiver will be described at an early date. The present receiver may, of course, be operated from A.C. or D.C. mains through a standard A.C. or D.C. mains unit, retaining the accumulator for the filament supply. It is not recommended that the valves be replaced by indirectly-heated valves of the mains type, as these are much higher in efficiency than battery valves and some difficulty might be experienced in obtaining a stable circuit without carrying out further modifications in the arrangement as it has so far been described. To complete "all-mains working" with a battery receiver it is quite in order to use a trickle charger for the accumulator, switching this on as desired so that the accumulator never runs out, but in such a case it is worth while remembering that it is advisable periodically to permit the cell to run down to the level recommended by the makers and then to have it inspected and charged at your local Service Station. A scheme which is adopted by many who use a battery receiver is to connect a trickle charger across the accumulator whilst the set is on, and thus use the charger more or less as a current supply source with the accumulator acting as a stabiliser or condenser across the trickle

charger output. This is quite a good scheme provided that the condition of the cell is closely watched. The output load should preferably be slightly greater than the input so that the accumulator carries out its normal function of discharge and is recharged periodically.

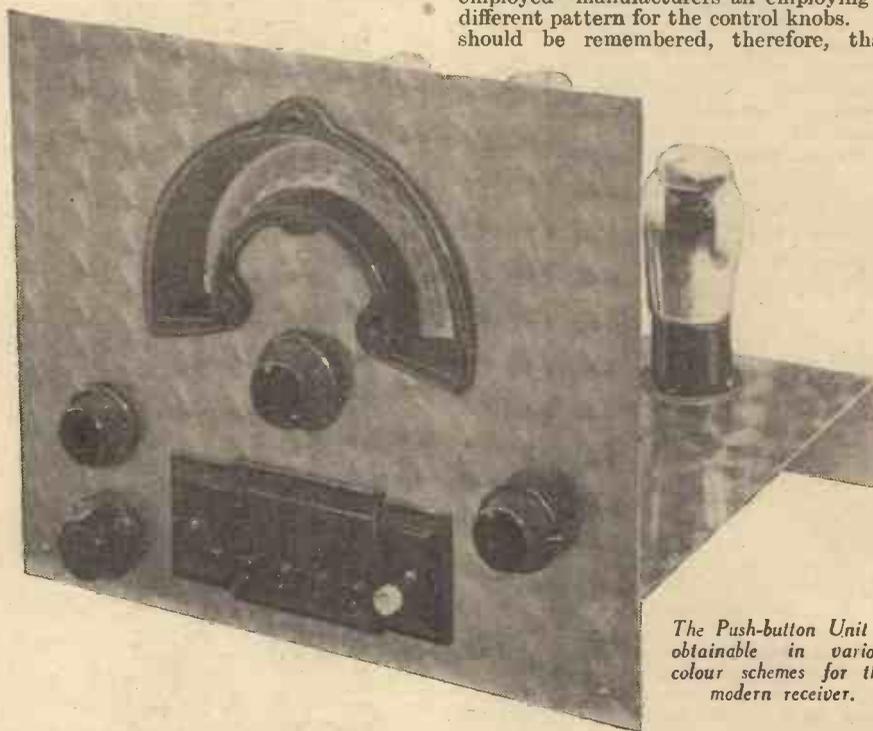
Push-button Units

With regard to the small push-button escutcheon and buttons it may be pointed

out that these are now obtainable in various colours where it is desired to match some particular cabinet or colour scheme. A comprehensive range of colours is now available. Name indications may be cut from a daily paper and inserted in the small slots above the buttons, or they may be written in ink on slips of paper and then inserted in the slots. A coating of shellac or varnish will prevent them from becoming discoloured.

Control Knob Standardisation

Messrs. Bulgin can supply a wide range of knobs which will fit all standard components having $\frac{1}{4}$ in. spindles and these range in price from 4 $\frac{1}{2}$ d. to 9d. Some of these have chromium dome insets where it is desired to give the receiver a modern appearance. For components which have smaller spindles than $\frac{1}{4}$ in., special reducing sleeves are available from the same firm at 1d. each, with the aid of which the shaft or spindle may be brought up to the necessary diameter to enable the knobs to be rigidly attached.



The Push-button Unit is obtainable in various colour schemes for this modern receiver.

LIST OF COMPONENTS FOR THE PUSH-BUTTON THREE-VALVE RECEIVER

- One semi-circular dial (Polar).
- One B.P.114 coil (Varley).
- One tuning condenser, 2-gang, .0005 bar type (Polar).
- One reaction condenser, .0003 mfd. Compax (Polar).
- One push-button switch, S.221, with knobs and escutcheon (E10) (Bulgin).
- Ten pre-set condensers. (Bulgin).
- One series condenser, type 451, .0001 mfd. (T.C.C.)
- One grid condenser, type 451, .0002 mfd. (T.C.C.)
- One bias condenser, type 341, .1 mfd. (T.C.C.)
- One anode by-pass condenser, type 451, .001 mfd. (T.C.C.)
- Two screen condensers, type 341, .1 mfd. (T.C.C.)
- One coupling condenser L.F., type 451, .04 mfd. (T.C.C.)
- One tone condenser, type 451, .04 mfd. (T.C.C.)
- One H.F.C. H.F.9 (Bulgin).
- Three valveholders—two 7-pin, one 5-pin (Clix).
- Two grid-leaks, .5 meg. $\frac{1}{2}$ watt (Erie).
- Two screen resistances—one 30,000, one 20,000 1 watt (Erie).
- One anode resistance, 80,000 $\frac{1}{2}$ watt (Erie).
- One anode resistance, 10,000 1 watt (Erie).
- One on-off switch, S.132 (Bulgin).
- Two terminal strips—A., A.1, and E., L.S. (Clix).
- One panel, 11 in. x 9 in. alu. (Peto-Scott).
- One chassis, 11 in. x 2 in. x 9 in. alu. (Peto-Scott).
- One bias pot., 50,000 without switch (Erie).
- Fuse, 100 mA (Microfuse).
- Fuseholder (Microfuse).
- One valve, 210VPT, 7-pin metallised (Cossor).
- One valve, 210 SPT, 7-pin metallised (Cossor).
- One valve, O.T.220, 5-pin (Cossor).
- One 120-volt H.T. battery and one 2-volt 40 A.H. accumulator (Exide).
- One Stentorian loudspeaker (W.B.).

out that these are now obtainable in various colours where it is desired to match some particular cabinet or colour scheme. A comprehensive range of colours is now available. Name indications may be cut from a daily paper and inserted in the small slots above the buttons, or they may be written in ink on slips of paper and then inserted in the slots. A coating of shellac or varnish will prevent them from becoming discoloured.

Some readers have queried the reliability of the tuning, and it should be pointed out that under all normal conditions the pre-sets specified will remain "put" over quite long periods. It is necessary to remember, however, that extremes of temperature will affect these as it will affect any other type of condenser, and disappointing results with many modern receivers may be traced to the fact that the pre-set condensers or trimmers get out of adjustment from this cause. Therefore, the receiver should not be placed in front of a window where damp air or draughts may play upon the components, neither should it be placed in a room where steam is likely to load the atmosphere. The accumulator also, should be placed well clear of the chassis, or a sheet of rubber placed between the set and the accumulator to prevent the effect of acid

Messrs. Bulgin can supply a wide range of knobs which will fit all standard components having $\frac{1}{4}$ in. spindles and these range in price from 4 $\frac{1}{2}$ d. to 9d. Some of these have chromium dome insets where it is desired to give the receiver a modern appearance. For components which have smaller spindles than $\frac{1}{4}$ in., special reducing sleeves are available from the same firm at 1d. each, with the aid of which the shaft or spindle may be brought up to the necessary diameter to enable the knobs to be rigidly attached.

Tone Control

Where, due to the cabinet design or acoustics of the room, a more comprehensive tone control is desired, the usual resistance-condenser combination may be used in the output stage in place of the specified .04 condenser. The resistance should be approximately 20,000 ohms, and a standard volume control of this value will be most convenient. The fixed condenser should be left connected to the output anode, but the other side should be disconnected from the earth line and joined instead to one of the outside terminals of the volume control. The centre terminal of this (or, in other words, the arm of the control) should then be joined to earth.

Making a Simple Tone Control Unit

A Neat and Easily-made Device which will be Useful to Experimenters

THERE are many occasions on which a simple, easily connected tone-control device may prove useful. This is especially the case when trying out a new set, or when using a different type of valve in an old set, or when a different form of intervalve coupling is being used. Most modern receivers have some form of tone control or tone compensation, but this is not the case with many of the receivers which are a few years old.

As regular readers will be aware, there

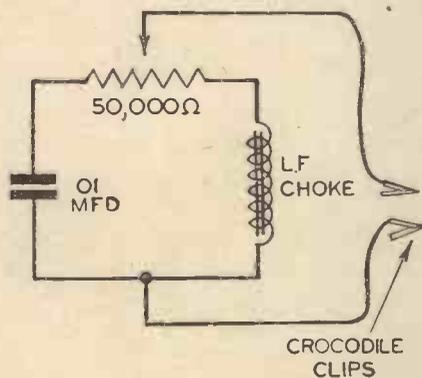


Fig. 1.—Simple circuit of a "two-way" tone control.

are dozens of methods of providing tone control, although most of them operate simply by suppressing the higher frequencies. Thus, it is standard practice to connect a fixed condenser in series with a fixed or variable resistor between the anode of a pentode and earth, or across the primary winding of the output transformer.

Alternative Methods

Another method is to connect a small condenser between the ends of the primary winding of an L.F. transformer. Yet another fairly well-known method is to connect a variable condenser between the grid of an L.F. valve and earth.

All of these are purely "one-way" tone controls, in that they provide a cut-off of the higher frequencies. The reason is that the impedance, or high-frequency resistance, of a condenser varies inversely with the frequency of the applied alternating current. For example, a condenser which offers an impedance of, say, 5,000 ohms at 1,000 cycles per second would provide an impedance of only 1,000 ohms (one-fifth) at 5,000 cycles per second.

By connecting a condenser in one of the positions mentioned the higher frequencies are allowed to "leak away" through it, while the condenser has little effect on the lower frequencies. When a variable resistor is connected in parallel with the fixed condenser the "leakage resistance" can be varied within fairly wide limits.

This is, in effect, what the simplest form of tone control consists of.

Attenuating Low Frequencies

But that is not sufficient unless the receiver naturally tends to give emphasis to the higher frequencies; most modern receivers do so, of course, but not all. To

by The Experimenters

provide real tone control it should be possible to reduce the proportion of either high- or low-frequency response at will. A tone control which does that is certainly far more suitable for general experimental purposes, although it is often an unnecessary refinement in any one particular receiver.

To attenuate, or weaken, the low notes we must have the very opposite of a con-

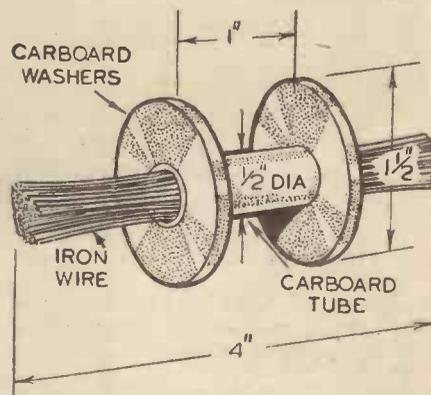


Fig. 2.—Details of the bobbin and core for the iron-core choke.

denser. For present requirements a choke fulfils this requirement. This is because the impedance, or resistance, to alternating current of a choke—either low-frequency or high-frequency—varies in direct proportion to the frequency of the A.C. applied to it. In other words, the impedance of a choke to low frequencies is comparatively small, while its impedance to high frequencies might reach almost to infinity.

In practice it is possible to use a fixed choke in series with a variable resistor, in just the same manner as a fixed condenser can be used with a variable resistor—but the function is reversed. A capacity of between .005 mfd. and .02 mfd. is generally suitable for the condenser used in most tone-control circuits, while a choke for this purpose should have an inductance of about two henries. Provided that the resistor has a fairly wide range and is of about 50,000 ohms, the actual choke inductance and

condenser capacity are not very critical. Because of this, it is a fairly simple matter to make a choke; the condenser and resistor would normally be bought ready-made because this is cheaper than making them at home.

High-Low Control

The simple circuit given in Fig. 1 represents the type of "two-way" tone control which we have briefly discussed above. It can be seen that one end of the choke and of the condenser are joined together, their other ends being connected one to each outside terminal of a 50,000-ohm variable resistor (preferably not of the graded type, although this will serve). One output lead is taken from the junction of the choke and condenser, the second being taken from the centre terminal or slider of the resistor, which provides the means of control.

It is obvious that when the slider of the resistor is moved to one end of its travel the condenser is directly in parallel with the two leads, the full resistance of 50,000 ohms being in series with the choke. On the other hand, by moving the resistor slider to the other end of its travel the choke is joined directly to the two leads, whilst there is a high resistance between the condenser and the leads. From this it is clear that the effect of either of the components on the circuit to which the leads are joined can be varied at will; and that is precisely what is wanted.

For practical reasons it will be desirable to make the choke as small (physically) as possible, and a simple and suitable form of construction is illustrated in Fig. 2. A small cardboard tube about an inch long is required, and at each end of this is fitted a cardboard or fibre washer to act as a check and form a complete winding spool. Through the centre of this spool is pushed a bundle of soft-iron wires, which will form the iron core. After winding the spool and covering it with insulation the ends of the wire are splayed outward and bent over the winding so that they overlap.

Making the Choke

However, the first step is to make the spool. If a short length of cardboard or fibre tube is available this can be used, and

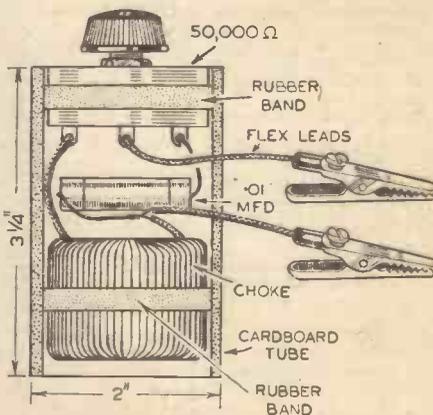
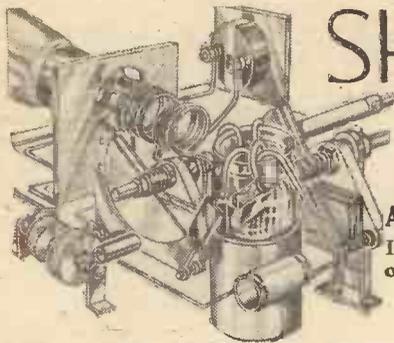


Fig. 3.—A convenient method of assembling the three components required.

two cardboard discs should be cut 1 1/2 in. in diameter, holes being bored in their centres so that they will fit tightly on the ends of the tube. Make sure that they fit tightly and after applying a little strong adhesive to the ends of the tube, press the checks into place. Allow the glue to set completely, and then make a couple of small holes in one of the checks.

(Continued on page 665)



SHORT-WAVE SECTION

AN ULTRA-SHORT-WAVE TWO-VALVER

In this Article Constructional Details are Given of an Experimental U.S.W. Two-valve Receiver with Novel Chassis Construction.

It will be apparent to readers who have had some experience in ultra-short-wave receiver design that it is essential when planning a really compact chassis to practically discard the idea of using wood throughout, and apart from the screening which may be had simply by the use of a metal front panel, invariably the condenser extension rods have to be of consider-

trife against convention by directly connecting to the anode of the detector; the ultimate performance was, however, in no way influenced by perceptible stray H.F., and the inclusion of a grid stopper-resistance R3 subdued any R.F. component that was previously evident, the final consideration along these lines being the inclusion of the by-pass condenser C8.

stage whilst maintaining as short a wiring as possible.

Screening

The only intended screening is that afforded by the chassis itself, and it will be seen that the output choke (Ch2) and associated components are arranged on the underside. It has not been possible to show the position of C7, as this lies directly between the handspread and band-setting condensers, C2 and C3, on the underside of the chassis.

The earthing system is effectively assured by a common bus bar principle using 14-gauge bare copper wire soldered to four points of the chassis, thus the H.T.—, L.T.—, and G.B. + are directly commoned and not, as would be in a normal broadcast receiver, made through the chassis itself. The actual position and points to which this bus bar is commoned to the chassis is not critical, there being no other component on the underside other than C8 to consider.

The positioning of the coils was, of course, critical, the required spacing being 3/16in., with the grid coil supported in the normal coil sockets, which in turn is conveniently bracketed to the chassis runner flange by "K," shaped from a strip of 18 S.W.G. aluminium.

The reaction coil is mounted directly in the wiring, the connections being made with 14 S.W.G. bare copper wire for rigidity; one of these, it will be seen, goes to the fixed vanes of C4, whilst the other is made straight to the anode socket of the valveholder, the grid and anode sides being adjacent.

The valveholders are mounted so that the valves are on the underside of the chassis, this affording excellent facilities for very short connections, whilst at the same time assisting considerably to attain mid-gut component layout.

The aerial terminal comprises an insulat-

Glancing now at the pictorial representation of the completed chassis, Fig. 2, and remembering that the overall measurements of this small receiver are only 6 1/2 in. by 6 in., by 6 in. it will be evident that if a breadboard layout had been decided upon the characteristics of the component relationship would have necessitated a considerably deeper design, not only to isolate the H.F. from the L.F. section, but to ensure, even more critically, the complete isolation of the detector

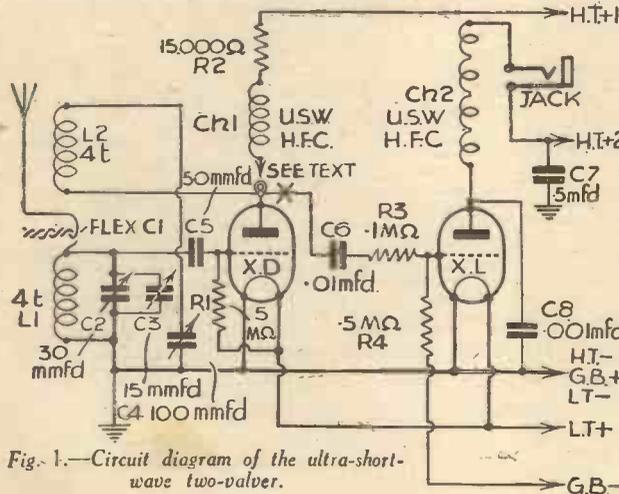


Fig. 1.—Circuit diagram of the ultra-short-wave two-valver.

able length to efficiently overcome the effects of hand-capacity and output feedback, thus resulting in waste of valuable space.

This receiver has therefore been designed to familiarise the use of all-metal construction when mid-gut chassis construction is required, and those who are comparatively new to U.S.W. work will be able to grasp the more important points in this class of design, such as that major consideration, "damping."

Referring to Fig. 1, it will be seen that a very simple two-valve circuit has been chosen, but the difficulties that were met in the layout of the components were none the less trying, since it became necessary to experiment principally with component relationship of the detector stage, then with the direct coupling to the L.F. valve, these two stages being done first of all individually, then in combination, to ascertain the best positions affording minimum component capacity to earth which would otherwise have prevented the oscillation of the detector stage.

H.F. Choke Adjustment

The question of damping here immediately suggested the careful adjustment of the H.F. choke (Ch1), and it was decided that for highest efficiency there remained only one satisfactory method of wiring this up, and a glance at Fig. 3 shows the rather novel principle of "floating" this in the H.T. lead. Whilst doing this, it became apparent that the capacity coupling to the output valve would have to be a

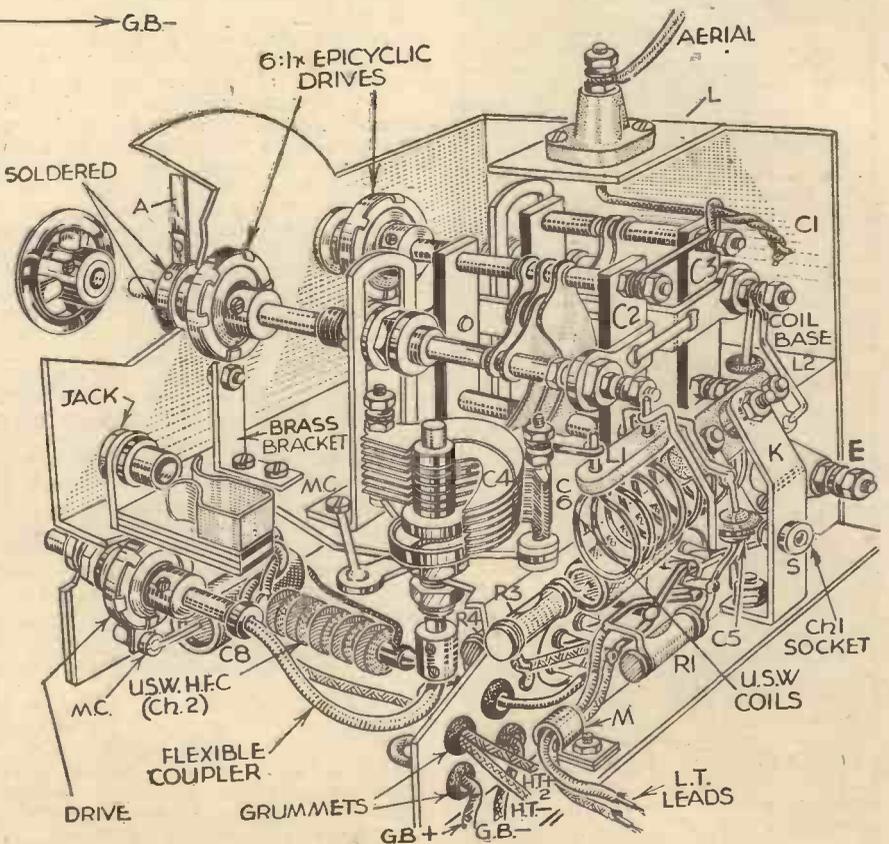


Fig. 2.—Pictorial view of rear of chassis showing layout of components.

SHORT-WAVE SECTION

(Continued from previous page)

ing pillar mounted on a bracket-piece "L," which was taken into consideration when cutting out the chassis, the lead from this—and which constitutes one side of the pre-set condenser C1—is taken through the hole provided in this bracket and up

condenser, and this in conjunction with an epicyclic drive ensures smooth operation with the minimum of space-wastage.

The battery leads are brought through separate grumnets let into the runner of the chassis, whilst the two L.T. leads are connected straight to the valveholders, and cleared by a small brass home-made clip, "M." It will be seen that a connection is taken from the centre of the negative L.T. filament commoning connection through the runner, this

be used to advantage for 5-metre work using the earth terminal as one pole of the aerial.

The receiver should be found perfectly stable in operation and simple to control. If desired, the band-set condenser may be provided with a 10-stop dividing plate or dial to assist in making accurate adjustments of a previously found station. It must be pointed out at this juncture, however, that we are unable to supply a blueprint of this receiver, and therefore all constructional work will have to be

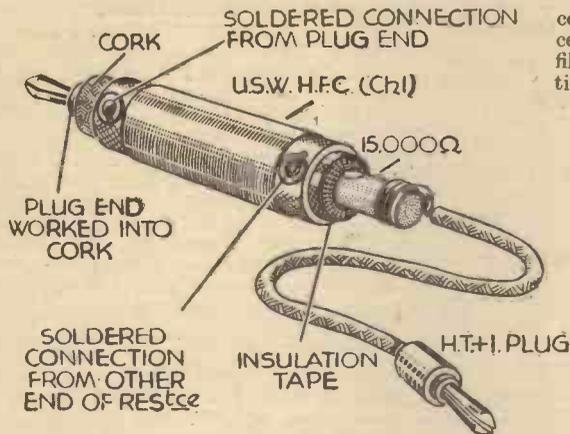


Fig. 3.—Method of arranging the H.F. choke in the H.T. lead

through the pillar, being securely fitted under the head of the terminal screw, the earth connection also is made in this manner from the "E" pillar located on the extreme right of the chassis and to the bus bar.

The 50-mmfd. grid condenser C5 is connected directly from the grid to the coil-holder solder tag, and will be noticed in close proximity to the bracket "K," and the H.F. Ch 1 socket. Flexible coupling is employed for the control of the reaction

wire terminating on the underside at the negative bus bar, as mentioned.

Dial Arrangement

As different coils may be used for various bands, the dial arrangement called for a little more home-construction, and by carefully fashioning a strip of thin brass to serve as a cursor, the expense of a slow-motion drive and combined scale was saved, apart from the extra room which would have been required for its assembly.

The brass cursor strip had first of all to be drilled, in order that this could be formed round the normal cursor drive flange of this type of drive, then soldered as shown ("A"). The dial, or scale, consisted of a piece of good quality stiff paper—cartridge paper will do quite well—this being glued to the shaped front panel.

The control knob relationship will be seen from the panel layout (Fig. 4), and the modernistic arrangement—apart from the absence of detrimental hand and 'phone lead capacities—leaves little to be desired. It will be noticed that the aerial and 'phone leads are kept well away from each other, and the R.F. side is similarly isolated from the output section.

There is just one other point which requires attention, and this is with regard to the previously-mentioned choke suspension, and the socket "S." This socket is, of course, of the insulated shank type, and the connection from the anode of the detector valveholder is taken absolutely direct.

H. T. Voltage

The H.T. tappings are optional, provided that due adjustment is made to the bias of the output valve, but the most favourable tappings would be 108-v. for the detector, and 120 for the output valve, with 3-v. bias.

Adjustment of the condenser coupling C1 should be made when combating dead-spots due to the resonance of the aerial, and if desired, a doublet or di-pole aerial could

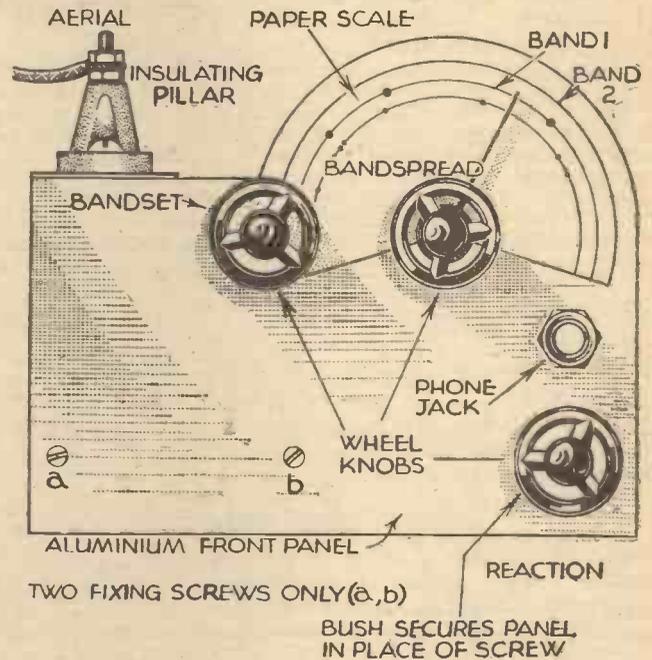


Fig. 4.—Panel layout, showing the novel dial arrangement.

carried out from the perspective drawing on the previous page.

LIST OF COMPONENTS

VARIABLE CONDENSERS

- One type 2140—15mmfids. (J. B.).
- One type 2141—30mmfids. (J. B.).
- One type 900/100—100mmfids. (Eddystone)

FIXED CONDENSERS

- One 50mmfd. (U.S.W. type) (Dubilier).
- One .01mfid., type 4601/S (Dubilier).
- One .5mfid., type 4608/S (Dubilier).
- One .001mfid., type 4601/S (Dubilier).

U.S.W.-H.F. CHOKES

- One type C.H.P. (Raymart).
- One type C.H.N. (Raymart).

COILS

- One set of U.S.W. interchangeable coils (Eddystone).
- One extra type ULCO coil (Eddystone).
- One Frequentite base type 1051 (Eddystone).

RESISTANCES

- One 15,000 ohms (1 watt type) (Polar).
- One 5 megohms (1 watt type) (Polar).
- One .1 megohm (1 watt type) (Polar).
- One .5 megohm (1 watt type) (Polar).

JACK AND PLUG

- One type J.2 single circuit jack (Bulgin)
- One type P.38 jack plug (Bulgin).

BRACKETS

- Two type EH.9. (Bulgin).

SOCKETS AND PLUGS

- One type No. 12 insulated socket (Clix).
- Six type No. 3, H.T.—(black), H.T.—(red), H.T.—(yellow), H.T.—(green), G.B.—(red), G.B.—(black) (Clix).
- Two type No. 14 spade terminals (red, black) (Clix).

VALVE SOCKETS

- Two type (V.6) 4-pin (Clix).

VALVES

- One type X.D. (Short-wave type) (Hivac).
- One type X.L. (Short-wave type) (Hivac).

REDUCTION DRIVES

- Three type E.R.D. (Raymart).

CHASSIS

- 18 S.W.G. aluminium (Machine finished and lacquered) (Peto-Scott).

WHEEL KNOBS

- Three (black) (Webbs' Radio).

INSULATING PILLARS

- Two type S.M. (Raymart).

COUPLERS

- One flexible coupler (Eddystone).

MISCELLANEOUS

- 6BA screws and nuts (Bulgin).
- Rubber grumnets (Bulgin).
- 14 S.W.G. bare copper wire (Bulgin).
- 18 S.W.G. tinned copper wire (Bulgin).

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ON YOUR WAVELENGTH



Afterthoughts on Radiolympia

MY thanks to all readers who called at our Stand and expressed their good wishes to Thermion. As in past years my visit had its amusing moments. One or two readers, for example, called to say that they did not wish to see Thermion; that they were some of the few who did not wish to see Thermion, but in being so emphatic made it very obvious that they were very anxious to meet Thermion.

When I arrived at the Stand a couple of very forceful saleswomen endeavoured to sell me a copy of this journal, and it was not in my heart to refuse them. Although the attendance was down the interest was up, for we sold more copies of this journal even than we did last year. There was also a steady demand for our handbooks, blueprints, and back issues.

There was great interest in the television demonstrations, every one of which I inspected. I am forced to the conclusion that in my opinion the cathode-ray tube is inevitable. I do not think that a mechanical system, however perfect, will be able to oust the cathode-ray tube from popularity. There were very few breakdowns, and the only one which

By Thermion

I actually witnessed related to a well-known system.

Beards at Radiolympia

I NOTICED more bearded youths at Radiolympia this year than ever before. Can some reader kindly explain to me why it is that young men between the ages of 20 and 30 should want to grow a beard? Do they in their vanity imagine that it improves their silly faces? Why do so many of these vacuous individuals try to grow a beard on [a schoolgirl complexion? Is it to hide a weak chin? Is it some religious cult, enabling the wearer of this shaggy and agglomerated hirsute appendage, appurtenance, integument, or mask of unkempt filaments to be easily recognised by some other member of the cult? If man descended from monkey

why should we wish to revert to them? I think that many of these vain-glorious individuals have seen a sketch in some advertisement showing a professor in the laboratory whom they wish to ape. Of course, horn-rimmed spectacles, an eccentric manner, sloppy clothes, uncut hair, and a dreamy eye are part of the affectation. These bearded creatures are obviously suffering from an inferiority complex, and I think that they should be objects of our pity. Such vanity might have impressed people in the early days of wireless when overgrown schoolboys with no practical training and very little education were widely publicised by ignorant editors as "Scientists," "Wireless Experts," "Wireless Engineers," and so on. Most of them in their childish writings referred to their "laboratory" which usually consisted of a fretsaw and a box of boys' tools used on the corner of the kitchen table. These technical incompetents have suffered the obliquy they deserved. I express the hope, therefore, that next year bearded people will stay away from the Exhibition altogether, or for once, have a shave so that they are a passing imitation of human beings. I have not the slightest hesitation in classifying the whole lot as inept



The "Practical and Amateur Wireless" stand at Radiolympia, showing the fine display of radio and other books which were on sale.

poseurs. Their leering leonine appearance represents a page from the Biblical past. They are quite out of place at Radfolympia.

The Show is over, and although it was the unlucky thirteenth of the present series (there have been 17 Exhibitions altogether), I understand that most of the firms did excellent business.

Some Problems

I INVITE my readers to ponder over the appended letter from H. V. B. (Wraxall):

"I cannot claim to be an old reader of your paper, but changed over to PRACTICAL AND AMATEUR WIRELESS on May 2nd, 1936. With regard to the following two questions, although they do not bear directly on wireless, I would be grateful if you would reply to them. My friend to whom these incidents occurred is not a wireless man, but I can vouch for his integrity.

"Q. No. 1. Approximately two months ago there was a bad thunderstorm at Long Ashton, Bristol, and a house was struck by lightning; torrential rain was falling, and my friend was passing in a small car at 40 m.p.h., when, as he thought, he heard a car behind him sound the horn, and he pulled in to allow the car to pass. But there was no other car about, and he and his passenger suddenly realised that it was their own horn that had sounded on its own account. This seems quite possible to me. What is your idea, please? Now comes the real hot number, Question No. 2. A bad thunderstorm, same road but halfway between Bristol and Clevedon.

"My friend was driving a Morris '10' towards Clevedon, when the car suddenly stopped on its own account, and could not be started again; 40 yards away, and headed towards him, an Austin Seven had stopped. He got out and asked the driver what was wrong—driver replied: 'don't know, the car stopped on its own.' While this was happening a Riley car passed by and a few minutes after both cars were started without any trouble, as though nothing had happened.

"Now my friend was so surprised at this occurrence that when he got home he 'phoned and reported this to the Long Ashton Police Station, giving number of cars, etc., and asked for a note to be made of it.

"I know you do not believe in any ray business, neither do I, but in a south-west direction about two miles away there is a G.P.O. station, at Backwell. (I have heard this station myself working on 6.4 metres.) And

Notes from the Test Bench

American Valves

THE popular range of American valves employ a 6.3-volt heater, and several English valves are now obtainable with a similar rating. Many constructors may prefer to use these but meet with difficulty on account of the fact that the mains transformers which they have available are provided with a 4-volt heater winding only. The difficulty may be overcome in two ways. If a spare 4-volt winding is available, one half of this (that is from one terminal to the centre-tap) may be joined in series with the other 4-volt winding to obtain 6 volts, and the small current taken, in conjunction with the fact that the windings are wound with very heavy wire designed for a high current, will permit the necessary 6.3 volts to be obtained. The two windings must be joined in phase and an A.C. meter should be used to check the voltage output. The alternative scheme is to wind a small transformer designed for an input of 4 volts and to give an output of 6.3 volts at the desired current. These transformers are now on sale commercially, for those who do not wish to make their own.

Instability and Decoupling

DECOUPLING components are often added to a receiver without removing instability. In such cases it should be remembered that the efficiency of the decoupling circuit may be modified in two ways. It is possible to increase the values of both condenser and resistance, or merely to increase the value of either component. In many cases, an increase in the capacity of the condenser up to 8 mfd. will be found all that is necessary, the increase in value of the resistance lowering efficiency due to the reduction of H.T. on the valve.

Differential Reaction Condensers

WHEN using this type of condenser it should be remembered that there are two distinct methods of connection. In one system—that which is most generally adopted—the moving vanes, and therefore the live spindle, are joined to the anode. This may give rise to hand-capacity effects, and the alternative method of joining the moving vanes to earth should generally be adopted. The fixed vanes are then joined to anode and reaction coil. A larger capacity condenser may be needed when this method of connection is adopted.

WIRELESS CONSTRUCTOR'S ENCYCLOPÆDIA

5/- or 5/6 by post from

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

my friend insists that it has some relation to the matter. I tried to tell him that no such thing is possible, and that the whole job was a most unusual occurrence, but I do not think that is the correct answer."

Hair's-breadth Accuracy

I REMEMBER the old saying that you cannot get more out of something than you put in, and although this phrase was coined long before the days of press-button radio, it still remains true of this latest and most intriguing radio novelty.

It is not difficult to appreciate that one of the first requirements of a press-button system is that it should be absolutely accurate; if it does not give you "dead centre" tuning, you are likely to be worse off than with the old hand tuning method.

Philips have been known for years for the wonderfully high degree of accuracy to be found in all their products, and in their new press-button receivers they have produced a piece of mechanism as beautifully accurate as a high-grade watch.

The revolutionary new linear action condenser, which is the basis of the press-button system built into two of their new models, is actually manufactured to within limits of one two-thousandth of a millimetre—or one fifty-thousandth of an inch! This almost incredible precision is very much less than the thickness of a human hair, and to achieve it required the design of special machinery to make the tools with which the condensers themselves are constructed.

Such is the cleverness of the design, however, that this astounding accuracy is built into the condenser as an integral part of its manufacture; it does not depend on skilful adjustment after it is put together. Therefore neither long use nor wear can upset it or cause it to lose its "dead centre" tuning; it must remain entirely accurate because accuracy was built into it in the beginning.

The ingenuity of the Philips press-button system also reveals itself in two other exclusive advantages. Any of the eight press buttons can be set to any station on the medium and long waveband without any restriction at all. Furthermore, the user himself can alter the settings of the buttons to any other stations he may desire in a matter of a few minutes without even opening the back of the set!

This unique system is built into the Philips 660—a handsome 5-valve all-wave table model at 13½ guineas, and the 597—a beautiful walnut console model, housing an all-wave receiver costing only 14 guineas.



Practical Television

September 10th, 1938. Vol. 3. No. 117.

Simpler Television

ONE very important fact which has manifested itself in connection with the ranges of new television receivers shown by different manufacturers is that the operation of the set has been simplified to the barest minimum. Readers will remember the very large array of knobs which characterised the first commercial sets just over two years ago. Every adjustment which could be made to the picture was evidenced by a control knob on some form of panel which unfortunately was in an accessible position as far as the inexperienced user was concerned. In an effort to master the intricacies of television reception the temptation to turn each knob proved too great for the viewer, with the result that quite frequently the picture became a maze of moving lines and patterns. A considerable time elapsed, therefore, before complete mastery was established and the knack of handling the essential controls to secure a good picture was found. An examination of the new sets has shown clearly that as a result of two years' experience many adjustments have proved superfluous and have either been eliminated altogether or combined with other controls to reduce the degree of complication. The outstanding example is the one-knob vision control set, an example of which is shown in the accompanying illustration. The left-hand control is called vision contrast, and that on the right is sound volume. This vision control is really a gain control which has the effect of increasing or decreasing the magnitude of the received vision signal modulation, together with the synchronising pulses. The original contrast control carried out the former function, but had no effect on the synchronising signals at all. The two controls together were found unnecessary, and the one now provided only needs to be handled intelligently to secure first-class picture reception. If advanced too far in a clockwise direction there is a tendency for the picture to tear or exhibit a jagged edge on all picture outlines, as well as exhibiting an over-modulated effect. If this should happen and it is still felt necessary to keep the control advanced because of some special local condition, then a readjustment of line speed or line lock at the rear of the set will generally restore the picture to normality once more. Continental practice is found to aim at this same receiver simplicity whenever possible, and should do much to popularise television reception among the non-technically minded

Colour Work

THE application of colour to talking films, photography and television has been very much in the news lately. Although in each of the three cases mentioned results are only achieved after employing complicated equipment, it is felt that the public reaction will be so beneficial to the industries concerned that the development, and research work

involved, will be well compensated. The next European country to show keen interest in colour television is Germany, and pictures have already been shown. The standard of definition employed is one of 180 lines, while red and green were the two primary colours used in the process. The images in some cases were hardly recognisable, but it is felt that the scheme adopted is based on the right lines. In addition to direct pick-up an attempt was

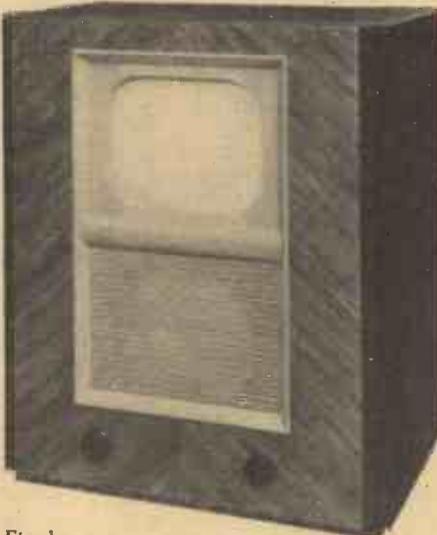


Fig. 1.— Here is a Baird "Two Control" television set.

made to televise colour films. Due to the colour response of the photo-electric material used in the camera, however these pictures did not seem so satisfactory as the studio material.

Unit Construction

TO permit easy transport so that demonstrations of television can be given if desired in districts outside the service

area, certain firms on the Continent are favouring unit construction for the amplifiers. An example of this is shown in Fig. 2. The film scanner on the right is a compact unit built specially for this purpose. Electrical scanning is employed, an image dissector tube of the Farnsworth type being used with secondary multiplication in preference to the storage type iconoscope camera which is favoured more for direct pick-up work in the studio, or for outdoor transmissions.

With space saving as one factor, convenience of operation another, the third is that the sensitivity of the camera is so high that an incandescent lamp acts as the light source instead of the usual carbon arc. The mobile amplifiers in this case are subdivided into six units, each of which is capable of being carried with ease by two persons. Three chassis are accommodated in each case, and jumper cables provide the necessary inter-connecting links. On the left is seen the check receiver, which is simply a standard commercial set fed with the outgoing signals via a special pad box.

Selling Television to the U.S.

WE have become so accustomed in this country to importing new ideas and developments from the United States that it is quite refreshing to hear that the reverse is happening with television. It is an undisputed fact that with big screen cinema television the pioneering work in this country has outstripped the States. The result of this is that it is now announced that Gaumont British are to introduce the Baird cathode-ray tube projection equipment into that country. Although the picture definition standards employed there are slightly different to those of England, since the apparatus is all electric in character it is quite an easy matter to make the requisite alterations. It is mainly a matter of altering component values in the time base generator, and extending the frequency response of the vision amplifier, so as to deal with the increased number of lines and greater frame speed. One section especially seems to be lagging in the United States, and that is in connection with the production of projection cathode-ray tubes giving a black and white picture, instead of the more familiar green colour. The pictures shown at the three London cinemas now equipped with big screen television apparatus definitely show black and white images, and this represents a marked advance in modern electronic methods of television.

READ "THE CYCLIST"
2d. Every Wednesday.

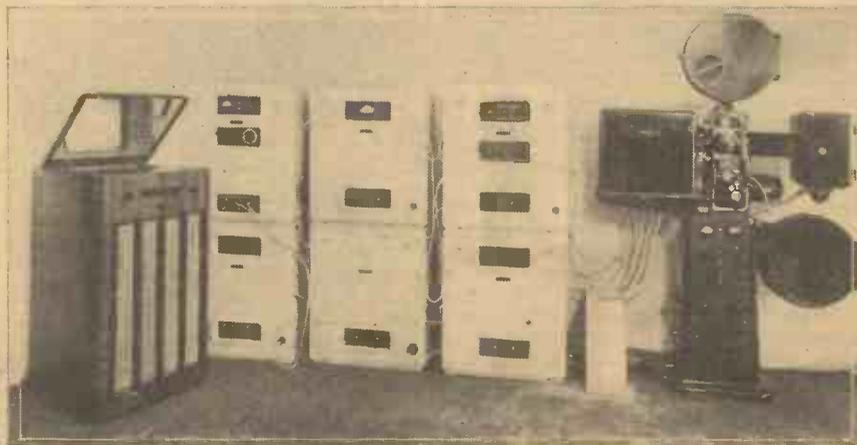
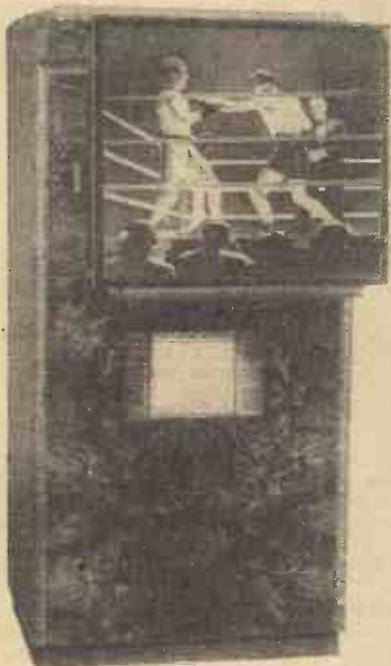


Fig. 2.—An example of unit construction used on the Continent.

NEW SEASON'S TELEVISION SETS

A Brief Review of the New Receivers, with Details and Prices of Some Popular Models

THE first thing which struck the visitor to Olympia this year was the wide range of television receivers which were displayed. These extended from table models to large combined all-wave radiograms suitable for hotels and clubs, and a very wide group of picture sizes could be seen. These ranged from the large screen of the Scophony, Marconi and Philips apparatus to the small H.M.V. and Marconiphone models. The largest screen available at the moment is on the Scophony or Ekco-Scophony models, and these, of course, employ the optical-mechanical system. The picture size in the largest domestic model is 24ins. by 20ins., and in the smallest it is 4ins. by 3½ins. The cheapest



This is one of the big-screen televisions. An Ekco-Scophony product.

set on view was the Pye Model 817, which costs £22 1s., and the dearest was the Ekco-Scophony large-screen model at £231.

Between these extremes are models of all types and it should be noted that in the majority of cases the low-priced models are not in themselves complete. For instance, the Pye Model 817, referred to, provides vision only, and is in the form of an adaptor which has to be used in conjunction with a radio receiver tuning to the sound television programme. A special converter circuit then provides the vision element, the sound being reproduced from the normal broadcast receiver. This is, of course, an ideal way of acquiring television where a really good broadcast receiver is available. It must be remembered, however, that the quality of reproduction on the television programme is of a very high standard, and many receivers designed for normal broadcast use will not do justice to the quality. A receiver designed for television, however, will give very good results on this side.

Sound and Vision

A compromise has been arrived at by some manufacturers by producing a receiver which gives the sound and vision programmes only, and thus a separate receiver is necessary for ordinary broadcast reception. This keeps down the cost considerably and enables the good quality to be obtained. The prices of this type of receiver range from £24 3s. for the Cossor Model 54 to the Ekco and Scophony large-screen models which are designed on this principle. Again, the models are available with various picture sizes, the Cossor providing a 5in. by 4in. picture. This type of apparatus is also supplied in two patterns, either as a table cabinet or a floor console.

Another type of receiver which is available provides the television sound and vision and in addition a radio section which gives the medium- and long-wave broadcasts. Usually, the television section is brought into action by a separate switch or a separate section of the main wave-change switch, and separate controls are provided for brilliancy or contrast and sound volume. The new Pilot is a receiver of this type, giving a 10in. by 8in. picture and being built in the form of a medium-long-wave radiogram. The price of this is £68 5s. In the same class the Pye Model 819 is a lower-priced model, but does not include the gramophone section and gives a picture 4½in. by 3½in. The price of this is £29 8s.

With the exception of the Ekco and Scophony apparatus, the remainder all employ the cathode-ray tube. The tube size varies from the large Baird Cathovisor to the small projection tubes employed in Baird, Marconi, Philips and other receivers utilising the projection systems. In the majority of these the actual picture formed on the tube, which is arranged vertically at the base of the cabinet, is only about 2in. in width, and enlargement is carried out by an ordinary lens, the large picture being thrown forward on to a translucent screen by means of a mirror.

Tube Sizes

The general assembly of apparatus provided picture sizes as follows:

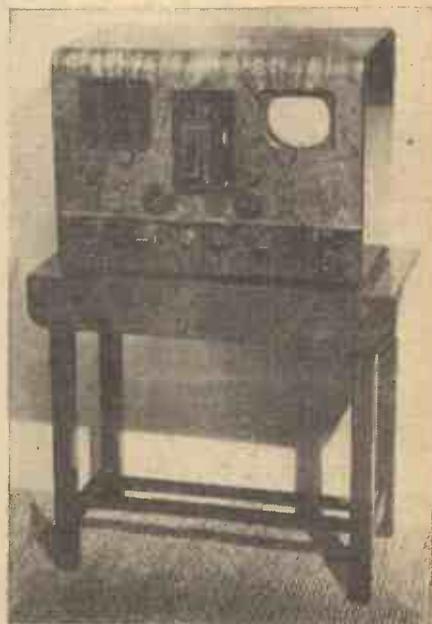
- 4in. by 3½in. (Invicta).
- 4½in. by 3½in. (Pye).
- 4½in. by 4in. (Marconiphone and H.M.V.).
- 5in. by 4in. (Cossor).
- 5in. by 6½in. (H.M.V.).
- 6½in. by 5in. (Marconiphone).
- 7in. by 5½in. (Kolster-Brandes).
- 7½in. by 5½in. (Invicta, Pye).
- 7½in. by 5½in. (G.E.C.).
- 7½in. by 6in. (H.M.V., Marconiphone, Murphy).
- 7½in. by 6½in. (Beethoven).
- 7½in. by 6½in. (Baird, Marconiphone, Ultra).
- 8½in. by 6½in. (Cossor).
- 9in. by 7in. (Murphy).

- 9in. by 7½in. (McMichael).
- 10in. by 8in. (Baird, Burndep, Cossor, Dynatron, Ekco, Ferranti, G.E.C., H.M.V., K.-B., Marconiphone, Pilot, R.G.D., Tannoy and Vidor).
- 10½in. by 8½in. (Ultra).



Cossor Table Receiver Model 54, with 5in. by 4in. picture. It gives sound and vision only.

- 12in. by 9½in. (Cossor).
- 13½in. by 11in. (Baird, G.E.C.).
- 18in. by 14½in. (Philips).
- 18in. by 15in. (Baird, Pye).
- 22in. by 18in. (H.M.V., Marconiphone).
- 24in. by 20in. (Ekco, Scophony).
- 6ft. by 5ft. (Scophony).



In the small table models this Marconiphone receiver shows the small picture measuring 4½ins. by 4ins.

A PAGE OF PRACTICAL HINTS

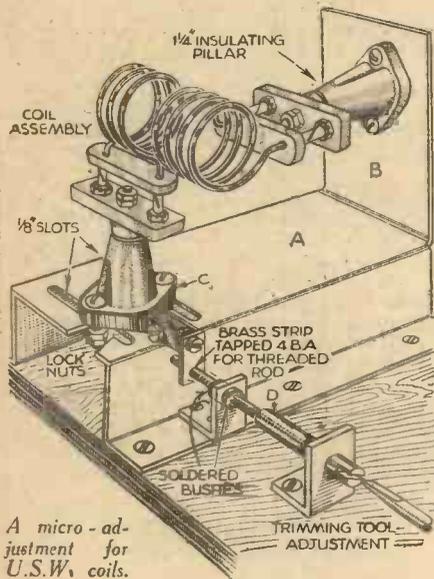
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Micro-adjustment for U.S.W. Coils Coupling

USING standard U.S.W. coils and sockets, I have, by mounting one vertically and the other horizontally, been able to

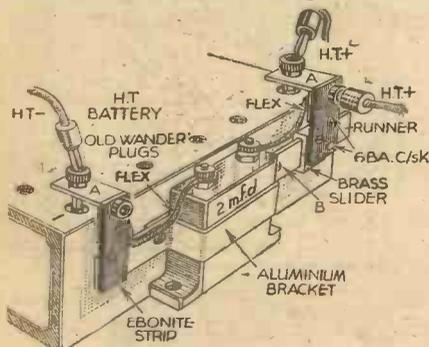


A micro-adjustment for U.S.W. coils.

contrive a novel micro-adjusting movement, and one which will give a coupling unrestricted by the coil supports. From the accompanying illustration, it will be seen that the horizontally mounted coil and pillar assembly is permanently fixed to the bracket "B" whilst an adjustable slot fitting is provided for the vertical coil assembly.

A brass band "C" is bent round the base of the horizontal coil support pillar, this being fitted to a small brass piece tapped for the 4BA rod. This threaded rod passes through the other brass bracket but via small brass bushes to which it is soldered, one on each side of the bracket.

The threaded rod was soldered to a length of brass rod (D) 1/8 in. diameter, but other readers utilising this idea can, failing this, employ an ebonite rod, or tube, quite satisfactorily. The space "A" on the chassis was used to advantage for other



A simple bypass condenser attachment.

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.

short-wave components, and lends itself to other ideas during construction.—E. S. WENGROVE (Ipswich).

A Novel Adjustable Condenser Attachment

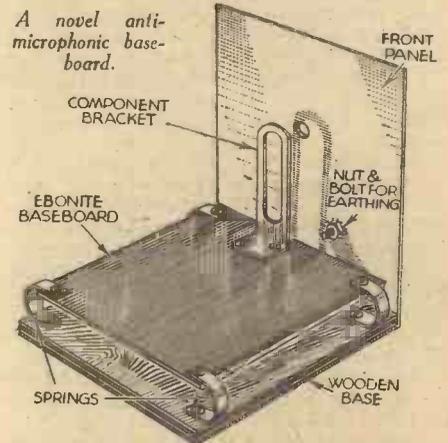
RECENTLY I constructed a simple adjustable bypass condenser attachment, as shown in the accompanying sketch, and now I am able to transfer the condenser—which may be 2 or 4 mfd capacity—to either the small or the large H.T. battery without any trouble. Previously I used odd lengths of flex, but they invariably caused trouble when I moved the battery, and difficulty was experienced in retaining good connections with the plugs. The bracket securing the condenser is of

16 S.W.G. aluminium and has one arm B sufficiently long to permit adjustment of the slider, which is obtained from a length of disused curtain runner. The end contact strips, to which are fitted the wander plugs, are also of the same gauge aluminium, and finally a refinement was obtained by fitting extra sockets. A single 6BA bolt, and the socket, retain the A pieces in position in each instance, and the slider required tapping to take these bolts.—G. S. GROEVES (East Ham).

An Anti-microphonic Baseboard

THE accompanying sketch depicts a simple low-loss anti-microphonic baseboard suitable for use with small short-wave sets, or any other small sets. All components are mounted on the ebonite baseboard, and any condensers or potentiometers that are used are mounted on component brackets. The hole in the panel must be a good deal larger than the spindle passing through it so as to allow for oscillation of the baseboard. The springs are made from parts of clock springs, old cycle clips,

or thin brass strip, and a small hole is made at each end of these for fixing them. The height of the ebonite above the wooden base should be about one inch. The ebonite is about a quarter of an inch from the front panel, and in the case of a metal one,

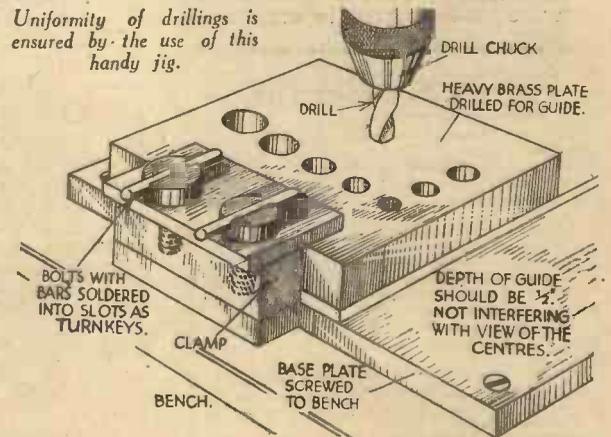


earth connections can be made to a small nut and bolt, as shown in the sketch.—RICHARD J. SHELL (W. Hampstead).

A Handy Drilling Jig

WISHING to fit a number of components to my set by means of tapped holes, I found that the holes were at different angles, and those screws that were visible not being straight were very unsightly. To overcome this, I have devised the fitment

Uniformity of drillings is ensured by the use of this handy jig.



illustrated, to ensure a uniformity of drillings.

A piece of heavy brass plate about 1/2 in. thick was carefully drilled with a number of different size holes, and as it is necessary to see the centres of the holes to be drilled in the work, the thickness of the plate should not exceed that mentioned, which is sufficient to ensure the vertical position of the drill. The guide plate is placed over the work and clamped tightly in position, and it is quite a simple matter to drill a number of holes quite uniformly by shifting the plate in each case.—B. ROCHE (Dunstable).

F. J. Camm's "Admiral" 4-valve Receiver

Further Constructional Notes on the 2-H.F. Battery Receiver

ON this page we give the wiring diagram, above and below chassis views, of this new set. The work is a little more difficult than is met with in the case of simple types of receiver, and great care must be paid to the run of the wiring. Therefore, the positions of leads as shown in this diagram should be followed as closely as possible. There are several points of note in this connection. Firstly, resistances and condensers are suspended in the wiring, and for this purpose some leads have to be lengthened, whilst others have to be cut down. In each case, lengths of insulated sleeving should be slipped over the leads before they are soldered into position, and if the leads are carefully bent the components should stand rigid. Any slackness will be detrimental to the performance of the receiver, and in some cases damage may arise due to a short-circuit. With a receiver of this type it is, no doubt, preferable to mount all components before commencing wiring, and then to carry out the wiring in a systematic manner. The procedure recommended is to attach the leads to the gang condenser first, mount this in position, and then mount all other parts. Note that two leads are attached to the wiping contacts of the moving vanes of the gang condenser, and taken down through holes 1 and 2 for subsequent connection to a common earthing bar. This is done in the interests of stability, although the condenser is in good contact with the chassis.

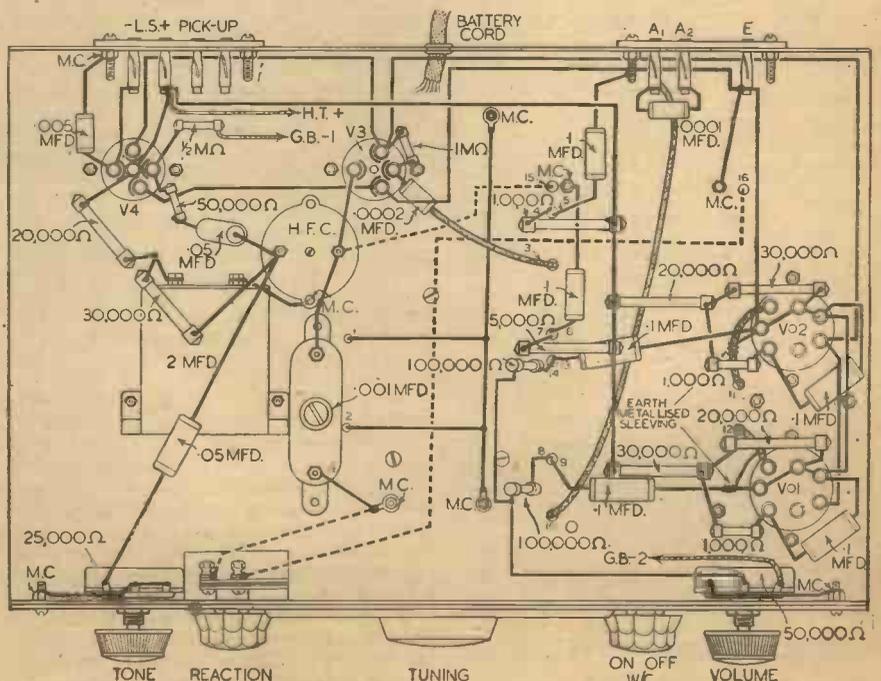
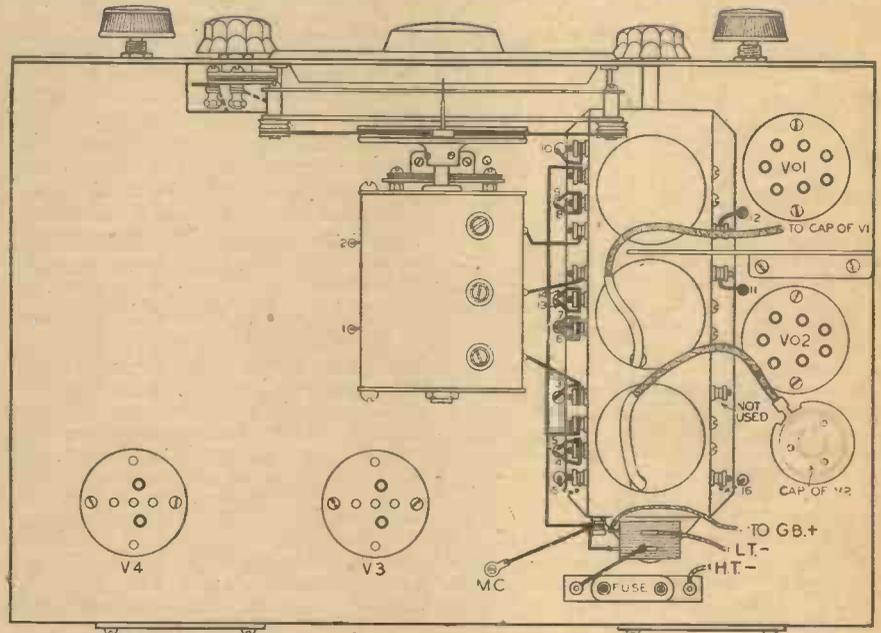
Screened Leads

It will also be noted that several of the leads are screened. Care is necessary here, and the screened sleeving should first be carefully measured, cut off to length, and then the ends prepared to avoid short-

circuits. Turn back the ends of the metallic covering so that a quarter of an inch or so of the insulated sleeving projects, and then carefully run some solder round the sleeving to prevent "whiskers" coming into contact with the internal lead. The sleeving is earthed by soldering a bare wire round it at the points indicated and connecting the wire to earth.

It will be noted that connections to the reaction condenser are shown in broken lines and the reaction circuit may be included at the desire of the constructor. In many cases it will be found that reaction is not needed, the general high gain being adequate for all normal purposes. Only where the situation is poor should reaction be employed in a set of this type, although for experimental use it may be connected up. The anode by-pass condenser is of the pre-set type so that the best value may be found by experiment, and this will vary if reaction is employed. Therefore, when the receiver has been wired and ganged, adjustments should be made to this condenser in order to find the best position for smooth reaction and good quality signals. A top-note cut will be experienced if the condenser control is screwed right down, and therefore a minimum adjustment should be obtained if possible.

WIRING DIAGRAM OF THE "ADMIRAL"



LIST OF COMPONENTS FOR F. J. CAMM'S ADMIRAL 4-VALVE RECEIVER.

- One coil unit—B.P.116 (Varley).
- One variable condenser—Baby gang, 3-section (Jackson).
- One micro-horizontal dial (Polar).
- Four valveholders (Clix).
- Terminal strips, A, A1 and E, L.S., P.U. (Clix).
- H.F.C., H.F.10 (Bulgin).
- One switch—S. 139 (Bulgin).
- One aerial series condenser, type 451 (T.C.C.).
- One reaction condenser—Compax.0002 (Polar).
- One volume control, 50,000 type B (Dubilier).
- Fixed resistances:
 - Three type F. 30,000 1 watt, three type F. 20,000 1 watt, two type F. 1,000 ½ watt, one type F. 1,000 1 watt, two type F. .1 meg. ½ watt, one type F. 50,000 ½ watt, one type F. .5 meg. ½ watt, one type F. 1 meg. ½ watt, one type F. 5,000 1 watt (Dubilier).
- Fixed condensers:
 - One 2.0 mfd. type T.C.C. 50; one 1.0 mfd., type 341; six 0.1 mfd., type 341; two .05 mfd., type 341; one .005 mfd., type 451; one .0002 mfd., type 451; one .0001 mfd., type 451 (T.C.C.).
- Tone-control potentiometer, 25,000 type B (Dubilier).
- Chassis—14in. x 9in. x 3in. Alu. (Peto-Scott).
- Panel—14in. x 10in. Alu. (Peto-Scott).
- Four valves—Two VP210, one HL2, one Pen220 (Mazda).
- Fuse—100 mA (Microfuse).
- Fuseholder (Microfuse).
- One 120-volt H.T. battery and one 2-volt 40 A.H. accumulator (Exide).
- One Stentorian loudspeaker (W.B.).

The Modern Loudspeaker-1.

A Survey of the General Principles of Design

IN common with other scientific instruments, the loudspeaker is often misused, yet even a cheap unit is capable of good results if the operating conditions are favourable. Let us, therefore, glance at the major points of magnetic theory as applied to loudspeakers.

Fig. 1 represents a section through the poles of a field magnet, the horizontal lines illustrating the "lines of force" which permeate the magnet assembly and constitute the magnetic field. A "line of force" may best be considered as one of an array of tentacles which a magnet shoots out into the surrounding media, and which pulls or pushes objects about according to their composition.

The total number of "lines of force" passing through an area of 1 sq. cm. is known as the "flux density," and is variously described as "lines per sq. cm.," "Maxwells," or just plain "lines." The "flux density" of the average moving coil magnet ranges with individual types from 8,000 to 12,000 lines per sq. cm., the speaker with highest flux density proving most sensitive in practice.

Why a speech coil should move in a magnet field is a phenomenon imperfectly understood by many amateurs. The theory of speech coil operation is fundamentally the same as that of the moving-coil meter and the electric motor, and is known as the "dynamometer principle."

Referring to Fig. 2, the circles in the

field represent a cross-section of a speech coil and the operation is described for one complete cycle of alternation. We assume the speech current to rise from zero to a maximum, to fall through zero to a maximum in the reverse direction, and to return to the zero line again in preparation for the next cycle.

The Magnetic Field

An electric current flowing in a conductor induces a magnetic field surround-

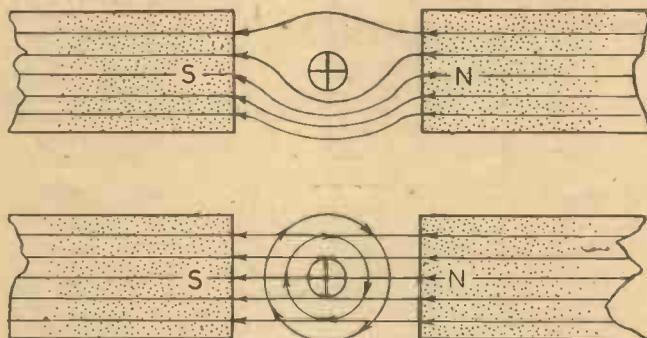


Fig. 1.—Diagrams illustrating the motion of a current-carrying conductor in a magnetic field.

ing the conductor, the lines of force linking with the current to form a closed chain. In the diagram, Fig. 3, "current" is indicated as flowing through the coil, from outside, to the centre pole piece. It will be seen that the magnetic field created by the speech coil interacts with that of the magnet, the flux density in the air gap being higher above the coil.

The forces will tend to adjust themselves to a state of equilibrium in common with all physical phenomena, and in an attempt to even out the field the speech coil moves towards the magnet pole. After passing its maximum, however, the speech current decreases, the field surrounding the conductors also decreases, and the coil returns to its original position. Speech current then builds up in the opposite direction and the coil moves away from the magnet.

Since this oscillatory motion is produced by audio-frequency current, the speech coil and cone act as a form of convertor, changing electrical impulses into air disturbances.

Resonance

The natural tendency of a freely suspended cone assembly is to remain in a state of equilibrium. If disturbed, it will return to rest after several swings, in the same way as a pendulum, and like a pendulum it has a definite frequency of oscillation. This tendency to oscillate is common to most types of loudspeakers, and is known as "resonance."

Resonance is dependent on several factors, one of which is the cone mass, another the suspension. If the cone mass is small and the suspension light, the efficiency of sound conversion will be high, and bass resonances minimised. Cone area must be large to deal with lower frequencies, and therefore the cone assembly will be fragile and subject to damage by a slight overload. In practice a compromise is effected. A

stout cone and robust speech coil is the rule, and the inevitable resonance utilised to boost the lower frequencies.

The prominence of resonances in the speaker response can be considerably reduced by careful attention to circuit design. As a tuning coil resonance hump is flattened by a parallel resistance, so the unduly accentuated peaks in reproduction can be evened out by ensuring that the working impedance of the output transformer is kept constant, instead of rising with increase of frequency.

"Tone Control"

The two methods generally adopted to ensure this desirable state of affairs are the provision of a "tone-control" and negative feedback, an ingenious circuit adaptation that gives admirable results.

The "tone control" consists of a series capacity-resistance shunt across the primary winding of the output transformer. To an increasing frequency input, the transformer primary winding offers an increasing impedance, while that of the series capacity and resistance falls off. Consequently, the resultant impedance remains practically constant and ensures the output valve working at its optimum anode load.

The more efficient means of "tone correction"—negative feedback—produces a similar effect in a more scientific manner. As in the case mentioned above, a signal which is increasing in frequency will have an increasing impedance presented to it by the output transformer.

But as the frequency increases, an increasing amount of signal is taken from the anode of the valve and fed into the grid circuit in opposition to the grid signal. The benefits of this device are twofold, for as the grid swing on the valve is kept down, the liability to overload is correspondingly

(Continued on page 659)

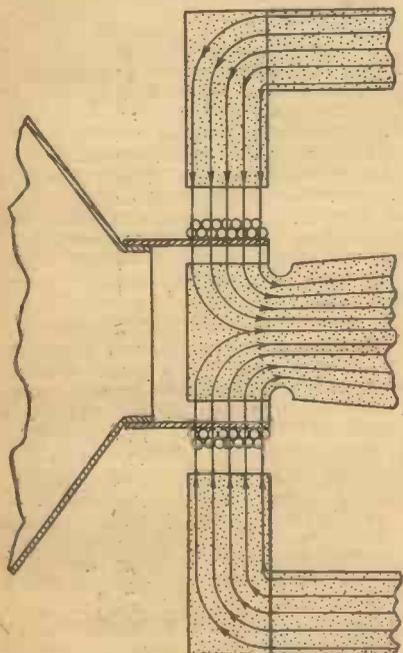


Fig. 2.—Diagram showing flux distribution when no speech current is flowing.

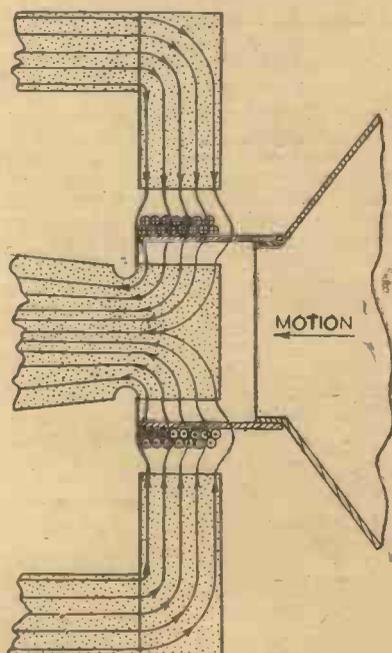


Fig. 3.—Diagram showing distorted field due to speech current flowing in the coil.

Circuit Balancing

The Importance of Correct Adjustment in Various Modern Radio Circuits, and the Method of Carrying Out Balance

By W. J. DELANEY

THE builder of a modern receiver employing two or more tuning circuits will be familiar with the problem of accurate matching between the circuits. This is usually carried out by adjusting trimmers on a gang condenser, and it is often found that no matter how much time is spent on the adjustment of the trimmers it is impossible to find a setting which will enable maximum performance to be obtained at every degree of the dial. With most receivers of this type you can tune to a distant station at some part of the dial and a slight adjustment of one of the trimmers will result in an improvement in signal strength, but it will then be found that at another part of

the dial re-adjustment has to be carried out to obtain maximum signal strength. This is in spite of the fact that the coils are

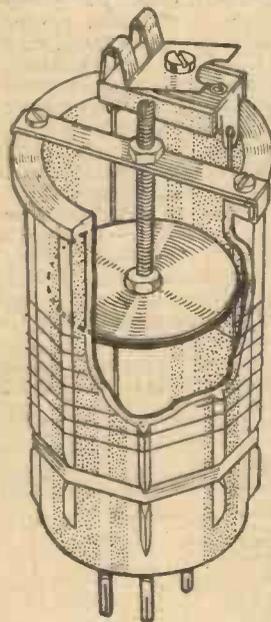


Fig. 1.—Accurate matching with simple coils may be carried out by an inductance and capacity trimmer as shown here.

wound to a fixed inductance value and the condensers are matched at various parts of the scale by means of split end vanes or

some other adjustment. This is, however, only one indication of the importance of balance in circuits, and where it is desirable to obtain maximum results this may be carried out by additional means to those usually provided.

A good suggestion for those with two- or three-gang coil units who wish to make an improvement is to obtain a .000015 mfd. short-wave tuning condenser and mount this on a small bracket connected to earth. To the fixed vanes attach a length of connecting wire (flex is most suitable) and connect this to each fixed vane connecting terminal in turn—tuning to various weak stations at the same time. You will probably find that when connected to one circuit this will prove of great value in obtaining improved results and in that case it may be mounted on the panel and used as an additional trimmer.

Matching Inductances

The additional control will prove worth while although it may add further to the panel confusion which already exists on many sets due to a large number of controls.

An alternative scheme is to match the inductances, and this will probably be found preferable in receivers utilising short-wave coils. One simple way of doing this which is applicable to receivers in which standard 4- or 6-pin plug-in coils are used, is to

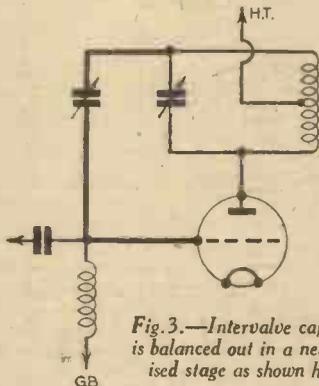


Fig. 3.—Intervalve capacity is balanced out in a neutralised stage as shown here.

mount one of the small ceramic trimming condensers inside the coil former, and connect this across the winding. It may often be found, however, that this only increases the matching above a certain value, the minimum settings being already adjusted by the inductance value. In such a case some method of adjusting the coils at the lower end of the tuning range will have to be adopted, and the best method of doing this is as shown in Fig. 4. A disc of copper should be cut which will just go inside the coil former, and it should be soldered to a length of threaded rod. This,

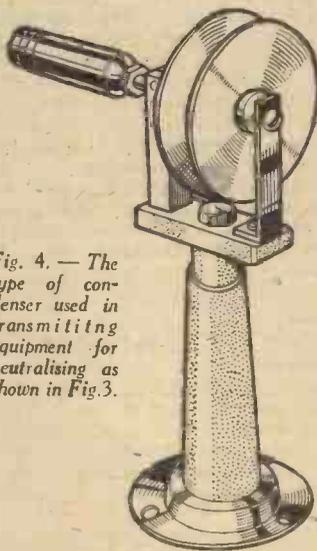


Fig. 4.—The type of condenser used in transmitting equipment for neutralising as shown in Fig. 3.

in turn, should be mounted on a bracket which is threaded (or to which a nut has been soldered so that by adjusting the rod the disc may be moved inside the coil winding. A combination of the inductance match and trimming condenser should enable the coils to be accurately matched throughout every part of the range.

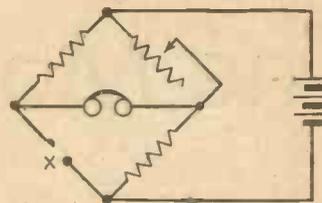


Fig. 2.—The basis "Bridge" circuit in which "balance" is used for measuring.

Bridge Circuits

A very popular indication of the value of circuit balance is found in the test apparatus which utilises an arrangement known as a Bridge Circuit. The fundamental scheme is shown in Fig. 2, and it will be seen that four "arms" are employed with an indicator at the centre. This latter may be a meter or phones, or equivalent indicating device. This type of apparatus is employed for testing resistances, inductances and condensers and when properly balanced the flow of current results in a certain indication on the indicating device. Thus, when an unknown component is to be tested it is connected as one of the arms, and by using calibrated components at the other arms a

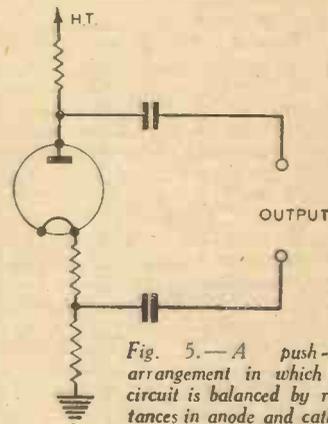


Fig. 5.—A push-pull arrangement in which the circuit is balanced by resistances in anode and cathode leads.

balance may be obtained upon which the value of the unknown component may be read off.

Neutralising

In the neutralised stage we have a very similar arrangement, where the capacity of a valve is balanced by an external capacity, and although this is not now used in receiving apparatus it is still needed in the triode power amplifier employed in transmitting equipment. As the anode and grid circuits of such an amplifier have to be tuned to the same frequency a possibility of oscillation arises due to the coupling between those two circuits which will exist between the grid and anode of the valve itself. By connecting a condenser from the grid to anode and adjusting this so that it balances out or neutralises this capacity coupling oscillation is prevented, and as the valves used in such a circuit will be of the super power type with a very low inter-electrode capacity very small condensers will be needed for neutralising. The most popular type is that shown in Fig. 4, where two discs of brass or copper are so arranged that they may be brought together with a micrometer movement. As high voltages are used in such a circuit a high degree of insulation is needed and thus these condensers are mounted on high quality bases as shown.

(Continued on next page.)

CIRCUIT BALANCING

(Continued from previous page)

L.F. Circuits

There is one further popular example of circuit balance in modern apparatus and that is in the push-pull L.F. stage. Here, two valves are intended to operate in place of one, and the incoming signal is split into two, each half of which is fed to a separate valve, and the output from the two valves is then combined to deliver a single signal to the speaker. Obviously, here the two halves should be accurate in order to obtain an undistorted signal, and the modern centre-tapped transformer enables this point to be satisfied. Similarly, the output transformer is also tapped, but any inequality of balance between the various halves will result in some form of

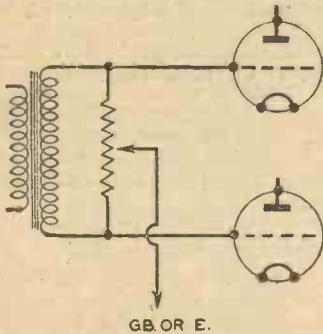


Fig. 6.—A balance for push-pull may be obtained with an ordinary transformer as shown here.

distortion. A resistance-capacity or paraphase push-pull system fulfils the same conditions, but instead of using a transformer the signal is split by passing it through resistances, a popular arrangement being shown in Fig. 5 where an indirectly-heated valve is shown with the necessary resistances arranged in the anode and the cathode circuits. "Unbalance" here may be obtained due to the effect of the bias resistance on one side of the circuit. By making one resistance variable the circuit may be accurately balanced, and in a transformer push-pull stage an approximate balance may be obtained with an ordinary transformer by connecting fixed resistances across the secondary. To assist in obtaining exact balance in this case a potentiometer may be used, with the arm taken to earth or grid bias, as shown in Fig. 6.

THE MODERN LOUDSPEAKER

(Continued from page 657)

reduced. Furthermore, since higher frequencies are fed back in preference to the lower, there will be a reduction of harmonics in the anode signal, which gives to a pentode a performance comparable to a triode, but with greater valve efficiency. Thus the "shrillness" which once constituted "pentode tone" is now happily only a memory.

A mechanical device for the reduction of resonances sometimes incorporated in the cone assembly is a "damping ring" of light metal constituting the speech coil former. The ring oscillates in the magnet gap, and "eddy currents" are induced in it in the same way as a current is induced in the armature of a dynamo. These currents also produce a magnetic field surrounding the ring, which opposes any effort to move it. Any tendency to sustained oscillation has, therefore, a restoring force to overcome, and the damping effect is thus achieved.

We have now touched on the major points of loudspeaker theory, and the why and whereof of performance. In a future article the writer will discuss methods of improving reproduction.

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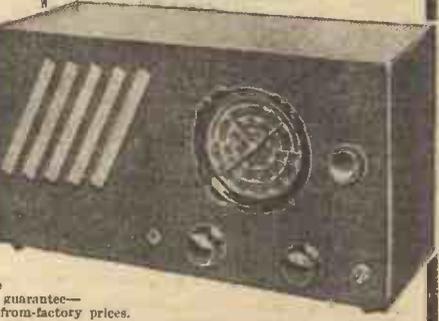
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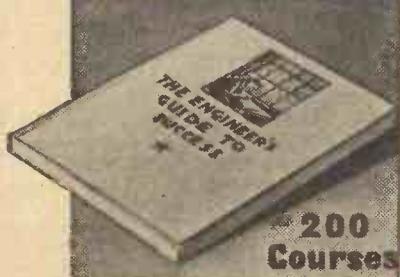
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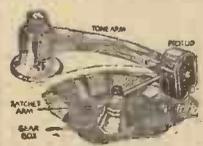
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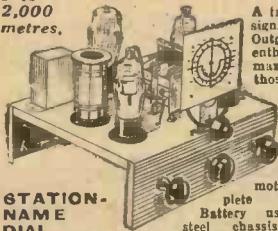
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Leaves from a Short-wave Log

The News Tower Broadcast

UNDER this title W2XAD and W2XAF, Schenectady (N.Y.), U.S.A., on 19.56 m. (15.33 mc/s) and 31.48 m. (9.53 mc/s) respectively, transmit every evening news bulletins for English-speaking listeners throughout the world.

All-India Broadcasts

THE schedule of the British India transmissions has now been fixed as follows: VUB2, Bombay, 31.41 m. (9.55 mc/s); G.M.T. 02.30-03.30 and 06.00-08.30; on 61 m. (4.9 mc/s) from G.M.T. 12.00-17.30; VUC2, Calcutta, 31.48 m. (9.53 mc/s), G.M.T. 07.06-09.06; VUC5, 61.48 m. (4.88 mc/s), G.M.T. 11.36-17.06; VUD2, Delhi, 31.33 m. (9.575 mc/s); G.M.T. 01.30-03.30; 06.30-08.30; on VUD8, 60.98 m. (4.92 mc/s), G.M.T. 12.30-17.30; VUM2, Madras, 60.48 m. (4.96 mc/s), G.M.T. 12.00-17.00.

Submarine Transmissions

FOR the first time in radio history four American engineers have succeeded in broadcasting speech from a submarine immersed off the Barlett Reef Lightship some ten miles distant from the submarine base at New London (Connecticut), where the signals were clearly heard.

More Channels for Rome

IN view of the proposed extension of the Italian short-wave radio network which calls for 50-kilowatt transmitters, the following additional frequencies have been officially allotted to the Rome (Prato Smeraldo) stations: 13.85 m. (21.65 mc/s); 13.90 m. (21.58 mc/s); 13.91 m. (21.56 mc/s); 16.81 m. (17.85 mc/s); 16.83 m. (17.83 mc/s); 16.85 m. (17.8 mc/s); 19.54 m. (15.36 mc/s); 19.75 m. (15.19 mc/s); 19.87 m. (15.1 mc/s); 25.21 m. (11.9 mc/s); 30.96 m. (9.69 mc/s); 31.02 m. (9.67 mc/s); 41.38 m. (7.25 mc/s); 41.55 m. (7.22 mc/s); and 48.47 m. (6.19 mc/s).

Albania on Short Waves

FURTHER information is now available regarding the proposed installation of a 3-kilowatt short-wave transmitter in the vicinity of the capital (Tirana); tests will be made on the following channels: 30.04 m. (9.987 mc/s); 29.71 m. (10.097 mc/s); 40.07 m. (7.487 mc/s); 41.02 m. (7.313 mc/s); and 41.61 m. (7.21 mc/s). Two frequencies will be eventually adopted for radio telephony, the others to be used for traffic on radio telegraphy.

Moscow Calls the World

RKI, Moscow (U.S.S.R.), on 19.89 m. (15.08 mc/s) appears to provide the clearest and loudest signal for the Russian news broadcasts. The best times to listen are between G.M.T. 00.00 and 01.00 and from 02.00-02.30. During these periods the broadcasts are made in the English language.

The Four Main Stations of Costa Rica

ALTHOUGH many broadcasts from Costa Rica are already being logged, the most important short-wave stations are located in the capital, San José. Of these, TIEP, on 44.71 m. (6.71 mc/s), is the most powerful as it is rated at 3 kilowatts. The call is coupled with the slogan: *La Voz del Tropico*, but when English announcements are given reference is made

to *The Voice of the Isthmus*. Address: Sr. Eduardo P. Hernandez, Apartado Postal, 257, San José. Next in importance are TIGP, on 46.8 m. (6.41 mc/s), *La Voz de la Victor* or *Radio Costa Rica*, of which the address is Casa Victor, Estación TIGP, Apartado Postal, 225, San José, and TIGPH, on 51.55 m. (5.82 mc/s), both working on a power of 1 kilowatt. For the latter station send reports to Radiodifusora *La Reina del Aire*, TIGPH, Alma Tica, San José. Finally, TIRCC, a 500-watt transmitter operated by the *Accion Catolica*, on 45.8 m. (6.55 mc/s), has established a new schedule of broadcasts. It is on the air from G.M.T. 05.00-06.00 (Tuesday, Thursday, Saturday); from G.M.T. 03.00-04.00 on Thursday only, and on Sundays from 08.00-09.00, and again from 10.00-11.00. The standard time of Costa Rica is G.M.T. less six hours. Details of TI2XD and TILS, San José, were given in a recent issue of PRACTICAL AND AMATEUR WIRELESS.

Better Signals from Fiji

IT is to be hoped that the plan to increase the power of the present Suva (Fiji Islands) transmitter from 400 watts to 10 kilowatts, as announced by the Amalgamated Wireless (Australasia), Ltd., will mature in the near future. So far, VPD2 has only been working on 31.46 m. (9.535 mc/s) on week-days between G.M.T. 10.30-12.00. Three further channels, however, have now been reserved for the new station, namely, 48.94 m. (6.13 mc/s); 25.22 m. (11.895 mc/s), and 19.79 m. (15.16 mc/s).

Another German Mystery Station

IN addition to the still undiscovered *Deutscher Freiheitssender* (German Liberty station) working nightly on 29.8 m. (10.067 mc/s) or on an adjoining wavelength when jamming occurs, listeners are now picking up broadcasts from an anti-Hitler transmitter which operates every Sunday towards midnight on a channel varying between 23 and 27 metres. So far, although a continuous search is being made, the police have failed to discover the location of the station, and it is thought that it may be a mobile transmitter or even installed on a ship in the Baltic. The call is: *Hier der Freiheitssender Danzig* (this is the Dantzig liberty station), but it is fully realised that the information thus disclosed may be misleading.

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The Battle of the Buttons

RADIOLYMPIA this year was a veritable battleground of buttons! Practically every set manufacturer was showing some form of press-button tuning, and great was the competition between them to impress on the public the merits of the different systems.

Probably one of the most ingenious exhibits was that shown by the Philips firm—Stand 51—who, by the way, have two very special press-button systems of their own.

Since some forms of press-button tuning involve a simplification of the circuit design which may have an adverse effect on the set's general performance, Philips have

NEW MULLARD VALVES

NOTWITHSTANDING all the improvements in receiver design, the undoubted attraction of press-button tuning and other refinements, the valve is still the heart of the set, and the efficiency of its valves the vital factor in the set's performance.

One of the most notable developments in valve design in recent years is the introduction of the new Mullard "E" series, popularly known as the "red" valves, on account of the distinctive colour of their coating.

Apart from their colour, their most noticeable external feature is their very small size. By using a short cathode of high emission, the great advantages of a low heater current, good heat radiation, mechanical rigidity and compact assembly have been obtained. This means in practice that the valves are more economical to run, stronger and more reliable.

Again the closer electrode spacing means that the transit time of the electron is shorter, resulting in greatly increased efficiency, particularly at high frequencies and short wavelengths.

With the wider development of television, the valve's responsibility is correspondingly greater and the need for increased valve efficiency more insistent. The new Mullard E series has been designed with the stringent requirements of television in mind, and they will play an ever increasing part in the growth of this newest medium of home entertainment.

Realising that unwanted background noise has hitherto been a definite drawback to enjoyable short-wave listening Mullard have attacked the problem at its source, and have also developed a new valve which provides a very high degree of amplification and at the same time reduces background noise to the very minimum. As a result, sets incorporating the new Mullard Noiseless Pentode give reception on short waves which is comparable with that on the medium and long bands, thus making a very valuable addition to the wealth of entertainment which is available to owners of one of these new receivers.

Nor are the special advantages of the Mullard Noiseless Pentode confined to the short-wave band. Owing to this great reduction in background noise, sets with the new valve have a much better performance on medium and long waves as well, particularly when only a short aerial can be used. Under these conditions, the benefits conferred by the Noiseless Pentode are easily appreciated.

designed two systems working on entirely revolutionary principles and giving "dead centre" accuracy without any interference with the efficient working of the set or any cheapening of its general design.

One of the systems is based on a completely new type of tuning condenser, which has a sliding instead of the usual rotary movement and can therefore be operated directly by the press buttons themselves. The other system is of the motor driven type, but it differs from all the other motor driven systems in that it uses a very clever mechanical system of station selection which overcomes in the simplest manner all the problems which have so far confronted the designers of press-button receivers.

Interesting leaflets describing their exclusive press-button systems are available by post on application to 145, Charing Cross Road, W.C.2.

VALVE PRICES DOWN

VALVES for every type of receiving set are described in the latest Osram Valve Guide. In addition to the fullest information as to working voltages, currents, power output, optimum load, etc., there is a wide range of circuits illustrating different classes of broadcast valves used in modern sets.

Reductions listed are as much as 10s., and the lower prices at which the International type valves are available indicate that British valves are not only as good as any others in the world, but also as inexpensive. In fact, it cannot be too strongly stressed that the enormous price reductions bring the re-valving of sets within reach of the pockets of all.

Amateurs and experimenters as well as radio service engineers are invited to apply for copies of the Guide, which is obtainable from the Osram Valve Technical Department, General Electric Company, Ltd., Magnet House, Kingsway, W.C.2.

Man who Listens-in but Never Hears

How a Radio Sound Expert Spends His Hours of Duty

AT Wembley there is a man who listens in all day to the latest radio receivers yet can never hear a programme.

He is Mr. F. H. Brittain, a radio expert at the G.E.C. research laboratories, and the room in which he works is so ingeniously contrived that no sound from the outside world can penetrate it—not even by the radio waves.

Mr. Brittain's job is to trace down and exterminate any sign of those background noises which occur within any highly-sensitive set that is not adjusted to the last degree of accuracy.

An Insulated Room

The sounds are caused by electrons moving at incredible speed in the set's

components and cannot be isolated and measured by themselves during the 24 hours of world-wide broadcasting.

Supported on insulators, the room is lined with solid copper, and so scientifically perfect has the insulation to be that exclusion of radio-signals is not complete until the last door clamp is pressed right home.

Shut off completely from all sound and communication from the rest of the world, Mr. Brittain switches on the radio and proceeds to make his tests. Then he tunes the set in the normal way, turns the volume-control full on—and is rewarded by a golden silence. This is the story behind the "silent background" feature that is incorporated in each of the new G.E.C. receivers, and that is claimed to double the entertainment value of any programme.



This is how natives in the Sudan react to dance music broadcast by the B.B.C. The picture was taken by Mr. R. Moxham, of the G.E.C. Works, Coventry, who is on a 50,000 miles tour studying reception conditions in distant parts of the world.

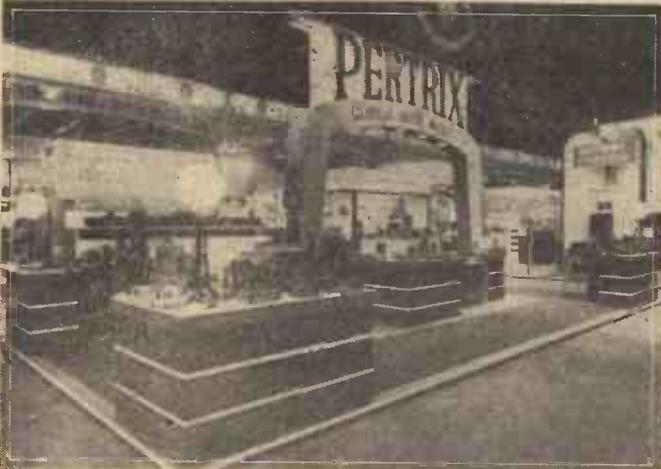
Special Stand Features at Radiolympia



The winners of the Trophy for the Best Stand at Radiolympia were McMichael, whose stand is seen above. The two-tier arrangement was most effective in giving a clear display to the various receivers which were on view.



Masteradio, specialists in car radio receivers and equipment, had quite an attractive small stand in the National Hall. They are issuing an interesting book on the subject of car radio, price one shilling.



A good example of an open stand, this Pertrix display enabled visitors to see every type of Pertrix product in comfort.



Above is the Exide stand, the main attraction on which was a live electric eel in an aquarium. This was balanced by an Exide battery, also under water. On the left is the Edison Stand, in which the Television demonstration room was all enclosed and arranged in a very novel manner.

PERSONAL PARAGRAPHS

Rothermel's Sales Manager Resigns
MR. E. F. HEAVER has resigned his position as sales manager of R. A. Rothermel, Ltd., and of British Centralab, Ltd., after fourteen years' service.

Post Office Regionalisation

IN pursuance of his policy of extending throughout the country the regional form of provincial administration, which has been tried out successfully in Scotland and North-Eastern England, the Postmaster-General is preparing to set up in 1939 two new Regions: the North-Western Region, with headquarters at Manchester, and the Northern Ireland Region, with headquarters at Belfast. To this end he has appointed, as from October 1st, 1938, Mr. V. R. Kenny, M.B.E. (at present Postmaster-Surveyor, Manchester) to be Regional Director, North-Western Region; Mr. J. Sweeney (at present Assistant Surveyor, Class I, Preston) to be Staff Controller, North-Western Region; Mr. H. S. Thompson (at present Superintending Engineer, Northern Ireland) to be Regional Director, Northern Ireland, and Mr. E. E. Harper (at present Postmaster-Surveyor, Belfast) to be Postal-Controller, Northern Ireland.

Mr. V. R. Kenny, M.B.E.

MR. KENNY was for nineteen years an Assistant Surveyor, and has had extensive experience of Post Office activities up and down the country. In 1931 he became Head Postmaster of Nottingham; in 1933 he was made Postmaster-Surveyor, Leeds, and from Leeds proceeded to Manchester as Postmaster-Surveyor in 1935.

Mr. J. Sweeney

MR. SWEENEY has been an Assistant-Surveyor in the Post Office for the last eighteen years. Latterly, as Assistant Surveyor, Class I, he has been attached to the Surveyor's Department at Preston.

Mr. H. S. Thompson

AFTER service under the National Telephone Company, Mr. Thompson joined the Post Office when the telephone service was nationalised in 1912, and since then has served in the Engineering Department. He was appointed to the rank of Superintending Engineer in 1933.

Mr. E. E. Harper

MR. HARPER has had a very varied experience of the Department's activities: he has served in the Stores Department, has had ten years' experience as an Assistant Surveyor, and was for some time a member of the Headquarters Postal Traffic Section. In 1934 he went to Newfoundland to help the Newfoundland Government reorganise the Postal Department.

Mr. Eric Cole Appointed Managing Director

THE Board of Directors of E. K. Cole, Limited, announce that Mr. W. S. Verrells has relinquished his appointment as Managing Director but will continue as Chairman of the Company. Mr. Eric K. Cole has been appointed Managing Director.

R.A.F. CALL TO RADIO AMATEURS

AS announced recently by the Secretary for Air, Sir Kingsley Wood, a Civilian Wireless Reserve is shortly to be formed. In explaining the need for the new Reserve and its proposed functions, Sir Kingsley, in a statement, remarked that: "The work of the Royal Air Force must be accomplished in all weather conditions, and it is imperative for the success of its operation and the safety of its personnel that it shall be served by an efficient wireless organisation.

Recruitment Plan

"We look to the large body of wireless amateurs in this country to man the Civilian Wireless Reserve, and particularly to those who hold Post Office wireless transmitting licences. I am confident that they will come forward and ensure the early success of the scheme.

"The recruitment and training of these reservists will be under the direct control of the Director of Signals at the Air Ministry, and the organisation will be based on the sub-division of the country into areas, regions and groups.

"To each area will be appointed a controller, selected from the members, who will act as liaison officer between Headquarters and the subordinate formations.

"Training will for the most part be undertaken by the volunteers at their homes on their own sets. It will consist of regular exercises broadcast direct from the Air Ministry or the Electrical and Wireless School, Cranwell.

"Members who possess Post Office wireless transmitting licences and have reached the required standard of proficiency will be paid a sum of £2 per annum to compensate them for the maintenance of their sets. A free issue of crystals will also be made.

"In addition to home training, occasional attendance at Royal Air Force stations and reserve centres will be necessary for exercises and lectures, and for such attendance they will receive a small training allowance and travelling expenses.

"Applications should be addressed to the Under-Secretary of State, Air Ministry (Signals (C.W.R.)), Adastral House, Kingsway, W.C.2."

Five Years' Service

Candidates, it is stated, will be required to show that they have a reasonably good knowledge of wireless telegraphy. They must be not less than 18 and not more than 54 years of age on the date of application, but exceptional consideration will be given to applicants with special qualifications who are above the maximum age limit.

They will be invited to enrol in the first instance for a period of five years, and they may be permitted to extend their membership for further periods, each of not more than five years. Membership will not normally continue beyond the age of 60.

Members will be required to give an undertaking to place their services at the disposal of the Air Council in the event of an emergency, and to transfer to the Royal Air Force Volunteer Reserve when called on to do so.

When required to attend a Royal Air Force station or centre, an allowance of 6d. an hour will be paid to members for each complete hour's training, subject to a maximum payment of 4s. for any one day's attendance.

A badge will be issued to all members.

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Session commences September 26th, 1938.

Enrolments: September 19th to 23rd, from 6 to 9 p.m.

Full particulars and prospectus from the Director of Education.

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The course extends normally over a period of two years and includes theory, practical service work and calculations, and prepares for the City and Guilds of London Institute examination in Radio Service Work.

Enrolments may be made from September 19th to 23rd, 6-9 p.m.

Syllabus and time-table from the Director of Education.

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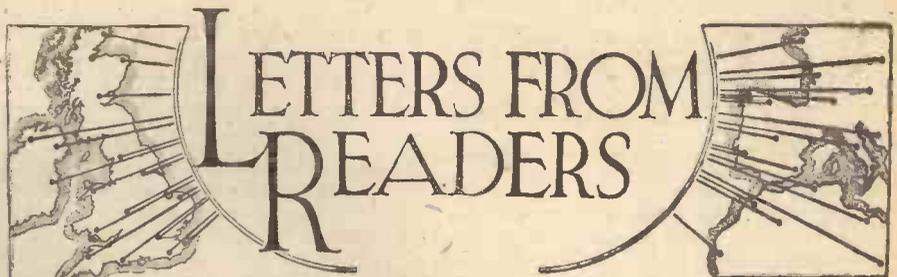
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"Practical and Amateur Wireless"



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).

A 20m. Log from Eltham

SIR,—I append a copy of my log for Monday, August 15th, from 22.30 until 23.00 hours on 20m. amateur 'phone band.

WIDMV, R9, calling G6MG, 22.31; CTIQE, R7, calling CQ, Brazil, 22.33; W8GLC (Penn.), R8, calling CQ, France, 22.35; WIDLO, R8, calling G3FX, 22.38; W9PTY (Minn.), R7, calling CQ, DX, 22.40; W8MHY, R6, calling CQ, DX, 22.44; CNSMM, R6, calling W3FDU, 22.50; PY2LM, R8, calling CQ, 22.54; F8XT, R7, calling KA1BH, Manila, 22.56.

All the above were heard on a commercial battery 3—Det, SG, Power, running on 150 volts H.T. eliminator, and using a 1-valve S.W. adaptor. Antenna 55ft. L-type, running N.E.-S.W. All stations were logged on the loudspeaker.—J. C. WALKER (Eltham).

Stations ZEB and ZEA, South Africa

SIR,—I have been interested in short-wave listening for the past three years, commencing with a two-valve battery receiver. I have never done any long-wave listening as it is practically useless here, the local only just coming through. By the way, has any reader in England ever logged station ZEB or ZEA, our local broadcasters? ZEB is in Bulawayo, and ZEA in Salisbury. The power of ZEB is only $\frac{1}{2}$ kW on the short, and $\frac{1}{4}$ kW on the long waves; the hours are Mondays, Wednesdays and Fridays from 8.30 to 10.15 p.m.; Tuesdays 6 p.m. to 7 p.m., and Thursdays 5.30 to 7 p.m. This includes a children's hour, and there is also a Sunday morning programme, but this is only from Salisbury. The programme is sent by landline from Salisbury, and is transmitted from both stations.—D. M. F. (Bulawayo, S. Africa).

Correspondent Wanted

SIR,—I am very keen to get into communication with any S.W. fan residing in Great Yarmouth with a view to exchanging logs and general tips, etc. I shall myself be residing in Great Yarmouth for a considerable part of September, and I would then like to fix up a personal call and perhaps a hunt over the ham bands, if possible. I shall be pleased to hear from any S.W. fan in Great Yarmouth who is interested.

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM.

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

May I also take this opportunity of expressing my appreciation of our old friend Thermion, and his witty banter, which never seems to pale although the weeks roll by.—R. T. PARSONS (14, Carlyle Avenue, Brighton 7).

Station VP4TK

SIR,—Following a report I sent to VP4TK I received a card from VP4T, who wishes to correspond with a listener who plays cricket. VP4T's address is: Lenard Harbin, Chaguanas, Trinidad, B.W.I.—W. WALKER (Birmingham).

Back Number Wanted

SIR,—I am trying to obtain a back issue of *Wireless Magazine*, dated July, 1936, as it is out of print. It is required for the construction of the "W.M." A.C. Short-Wave Converter. I shall be grateful to any reader who will loan me this copy for a short time.—ALAN N. HOLT (Stockport).

[If any reader can oblige, and will forward the issue required to this office, it will be forwarded on to the reader concerned.—Ed.]

CUT THIS OUT EACH WEEK.

Do you know

—THAT the centre-tap on a heater winding is not essential for the rectifying valve or for normal heaters in a short-wave receiver.

—THAT in the above two cases the H.T. positive tapping may be taken from one side of the heater, and the earth may be taken to one side of the heater winding.

—THAT tone controls may be fitted in any stage of a receiver after the detector.

—THAT a metre, referred to in wavelengths, is a linear measure and is 1.094 yards.

—THAT the linear measure is in respect of the distance from the crest of one oscillation to the crest of the next.

—THAT new valves are now available which are claimed to give improved results on the short waves.

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.

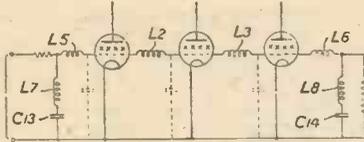
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LATEST PATENT NEWS

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

DISTRIBUTING MUSIC, ETC.—Sparrowe, J. W. No. 483276.

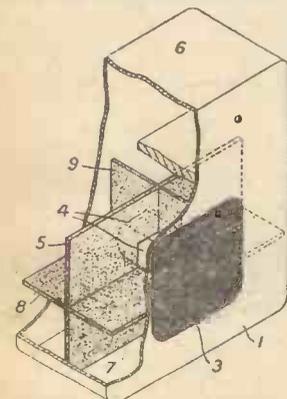
Buffer valves for coupling an aerial, signal generator or amplifier to a number of lines, are fed through a filter formed by inductances L2, L3, L5, L6 and the input capaci-



ties of the valves themselves, with or without additional shunt capacity, to avoid the shunting effect on the higher frequencies of a number of input circuits connected directly in parallel. The filter may be of low-pass or band-pass type and is terminated by a resistance equal to that of the source. Additional elements L7, C13, L8, C14 may be provided in the end sections to improve the characteristic. Formulae for calculating the values of the filter element are given.

LOUDSPEAKERS.—Murphy Radio, Ltd., and Brayshaw, G. S. No. 483745.

A cabinet for a loudspeaker has a sheet of sound-absorbent material placed midway between the front and back of the cabinet in order to diminish the resonance of the air column within the cabinet. In the construction shown, the sheet 5



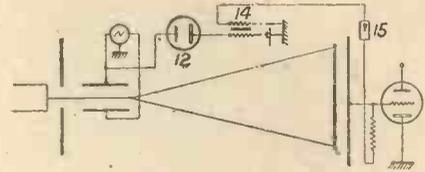
located between the front 1 and rear of the cabinet is supplemented by a sheet 8 parallel to and midway between the top 6 and bottom 7 and by a further sheet 9 disposed midway between the

side walls. The sheets are cut away to accommodate the diaphragm 3 and its operating mechanism 4. Sheets may also be placed at the positions of the velocity antinodes of vibrations corresponding to harmonics of the fundamental resonances. In the case of a normally open-ended cabinet, sheets may be placed at the open end and at a distance from the closed end equal to one-third of the distance between the open and closed ends of the cabinet.

TELEVISION TRANSMITTERS.—Radioakt Ges. D. S. Loewe. No. 485132.

Synchronizing signals are derived by

applying the deflecting potential to an amplitude filter 12 biased to conduct just at the end of a line. The impulses are preferably taken from transformer 14, rectified at 15, and mixed with the picture signals.



Alternatively, they may be used to suppress the aerial current. Where magnetic deflection is used, the amplitude filter is connected in parallel to the deflecting coils or to a resistance in series with the coils.

NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office and the Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications.

- 22897.—Ferranti, Ltd., and Taylor, M. K.—Television, etc., systems. August 3.
- 22808.—General Electric Co., Ltd., and Espley, D. C.—Rectifiers for supplying D.C. voltage to a radio receiving-set from an A.C. supply. August 2.
- 22687.—Marconi's Wireless Telegraph Co., Ltd., Davis, N. E., Robb, F. G., and Craymer, H. J.—Inductances. July 29.
- 22718.—Robinson, H. J.—Radio aerial for motor vehicles. August 30.
- 22939.—Standard Telephones and Cables, Ltd., and Goodchild, F. D.—Thermionic valves, etc. August 3.
- 22841.—Standard Telephones and Cables, Ltd., and Newton, G.—Tuning-mechanism for radio receivers, etc. August 2.

21262-21398.—General Electric Co., Ltd., and Espley, D. C.—Television receivers. July 18.

Specifications Published.

- 489486.—Kramolin, L. L. De.—Frequency-changers for heterodyne receivers and modulators. (Addition to 409756.)
- 489370.—Murphy Radio, Ltd., Moxon, L. A., and Boyd, J. D. A.—Radio receivers.
- 489422.—Radioakt.—Ges. D. S. Loewe.—Television tube. (Divided out of 31821/36.)
- 489608.—Telefunken Ges. Fur Drahtlose Telegraphie.—Thermionic valves and thermionic valve circuit arrangements for use on short waves. (Divided out of 488094.)
- 488644.—Radioakt.—Ges. D. S. Loewe.—Television transmission tubes.
- 488948.—Radioakt.—Ges. D. S. Loewe.—Grid control of cathode tubes.
- 488843.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Television receivers.

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.

MAKING A SIMPLE TONE CONTROL UNIT

(Continued from page 648.)

About one ounce of 38-gauge enamelled wire will be required for the winding, and a short length of rubber-covered flex should be soldered to one end of the wire. Push the end of flex through one of the holes in the cheek and then wind on the wire. Put it in layers, keeping the winding as even as possible and attempting to maintain a uniform tension on the wire while winding. When it has all been wound on the spool, solder a short length of rubber-covered flex to the other end and pass the flex through the second hole. Cover the whole of the winding with insulating tape or empire tape, making sure that the winding is completely enclosed.

The Core

The soft-iron wire for the core is next required. It can be obtained from most butchers and florists for a few coppers. After buying it, place it in a fire that is

just red but nearly out, and leave it there. After the fire has died and cooled, take out the wire, which will then be perfectly soft. If it is in a coil, this can be flattened and the ends cut off with tin snips, or even a pair of old scissors, to 4in. long. Push the bundle through the bobbin, making it a tight fit by using as much wire as can be accommodated. With the ends projecting equal distances from each end of the spool, hold the two flex leads, splay out the wires at each end, fan-wise and bend them back over the spool; they should overlap in the middle. Bind them with a length of the soft-iron wire. That completes the construction of the choke.

Final Assembly

Fig. 3 shows a convenient method of assembly, using a length of cardboard tube. A variable resistor or potentiometer should be chosen with base terminals, and this should almost fit the tube. In any case, it can be made to grip the inside of the tube by putting one or two rubber bands round it. An alternative method would be to fit

a brass-strip bridge across the top of the tube, drilling this in the centre to take the mounting bush. A similar method is used for fitting the choke.

Two holes must be made through the tube to take the two flexible connecting leads, to which crocodile clips may be attached to simplify connecting the unit to the set. It will be appreciated that the parts can be wired together before they are put into the containing tube as long as the leads between them are fairly long and of insulated flex. To prevent the bare wire leads from the fixed condenser touching the transformer core or potentiometer terminals, the condenser should be wrapped in insulating tape when it has been connected; a length of insulating sleeving can be slipped over the condenser lead which goes directly to the potentiometer.

When completed, the little unit can be connected quickly to any suitable point in the L.F. circuit, but it must not be connected between the anode of any valve and earth, because that would allow the H.T. to be shorted to earth.



QUERIES and ENQUIRIES

Amplifier Design

"I wish to build an amplifier, A.C., for use with a small auditorium type speaker for P.A. work. I have a few offers of this work for garden parties, etc., and should like to modify my present amplifier which is hardly powerful enough. I think 12 to 15 watts would be adequate for the work I have in mind, and should be glad if you could recommend a suitable blueprint from your list."—G. H. (Lanark).

WE cannot supply a blueprint of an amplifier of the type indicated, but in our issue dated October 30th last we gave full constructional details and wiring diagrams of a 12-watt A.C. amplifier which should meet your requirements. This was a 3-stage unit with a push-pull output stage employing two PX25A's and a valve rectifier. The back number is obtainable price 4d. post paid.

Valve Equivalents

"I should be glad if you could tell me the Mullard equivalents of the S24, HL2 and P2 valves."—F. J. L. (Wellington, Cape Province, S.A.).

THE equivalents of the valves in question are PM.12A, PM.1HL and PM.202.

Hand-capacity Effects

"I have a short-wave converter and despite the earthed metal panel and base-board I am troubled with rather bad hand-capacity effects below 20 metres. The set is situated on a first floor, the earth connection being taken to a gas pipe. I shall be much obliged if you will advise me how to stabilise the receiver."—L. C. (Beeston).

THE gas pipe is not an ideal earth. The joints in this are generally painted to prevent leakage, and thus each section of the pipe may be insulated electrically by the paint. A water pipe would be a better earth if you could find one handy. In some cases hand-capacity effects may be cured by using an insulated panel upon which the components are mounted, and then placing an earthed metal panel behind the main panel. Holes should be cut in the metal one so that no components are in contact with it, and it should be separately earthed. An old dodge which sometimes proves worth while is to place a sheet of metal connected to earth on the chair on which you sit when using the set.

Supplies of Metal Parts

"I often make up the devices illustrated in your Wrinkles page, and at the same time try out modifications and ideas of my own. I find, however, that I could do with a supply of various pieces of metal, rod, sheet, tube and coupling bolts, brackets, and so on. Is there any firm who specialises in these so that I could select the various items I need for experimental purposes?"—L. E. (Bedminster).

IN the latest Bulgin catalogue will be found a wide range of such items which we think will meet your requirements.

In addition to metal parts of this type, there are also many items in bakelite, fibre and other materials. Messrs. Bulgin can also supply various types of wire, bolts and nuts which may be of use to you in this connection.

Wave-changing

"In designing an all-wave set for myself I wonder if you could help with some suggestions. I prefer the plug-in type of coil owing to the fact that I can easily wind them myself, and they are easily modified as desired. I do not want to go to the trouble of coil changing, however, and it is in this connection that I should like some suggestions regarding an easily changed all-wave unit."—H. J. Y. (Bedford).

THERE are many ideas which you could adopt, but the best is probably that adopted in a certain well-known American communications type receiver. Here the four coils necessary for each waveband are mounted on a single panel

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.

and plugged in from the front of the set. A complete set of coils is supplied, and each sub-panel carries a calibration chart showing the dial settings for various wavelengths. Alternatively, you could mount up each set of coils in line and arrange to move them bodily over the necessary contacts for wavechange purposes. Care would have to be taken in this case to obtain really good contact to avoid background noises.

Historic Dates

"I should be glad if you could tell me when the first B.B.C. London transmission took place, and when the long waves were first used by the B.B.C. Is there anywhere where I could find such dates?"—H. S. (Canterbury).

THE B.B.C. transmitted the first programme from Savoy Hill on May 1st, 1923. The long-wave transmitter, 5XX at Daventry, radiated its first programme on July 27th, 1925. These dates, and many other interesting dates in radio history were given in our issue dated November 6th, 1937.

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

RADIO CLUBS & SOCIETIES

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

EDGWARE SHORT-WAVE SOCIETY

ON Wednesday, August 24th, the latest type Hallicrafter SX16 and SX20 receiving sets were tried and tested, and a discussion on the different merits of each receiver was of considerable interest. The "Enquiry Evening" held recently was one of the most successful of the year. Members were asked to write difficulties or queries on a piece of paper, and no names were mentioned. The papers were taken from a hat, and a round-table discussion took place. Simple and difficult questions arose, and no particular member felt embarrassed.

Future meetings include talks by Messrs. Cosser and Messrs. Mullards; a discussion on members' own 5-metre receivers, and a visit of the Walthamstow Radio Society.

On Saturday afternoon, August 27th, over half the members visited Radiolympia. Sunday meetings and Morse classes started again on September 4th, 11 till 1. The Club's First Annual Dinner will be held at Slaters Restaurant, Oxford Street, W, on November 26th. Guest of the evening will be Mr. Claracoats, R.S.G.B. secretary.—Secretary, F. Bell, 118, Collin Crescent, Hendon, N.W.9.

DOLLIS HILL RADIO COMMUNICATION SOCIETY

ON August 23rd two members, Messrs. Ash and Mackenzie, gave a talk and demonstration on their experiences with home-recording. With a thought to the future, a record was made of a speech by the president, and when played back showed a high standard of perfection.

All meetings are held fortnightly at Bramcroft Schools, Warren Road, N.W.2. Visitors are always welcome at any of the meetings, and the secretary will be pleased to furnish any further information required. Hon. Secretary, Mr. E. Eldridge, 79, Oxgate Gardens, Cricklewood, N.W.2.

RADIO, PHYSICAL AND TELEVISION SOCIETY

DURING the summer months the Radio, Physical and Television Society does not hold any regular indoor meetings. Instead, occasional visits are arranged to places of scientific interest, the visits being held, whenever possible, on Saturdays or Sundays or during the evenings after business hours.

On Saturday, the 27th ult., a visit was paid to Croydon Airport Transmitting Station, and afterward to the Aerodrome itself, where some of the receiving apparatus was inspected. Owing to the fact that tall masts in proximity to the flying field would be extremely dangerous to aircraft, it is necessary to have the main portion of the transmitter situated in Mitcham Road about two miles distant from the Aerodrome, the whole of the apparatus being operated by means of a system of relays. The main apparatus shown to the party consisted of the main transmitters, of which there are four, including the famous Croydon beacon, the switchboards, the latest type of short-wave, C.W., I.C.W. and telephony transmitter recently installed, the emergency sets, and the emergency power plant which can be put in operation in the event of the main power supply failing. The emergency plant was started up and several members tried their skill and strength at the starting handle of the engine. At the Aerodrome itself the party were conducted over the various receiving rooms, including the main office and the meteorological report receiving room.

The Annual General Meeting of the Society will be held within a few weeks, immediately before the commencement of the 1938-39 session. Readers interested in the Society are invited to write to the hon. secretary at the Society's headquarters at 72a, North End Road, West Kensington, London, W.14.

THE EASTBOURNE AND DISTRICT RADIO SOCIETY.

UNFORTUNATELY, due to bad weather, a field day that was to be held on Monday, August 22nd, had to be cancelled.—Hon. Sec., T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

PATENTS AND TRADE MARKS.—Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Rayner and Co., Patent Agents, of 5, Chancery Lane, London, W.C.2, who will give free advice to readers mentioning this paper.

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
 Wednesday, September 7th.—The St. Leger: A commentary from Town Moor Race-course, Doncaster.

Thursday, September 8th.—George Edwardes, part 2: The Guv'nor of Dalys, an illustrated biography.

Friday, September 9th.—Virginia, a musical comedy.

Saturday, September 10th.—Saturday Night Sing Song.

REGIONAL (342.1 m.)

Wednesday, September 7th.—Virginia, a musical comedy, from Midland.

Thursday, September 8th.—Variety programme from the Hippodrome, Bristol.

Friday, September 9th.—Concert Party programme from Lowestoft.

Saturday, September 10th.—Promenade Concert, from the Queen's Hall, London.

MIDLAND (297.2 m.)

Wednesday, September 7th.—Virginia, a musical comedy.

Thursday, September 8th.—A Concert by Gloucestershire artists, from the Town Hall, Cheltenham Spa.

Friday, September 9th.—Seeing Life: African Shades and Sidelights, a talk.

Saturday, September 10th.—Eye-witness account of the Shelsley Walsh Hill Climb.

WEST OF ENGLAND (285.7 m.)

Wednesday, September 7th.—How to Look at a River, a talk.

Thursday, September 8th.—Jane Austen in the West: a programme showing how Jane used her experiences in the West, as recorded in her diaries.

Friday, September 9th.—Variety from the Bristol Radio Exhibition.

Saturday, September 10th.—Choral programme.

WELSH (373.1 m.)

Wednesday, September 7th.—A Sonata Recital (instrumental).

Thursday, September 8th.—General Knowledge Competition between the villages of Y Garreg and Llanbedr.

Friday, September 9th.—An account of the Welsh Amateur Golf Championships, from the Rhyl Golf Club.

Saturday, September 10th.—A commentary on the London to Cardiff Air Race, from the Cardiff Airport.

NORTHERN (449.1 m.)

Wednesday, September 7th.—A Brass Band Concert: The Winning Band in the 86th Championship Contest held at Belle Vue, Manchester, on Monday, September 5th.

Thursday, September 8th.—A Sonata Recital (instrumental).

Friday, September 9th.—Concert party programme from the Floral Pavilion, New Brighton.

Saturday, September 10th.—Dance music programme.

SCOTTISH (391.1 m.)

Wednesday, September 7th.—Orchestral programme.

Thursday, September 8th.—Star Spangle, a foolish fantasy of film folk.

Friday, September 9th.—Concert Party programme.

Saturday, September 10th.—Bon Accord: Variety programme.

NORTHERN IRELAND (307.1 m.)

Wednesday, September 7th.—Ulster Weekly: A radio magazine for listeners by listeners.

Thursday, September 8th.—Counting the Stars, a talk.

Friday, September 9th.—An eye-witness account of the Irish Open Amateur Championships at the Royal County Down Golf Club, Newcastle.

Saturday, September 10th.—Choral programme.

TELEVISION PROGRAMMES

Stanelli's Bachelor Party

STANELLI'S Bachelor Party appears in television for the first time in the afternoon programme on September 8th. Stanelli has already faced the cameras with his "Hornchestra," but not with the Bachelor Party, which will be present in full strength with Norman Long, Russell and Marconi, The Three Musketees, Jack Wynne, Syd Jerome and, need one add, Stanelli himself.

Visit to R.A.F. Aerodrome

THE training of R.A.F. pilots will be televised, by courtesy of the Air Ministry, about the middle of October, when one of the B.B.C. mobile units will spend a day at an aerodrome near London. Viewers will then be able to watch fighter planes at close quarters and see pilots under instruction operating the controls.

A PHOTOGRAPHIC COMPETITION FOR EVERYONE

Pictures wanted for
"THE OPEN ROAD"

THE HOME PHOTOGRAPHER'S competition "The Open Road" gives you an excellent opportunity to win a cash prize with the photographs taken during your holidays. Full particulars appear in this month's number which also contains details of several other photographic contests. The October Competition "Shopping" gives you a grand chance, too!

See the SEPTEMBER HOME PHOTOGRAPHER

The Helpful Monthly for the Amateur
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Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS		No. of	D.C. £5 Superhet (Three-valve) ..	1.12.34	PW42
Date of Issue		Blueprint.	Universal £5 Superhet(Three-valve)	—	PW44
CRYSTAL SETS			F. J. Camm's A.C. £4 Superhet 4	31.7.37	PW59
Blueprint, Ed.			F. J. Camm's Universal £4 Superhet 4		PW60
1037 Crystal Receiver	0.1.37	PW71	"Qualitone" Universal Four	10.1.37	PW73
STRAIGHT SETS. Battery Operated.					
One-valve : Blueprints, 1s. each.			SHORT-WAVE SETS.		
All-wave Unipen (Pentode) ..	—	PW31A	One-valve : Blueprint, 1s.	—	PW83
Beginner's One-valver ..	10.2.38	PW85	Simple S.W. One-valver ..	0.4.33	PW83
Two-valve : Blueprints, 1s. each.	—		Two-valve : Blueprint, 1s.	—	PW35A
Four-range Super Mag Two (D, Pen)	29.8.30	PW36B	Midget Short-wave Two (D, Pen)	—	PW35A
The Signet Two (D & LF)	—	PW76	Three-valve : Blueprints, 1s. each.	—	
Three-valve : Blueprints, 1s. each.	—		Experimenter's Short-wave Three	—	PW30A
The Long-range Express Three	24.4.37	PW2	(SG, D, Pow)	—	PW30A
Selectone Battery Three (D, 2 LF	—	PW10	The Perfect 3 (D, 2 LF (RC and	7.8.37	PW63
(Trans)) ..	—		Trans)) ..	—	
Sixty Sizzling Three (D, 2 LF	—	PW31A	The Band-Spread S.W. Three	29.8.36	PW63
(RC & Trans)) ..	—		(HF Pen, D (Pen), Pen)	—	
Leader Three (SG, D, Pow) ..	22.5.37	PW35	PORTABLES.		
Summit Three (HF Pen, D, Pen)	—	PW37	Three-valve : Blueprints, 1s. each.	—	
All Pentode Three (HF Pen, D	20.5.37	PW39	F. J. Camm's ELF Three-valve	—	PW65
(Pen), Pen) ..	12.6.37	PW41	Portable (HF Pen, D, Pen)	—	PW65
Hall-Mark Three (SG, D, Pow) ..	16.3.35	PW48	Parvo Plyweight Midget Port-	19.6.37	PW77
Hall-Mark Cadet (D, LF, Pen (RC))	—		able (SG, D, Pen)	—	
F. J. Camm's Silver Souvenir (HF	—		Four-valve : Blueprints, 1s. each.	—	
Pen, D (Pen), Pen) (All-wave	13.4.35	PW49	Featherweight Portable Four (SG,	15.5.37	PW12
Three) ..	June '35	PW1	D, LF, Cl. B)	—	
Genet Midget (D, 2LF (Trans))	—		"Imp" Portable 4 (D, LF, LF,	19.3.35	PW36
Sameo Midget Three (D, 2 LF	8.6.35	PW51	Pen) ..	—	
(Trans)) ..	—		MISCELLANEOUS.		
8936 Sonotone Three-Four (HF	—	PW53	S.W. Converter-Adapter (1 valve)	—	PW48A
Pen, HF Pen, Westector, Pen)	—		AMATEUR WIRELESS AND WIRELESS MAGAZINE		
Battery All-Wave Three (D, 2 LF	—	PW55	CRYSTAL SETS.		
(RC)) ..	—		Blueprints, 6d. each.	—	
The Monitor (HF Pen, D, Pen) ..	21.3.36	PW61	Four-station Crystal Set ..	23.7.38	AW427
The Tutor Three (HF Pen, D, Pen)	14.8.37	PW62	1934 Crystal Set ..	—	AW444
The Centaur Three (SG, D, P)	—	PW64	150-mile Crystal Set ..	—	AW450
The Gladiator All-Wave Three	20.8.30	PW66	STRAIGHT SETS. Battery Operated.		
HF Pen, D (Pen), Pen) ..	—		One-valve : Blueprints, 1s. each.	—	
F. J. Camm's Record All-Wave	31.10.30	PW69	B.B.C. Special One-valver ..	—	AW387
Three (HF Pen, D, Pen)	—		Twenty-station Loudspeaker	—	
The "Colt" All-Wave Three (D,	5.12.36	PW72	One-valver (Class B) ..	—	AW449
2 LF (RC & Trans)) ..	—		Two-valve : Blueprints, 1s. each.	—	
The "Rapid" Straight 3 (D,	4.12.37	PW82	Melody Ranger Two (D, Trans)	—	AW388
2 LF (RC & Trans)) ..	—		Full-volume Two (SG det., Pen)	—	AW392
F. J. Camm's Oracle All-Wave	28.8.37	PW78	B.B.C. National Two with Lucerne	—	AW377A
Three (HF, Det, Pen) ..	—		Coll (D, Trans)	—	
1938 "Triband" All-Wave Three	22.1.38	PW84	Big-power Melody Two with	—	AW388A
(HF Pen, D, Pen)	—		Lucerne Coll (SG, Trans) ..	—	AW426
F. J. Camm's "Sprite" Three	26.3.38	PW87	Lucerne Minor (D, Pen) ..	—	WM409
(HF Pen, D, Tet)	—		A Modern Two-valver ..	—	
The "Hurricane" All-Wave Three	30.4.38	PW89	Three-valve : Blueprints, 1s. each.	—	
(SG, D (Pen), Pen)	—		Class B Three (B, Trans, Class B)	—	AW386
Four-valve : Blueprints, 1s. each.	1.5.37	PW4	New Britain's Favourite Three	15.7.33	AW394
Sonotone Four (SG, D, LF, P) ..	8.5.37	PW11	(D, Trans, Class B)	—	
Fury Four (2SG, D, Pen)	—		Home-built Coil Three (SG, D,	—	AW404
Beta Universal Four (SG, D, LF,	—	PW17	Trans)) ..	—	
Cl. B)	—		Fan and Family Three (D, Trans,	25.11.33	AW410
Nucleon Class B Four (SG, D	6.1.34	PW34B	Class B) ..	2.12.33	AW412
(SG), LF, Cl. B)	—	PW34C	£5 5s. S.G.3 (SG, D, Trans)	—	
Fury Four Super (SG, SG, D, Pen)	—	PW46	1934 Ether Searcher; Baseboard	—	AW417
Battery Hall-Mark 4 (HF, Pen,	—		Model (SG, D, Pen)	—	AW419
D, Push-Pull) ..	—		1934 Ether Searcher: Chassis	—	AW422
F. J. Camm's "Limit" All-Wave	26.9.36	PW67	Model (SG, D, Pen)	—	AW423
Four (HF Pen, D, LF, P) ..	—		Lucerne Ranger (SG, D, Trans)	—	AW424
All-Wave "Corona" 4 (HF Pen,	9.10.37	PW79	Cosor Melody Maker with Lucerne	—	AW436
D, LF, Pow)	—		Coils	—	
"Acme" All-Wave 4 (HF Pen, D	12.2.38	PW33	Mullard Master Three with	—	AW437
(Pen), LF, Cl. B)	—		Lucerne Coils	—	AW448
Mains Operated.					
Two-valve : Blueprints, 1s. each.	—		£5 5s. Three; De Luxe Version	10.5.34	AW436
A.C. Twin (D (Pen), Pen) ..	—	PW18	(SG, D, Trans)	—	
A.C.-D.C. Two (SG, Pow) ..	—	PW31	Lucerne Straight Three (D, RC,	—	AW437
Selectone A.C. Radiogram Two	—	PW19	Trans)) ..	—	AW448
(D, Pow)	—		All-Britain Three (HF Pen, D, Pen)	—	
Three-valve : Blueprints, 1s. each.	—		"Wireless League" Three (HF	3.11.34	AW451
Double-Diode-Triode Three (HF	—	PW28	Pen, D, Pen)	—	WM271
Pen, D, D, Pen) ..	—	PW25	Transportable Three (SG, D, Pen)	—	WM318
D.C. Ace (SG, D, Pen) ..	—	PW29	£6 6s. Radiogram (D, RC, Trans)	—	WM327
A.C. Three (SG, D, Pen) ..	—	PW35C	Simple-tune Three (SG, D, Pen)	June '33	WM327
A.C. Leader (HF Pen, D, Pow) ..	—	PW35B	Economy-Pentode Three (SG, D,	—	
D.C. Premier (HF Pen, D, Pen) ..	81.3.34	PW36A	Pen)	—	
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A	"W.M." 1934 Standard Three	Oct. '33	WM337
Armada Mains Three (HF Pen, D,	—	PW33	(SG, D, Pen)	—	WM351
Pen)	—		£3 3s. Three (SG, D, Trans)	Mar. '34	WM354
F. J. Camm's A.C. All-Wave Silver	11.5.35	PW50	Iron-core Band-pass Three (SG,	—	WM362
Souvenir Three (HF Pen, D, Pen)	—		D, QP21)	—	
"All-Wave" A.C. Three (D, 2	—	PW54	1035 £6 6s. Battery Three (SG, D,	—	WM371
LF (RC)) ..	—		Pen)	—	WM379
A.C. 1936 Sonotone (HF Pen, HF	—	PW56	PTP Three (Pen, D, Pen) ..	—	WM381
Pen, Westector, Pen) ..	—		Certainty Three (SG, D, Pen)	—	WM393
Mains Record All-Wave 3 (HF	5.12.36	PW70	Minutube Three (SG, D, Trans)	Oct. '35	WM396
Pen, D, Pen)	28.8.37	PW80	All-Wave Winning Three (SG, D,	—	WM400
Four-valve : Blueprints, 1s. each.	—	PW20	Pen)	—	
A.C. Fury Four (SG, SG, D, Pen)	—	PW34D	Four-valve : Blueprints, 1s. 6d. each.	—	AW370
A.C. Fury Four Super (SG, SG, D,	—	PW45	65s. Four (SG, D, RC, Trans)	16.9.33	AW402
Pen)	—	PW47	"A.W." Ideal Four (2 SG, D, Pen)	—	AW421
A.C. Hall-Mark (HF Pen, D,	24.7.37	PW45	2HF Four (2 SG, D, Pen)	18.8.34	AW445
Push-Pull) ..	—		Crusader's A.V.C. 4(2HF, D, QP21)	—	
Universal Hall-Mark (HF Pen, D,	0.2.35	PW47	(Pentode and Class B Outputs for	25.8.35	AW445A
Push-Pull) ..	—	PW81	above : Blueprints 6d. each)	—	
A.C. All-Wave Corona Four	6.11.37	PW81	Self-contained Four (SG, D, LF,	Aug. '33	WM331
(D, Push-Pull)	—		Class B)	—	
SUPERHETS.					
Battery Sets : Blueprints, 1s. each.	—		Lucerne Straight Four (SG, D,	—	WM350
£5 Superhet (Three-valve) ..	5.6.37	PW40	LF, Trans)	—	WM381
F. J. Camm's 2-valve Superhet ..	13.7.35	PW52	£5 5s. Battery Four (HF, D, 2LF)	Feb. '35	WM384
F. J. Camm's £4 Superhet ..	—	PW58	The H.K. Four (SG, SG, D, Pen)	Mar. '35	WM384
F. J. Camm's "Vitesse" All-	—	PW75	The Auto Straight Four (HF Pen,	—	
Waver (5-valver) ..	27.2.37	PW75	HF Pen, D, Pen)	—	WM404
Mains Sets : Blueprints, 1s. each.	—	PW43	Five-valve : Blueprints, 1s. 6d. each.	—	
A.C. £5 Superhet (Three-valve) ..	—		Super-quality Five (2HF, D, RC,	—	WM320
			Trans)	—	
			Class B Quadradyne (2 SG, D, LF,	—	WM344
			Class B) ..	—	

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 .. 7d. " "
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 (stamp order 6d. unacceptable) to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

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
S.G. Three (SG, D, Pen) A.C. ..	—	AW390
A.C. Triodyne (SG, D, Pen) A.C. ..	19.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen)	23.0.34	AW439
Mantovani A.C. Three (HF Pen, D, Pen)	—	WM374
£15 15s. 1936 A.C. Radiogram	—	
(HF, D, Pen)	—	WM401
Four-valve : Blueprints, 1s. 6d. each.	—	
All Metal Four (2 SG, D, Pen)	—	WM326
Harris' Jubilee Radiogram (HF	—	
Pen, D, LF, P)	—	WM386
SUPERHETS.		
Battery Sets : Blueprints, 1s. 6d. each.	—	
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"Varsity Four" ..	—	WM395
The Request All-Waver ..	—	WM407
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Two-valve : Blueprints, 1s. each.	—	
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"W.M." Band-spread Short-waver	—	WM368
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Four-valve : Blueprint, 1s. 6d.	—	
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THE SHORT-WAVE SPECIALISTS

CHOKES.—Interleaved American Smoothing Chokes, 20 h. 100 m/a; worth 8/6. Our price 3/11. Ditto: 40 m/a; our price 1/11.

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UTILITY 7/6 Famous Micro Dials, 3/9; Radiophone 00016 Short-wave Condensers, 3/6. Short-wave HF Chokes, 5-100 metres, 9d. Centralab Pots, all sizes, 1/6; switched, 2/-; 20,000 ohms Pots, 1/-. Tubular Glass Fuses, 2d. Milliameters 25 m.a. upwards, 5/9; super, 6/9.

THE NEW RADIOMART CATALOGUE shows dozens of New Short-Wave Components and is yours for 13d. post free.

A splendid range of short-wave components is always ready for immediate despatch. The right goods at the right prices.

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ALL goods previously advertised are standard lines, still available. Post card for list free.
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CLEARANCE GUARANTEED SPEAKERS.—Magnavox, Celestion, B.T.H., Rola, etc., from 8/6 each, also 3" to 14". 9" energised 6 watts from 10/6, Epoch 18" Cinema speakers from £5/0/0. A.C. speakers, complete with power-pack, 8" 4-watt from 21/-; 6-watt from 30/-. Oak Cabinets for above, 7/6 extra. Gramophone record changers, £5/10/0. All kinds and sizes Resistances, Condensers, Transformers. All Radio material.—Sinclair Speakers, Alma Grove, Copenhagen Street, London, N.1.

ALCO Eliminators and Chargers. 5 H.T. taps, standard outputs, 18/-. Also Class "B" with charger, 25/-. Charger, 7/6. Year's guarantee. Details free.—P. and D. Radio, 1, Gooding Rd., N.7.

ALL lines previously advertised still available.—Radio Clearance, Ltd., 63, High Holborn, W.C.1. Holborn 4631.

SOUTHERN RADIO'S Wireless Bargains, guaranteed and post paid; Garrard radiogram units, 42/-; Telsen Midget iron-core coils, W349, 3/6; dual range coils, 2/6; with aerial series condenser W76, 3/3; triple-gang superhet W476, 14/6; triple bandpass W477, 14/6; twin-gang W478, 9/-; Telsen A.C./D.C. multimeters, 5-range, 8/6; Sunbeam 4-valve A.C./D.C. superhet receiver, complete with valves and moving-coil speaker, 50/-. Brand new sealed cartons. American type valves, 6/-; parcels of useful components assorted, value 21/-, 5/- per parcel; thousands of more bargains.—Southern Radio, 46, Lisle St., London, W.C.1. Gerrard 6653.

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ALL POST ORDERS to:—
Jubilee Works, 367, Lower Clapton Road, London, E.5. Amherst 4723.
CALLERS to:—Jubilee Works; or 165, Fleet St., E.C.4. Central 2833 or 50, High Street, Clapham, S.W.4. Macaulay 2381.

PREMIER SHORT-WAVE KITS
Are all sold complete to the last detail. All valves and coils are included as well as theoretical and wiring diagrams, and lucid instructions for building and working. Thousands are giving excellent results all over the world.

Each Kit uses plug-in Coils and the Coils supplied tune from 13 to 170 metres. All Kits are supplied with a steel chassis and Panel.

- 1 Valve Short-Wave Receiver or Adapter Kit .. 17/6
- 1 Valve Short-Wave Superhet Converter Kit .. 20/-
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- 2 Valve Short-Wave Receiver Kit .. 25/-
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Will match any modulator to any L.F. Secondary Load. Triodes, Tetrodes, and Pentodes Class A. Single or Push-pull, Class "AB1" and "B" in Push-Pull or 500 ohm-line input, can easily be matched to any of the following Radio Frequency final stages requiring modulation.

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Totally enclosed in cast cases with engraved Panel, and full instructions. Ratings are based on R.F. inputs.

- 50 watt, 17/6. 150 watt, 29/6. 300 watt, 49/6.
- A new range of "Matchmaker" Universal Output Transformers which are designed to match any output valves to any speaker impedance are now ready.
- 5-7 watt, 13/6. 10-15 watt, 17/6. 20-30 watt, 29/6.

PREMIER 1939 AMPLIFIERS

A complete range of 7 High Fidelity P.A. Amplifiers for A.C. or A.C./D.C. mains operation. With the exception of the two 3-watt models, all Premier Amplifiers are supplied in Black Cracked steel cases, and incorporate the new Premier "Matchmaker" output Transformer, enabling any single or combination of speakers to be used.

6, 8/10, and 15-watt systems are provided with two separate input channels which can be mixed to any level. The 30- and 60-watt systems have 3 input channels. The built-in Pre-Amplifiers ensure that the gain is sufficient for any low level crystal or velocity microphone. The actual gain of the 6-, 15-, 30- and 60-watt amplifiers is over 100 decibels. Tone controls are also incorporated.

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6-watt A.C.	£6 15 0
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15-watt A.C.	£7 5 0
30-watt A.C.	£12 12 0
60-watt A.C.	£15 15 0

PREMIER ALL-WAVE SUPERHETS

A 5-VALVE ALL-WAVE SUPERHET
Receiver chassis with moving coil Speaker. Wave range 16-50, 200-560, and 800-2,000 metres. Output 4½ watts. Fully illuminated scale with Station Names and Wavelengths.

Automatic volume control. Tone control. Provision for gramophone input. Extension speaker sockets. International Octal valves. Complete with valves and speaker, £6 6s.

A 6-VALVE ALL-WAVE SUPERHET, as above, but with R.F. Amplifier Stage, 4 wave-bands from 12 metres upwards, 10in. Moving Coil Speaker. With valves and speaker, £7 19s. 6d.

A 10-VALVE DE LUXE SUPERHET RECEIVER CHASSIS; with Rola G.12 energised moving-coil speaker. Wave-range coverage from 5-2,000 metres in 5 bands. Two L.F. stages with sensitivity control. "Magic Eye" tuning indicator. Fully illuminated dial with station names and wave ranges. Automatic volume control, tone control, negative feedback, provision for gramophone input and extension speaker sockets. International Octal valves, giving an undistorted output of 15 watts. Complete with speaker and all valves. Price £15 15s.

NEW PREMIER 5-VALVE SUPERHET COMMUNICATION RECEIVER

Complete coverage from 12-2,000 metres in 5 bands. Separate Band-spread Condenser. Beat Frequency Oscillator. Phone Jack. Send-Receive Switch. Aerial Trimmer. Provision for single wire or Di-pole Aerial. International Octal Valves: For 200-250 v. mains (A.C.). Built into Black Crackle Steel case, providing complete screening. 10in. Moving Coil Speaker in separate steel cabinet to match Receiver. Complete with all tubes and Speaker, £8 8s.

Have you had our 1938 Catalogue, Handbook and Valve Manual? 80 pages of Radio Bargains and Interesting Data. Price 6d.
ALL GOODS PREVIOUSLY ADVERTISED STILL AVAILABLE.

NEW RECEIVERS AND CHASSIS

COULPHONE offer Brand New goods at lower prices. 13d. stamp for lists.—**COULPHONE RADIO, GRIMSHAW LANE, ORMSKIRK.**

ALL ARMSTRONG Radio chassis, including Press Button models, exhibited at Radiolympia can be seen and heard at our Showrooms. Demonstrations daily. Armstrong chassis are sent on 7 days' approval, carriage and packing free. Armstrong Company have fully illustrated technical catalogue describing all models.—Armstrong Company, 100, St. Pancras Way (formerly Kings Road), Camden Town, London, N.W.1. Gulliver 3105.

BANKRUPT STOCK.—Brand new 1938 Radio sets in makers' cartons with guarantees, some less than 30% retail prices. Send 13d. stamp for list bargains.—261-3, Lichfield Road, Aston, Birmingham.

LOUDSPEAKER REPAIRS

REPAIRS in Moving Coil Speakers, Cones and Coils fitted and Rewound. Fields altered. Prices Quoted including Eliminators. Loudspeakers Repaired 4/-; L.F. and Speech Transformers, 4/- post free. Trade invited. Guaranteed. Satisfaction. Prompt Service, Estimates Free.—L.S. Repair Service, 5, Balham Grove, London, S.W.12. Battersea 1321.

VALVES

AMERICAN Valves in Sealed Cartons, all types, 5/6, post paid.—Valves, 601/3, Harrow Road, N.W.10.

BUY VALVES DIRECT.—Fully guaranteed, 2-volt H2, L2, 2/3; Power, 3/-; Screens, 5/-; Pentodes, 5/6. Mains, General Purpose, 4/6; Power, 6/-; Screens and Pentodes, 6/6; Rectifiers, 4/6 and 5/6. Over 150 types available—Battery, Mains, and American. Postage 3d. each, 4d. two, 6d. three. Cash with order.—Luminous Electric Appliances, Ltd. (Dept. P.W.), 62/63, Edward St., Birmingham, 1.

CABINETS

MANUFACTURERS' surplus cabinets for Radiograms, Radio sets and Loudspeakers. Large and varied stock. Inspection invited, or send particulars of your requirements, with measurements of chassis. Photos sent for selection. (No catalogue.)—H. L. Smith & Co., Ltd., 287-289, Edgware Road, London, W.2. (Pad. 5891).

BATTERY CHARGING PLANT

200-250v. A.C. chargers: 2v. 1a., 8s. 6d.; 1 amp, 12s. 6d.; 2 amps, 18s. 6d.; 6 volt 1 a., 15s.; 2 amps, 25s.

Steel Cases, metal rectifiers; details, photos, stamp.—Brighton Radio Service, 34, Middle Street, Brighton.

SITUATIONS VACANT

ENGINEERING IS BOOMING. There are more good jobs available than men to fill them; the opportunities in Draughtsmanship were never brighter. Now is the time to prepare for entry and advancement. The FREE 1938 Guide explains clearly how all the best jobs are secured and describes numerous "Higher pay" courses in Aero, Electrical, and Radio Engineering, Government Service, etc. FREE on application to National Institute of Engineering (Dept. 3), Staple Inn Bldgs., W.C.1.

WANTED—ambitious young men to prepare for well-paid posts in TELEVISION, the great career of the future. Apply for free booklet from **BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY**, 18P, Stratford Place, W.1.

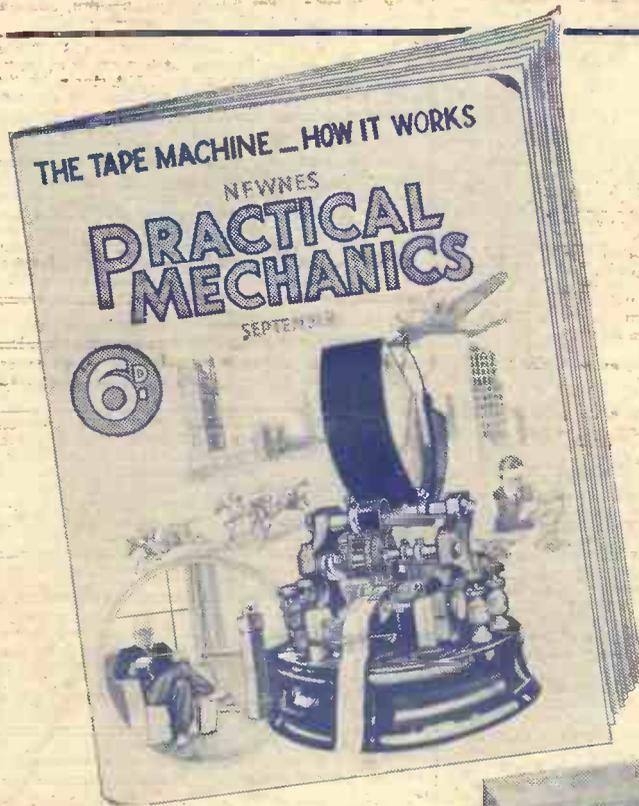
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FREE ADVICE BUREAU
COUPON

This coupon is available until September 17th, 1938, and must accompany all Queries and Writings.
PRACTICAL AND AMATEUR WIRELESS,
10/9/38.

The Magazine of Modern Marvels



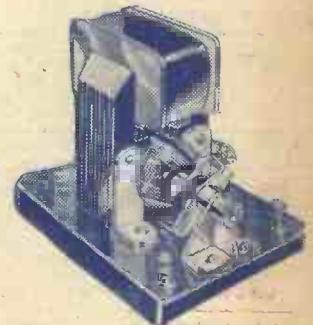
This type of tape machine is used for relaying sporting results. The September "Practical Mechanics" contains a special article on how tape machines work.

IN THE SEPTEMBER

PRACTICAL MECHANICS



Here is an electric motor which you can make with ease. Simple directions for its construction are given in the September "Practical Mechanics"



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Current news from the world of model aviation.

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EVERY
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Edited by F.J. CAMM

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Publication

Vol. 13. No. 313.
September 17th, 1938.

AND PRACTICAL TELEVISION

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**CIVILIAN
WIRELESS
RESERVE**
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By F. J. CAMM

A Complete, Practical and Up-to-date Work on the Testing of all Types of Wireless Receivers. 288 PAGES and OVER 220 PHOTOGRAPHS, DIAGRAMS, and PLANS.

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**THIS PIFCO METER
WILL TEST RADIO &
EVERYTHING ELECTRICAL"**

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- Plug-in test for valves.

Complete in velvet-lined case with testing leads.

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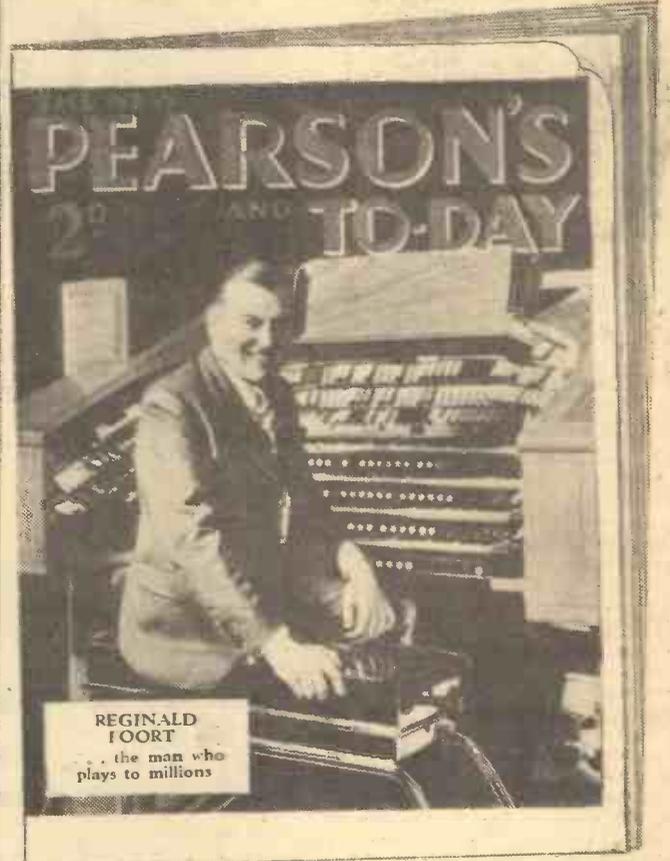
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Improving Your Loudspeaker—See Page 4



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. 313, September 17th, 1938.

ROUND *the* WORLD of WIRELESS

Problems of Interference

NO doubt the greatest drawback to modern listening is the background of interference noises which are experienced in various parts of the country. Unfortunately, all forms of interference differ in some respect, and whilst it may be possible to recommend one form of suppressor in one case, the same device may not prove effective in another. The simplest plan for the listener to adopt when interference is experienced, is to place his aerial out of the area of interference, and this, in conjunction with a mains suppressor when the set is mains operated should remove all his troubles. No doubt the proposed legislation to prevent the use of apparatus capable of causing radio interference will soon become effective, but in the meantime the listener is forced to adopt some scheme to enable him to listen to distant or weak programmes without difficulty. The two schemes mentioned in this issue will in practically every case enable this to be done, and the additional expense of the aerial systems will be well repaid by providing a more or less silent background for those long-distance programmes which are so often desired.

Confiscated Set

THE question of the steps which may be taken by the authorities in regard to the use of unlicensed radio apparatus has been brought to notice on many occasions. Usually a fine is all that is imposed, but recently the authorities confiscated an expensive radiogram which was being used without a licence, and it should be remembered that it is quite in order to make such confiscation in addition to a fine.

Cabinet Design

TO many listeners the shape of the modern radio or radiogram cabinet does not appear of great importance. It is customary to expect the usual "sideboard" design, but in America a new design is rapidly gaining popularity in the form of a "corner cabinet." Designed to fit into a corner this takes up much less space, and in addition gives greatly improved reproduction, owing to the fact that an improved effective baffle area is provided, and with a suitable internal design, no "back waves" are permitted to affect the normal front radiation from the speaker.

The Organ Breaks Down

FOR the first time since it was installed the B.B.C. organ recently broke down during a broadcast. To some listeners the defect may not have been noticeable as it merely took the form of what is known technically as a "cypher." One of the pedal notes remained open towards the end of a tune and although the mike was switched off, before it became fully ineffective the wailing of the note could be heard fading away.

jurisdiction of this office it is proposed to organise a staff of B.B.C. lecturers on television to undertake general propaganda and co-operate with dealers who are featuring television receivers.

Colchester Radio Show

MESSRS. CURRY, the well-known dealers, are running their own Radio Show at the Albert Hall, Colchester, from September 13th to 17th. In conjunction with this a local talent competition is being held, and all exhibition entrance receipts are to be given to the Essex County Hospital. A similar exhibition is also being given at Bath during the same period by Messrs. Curry, and in this case proceeds go to the Bath Royal United Hospital.

American Valve Data

MANY constructors prefer the American type of valve—not only on account of its price, but because of the many different types which are available, and which are not produced in English ranges. In this connection a proper study of the valve characteristics should be made, and Messrs. Holiday and Hemmerdinger, of Holmer Works, Hardman Street, Manchester, can now supply the "R.C.A. Receiving Tube Manual," which is a 192-page book dealing with valves and circuits in a very exhaustive manner. The cost of this is 1s. 6d., or 1s. 8d. post free. In addition to the comprehensive data there are four chapters giving information on the application of valves to rectification, amplification, oscillation and frequency conversion.

Street-corner Interviews

ON Saturday nights this autumn and winter John Watt, B.B.C. Director of Variety, and producer "Mike" Meehan introduce a new "vox popping" feature to "In Town To-night" programmes, which begin their sixth season on October 8th.

Arrangements will be made to have a convenient telephone line extended to the street and connected to a microphone. There, on the pavement, the Man with the Microphone will have a few minutes in which to spot, among the crowds of passers-by, several likely personalities whom he will invite to "tell the world"—or, at least, tell listeners—their views on the topic of the week.

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Push-button Tuning

CONTROVERSY is raging concerning the age of automatic or push-button tuning. Messrs. Bulgin have recalled the fact that in 1927 they marketed a push-button switch as one of their range of components, and it was in their catalogue eleven years ago. At Olympia Messrs. Kolster-Brandes exhibited a ten-year-old receiver of their make which incorporated the feature.

New Television Post

WE understand that a new post is shortly to be created at the Alexandra Palace, under the title of "Television Public Relations Officer." Under the

ROUND the WORLD of WIRELESS (Continued)

G.E.C. Activities

AMONGST the recent activities of the G.E.C. may be mentioned the fitting of a 15-watt all-wave radio installation on H.M.S. "Gallant" at 24 hours' notice at Chatham, just before the ship sailed for Malta. The firm have also installed a multiple speaker system for music re-diffusion at the Charles Letts' factory, the home of the well-known diaries.

Chimes Without Bells

IT is interesting to note that a Philips equipment for chimes without bells has just been installed in St. Andrew's Church, Jersey. The equipment consists of an oak cabinet containing turntable and pick-up,



A view of one side of the main hall at Radiolympia, showing the Cossor stand in the foreground

two type 3758 20-watt amplifiers, and four type 2394 10-watt flat projection metal speakers.

Radio-Eireann

IT is anticipated that the new short-wave transmitter, at present under construction, will be situated close to the Irish high-power station at Moydrum, near Athlone, Co. Westmeath.

That Loudspeaker in the Garden

AT Wavre, Belgium, a law-suit was brought by some neighbours against a radio-listener who, placing his loudspeaker at a window of his house, broadcast the programme to passers-by in the street. Although complaints were made in respect to the noise caused in this way, no attempt was made to mitigate the nuisance. As there is no law in Belgium against such disturbance, the Court, in its decision, condemned the owner of the radio receiver to the payment of an indemnity and costs on the finding that he was giving an unauthorised public performance, and was also liable to the payment of royalties on the items broadcast.

Propaganda on Medium Waves

FOR some considerable time night concerts have been broadcast from midnight onwards by the Frankfurt-am-Main and Stuttgart studios. During the past

INTERESTING and TOPICAL NEWS and NOTES

few months similar transmissions have been made by most of the German stations, and in the course of the programmes talks have been given in various foreign languages. Listeners will find many German studios on the air until G.M.T. 02.00.

Australian Short-wave Transmission Schedules (October, 1938)

V K2ME (Sydney), 31.28 m.: Sundays (Sydney time): 3.30 p.m.-5.30 p.m. (05.30-07.30 G.M.T.); 7.30 p.m.-11.30 p.m.

(09.30-13.30 G.M.T.). Mondays (Sydney time): 12.30 a.m.-2.30 a.m. (14.30-16.30 G.M.T.).

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

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

Midland Variety

ON September 16th, Arthur Marshall, who is a schoolmaster, and Hughes and Lever, who were originally Northampton artists, will provide a programme of studio variety for Midland and Regional listeners.

More Wireless Operators Wanted

WE are informed that the most serious shortage in R.A.F. recruiting is in the Wireless Operators' Section. Other sections which are still below the required strength are those for electricians and instrument repairers.

Radio Link with the Shetland Islands

EARLY next spring Post Office engineers are to conduct radio tests with the object of linking the Shetland Islands to the mainland by ultra-short-wave wireless telephone. It is also intended to replace

the present submarine telephone cable to the Orkneys by a similar system.

New Radio Outlook Series

A REEABLE fare is promised to listeners who like to hear personalities, gossip and variety, by the news that Robin Russell, B.B.C.'s variety assistant in Glasgow, will present the first of a new series to be called "Radio Outlook," on September 21st. He will start off with a piece of the news of the day, dramatised on "March of Time" lines. There will be an "odd spot" for some such surprise item as a variety act or a competition, and ten minutes or so will be kept open each night to accommodate any interesting people who chance to be visiting Glasgow.

Variety from Bournemouth

DANCE-CABARET will be broadcast from the Royal Bath Hotel ballroom, Bournemouth, on September 21st, when listeners will hear Gypsy Nina, Rob Wilton, and Billy Thorburn and his Music, with Eddie Guery and the Billy Boys.

No. 47,398, Airman Harry Swift

LANCE SIEVEKING, a reserve Air Force officer and now producer in the B.B.C. Drama Department, has hit upon the happy idea of taking a leaf from journalism for radio drama. Reporters nowadays frequently turn themselves into the most junior members of the fighting services. Going through the mill they describe for their readers the experiences of "Tommy Atkins" or "Jack Tar."

Lance Sieveking, for the purpose of his broadcast, has called himself "Airman Harry Swift." With the limited time at his disposal he will attempt to conduct listeners through Harry Swift's experiences from the moment of enlistment to the time when he becomes a fully fledged airman.

One of the B.B.C.'s latest enterprises is the foundation of a recording section. It is by means of the development of this department that Private Swift will be able in the space of one evening's programme of forty minutes to take listeners on a magic carpet and show them what he actually experienced during a period of approximately six months.

SOLVE THIS!

PROBLEM No. 313

In an endeavour to improve his three-valve battery set, Wrigley decided to use an H.F. pentode in place of the triode detector. He accordingly obtained a 4-pin type pentode to avoid having to alter the wiring, and connected the top cap to H.T. positive to obtain the necessary screen voltage. He found, however, that results were very little better than previously and no increase in amplification was obtained. Why was this? Three books will be awarded for the first three correct solutions opened. Envelopes should be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 313 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, September 19th, 1938.

Solution to Problem No. 312

The value of the potentiometer used by Jackson was too low, and he should therefore have used a higher value to obtain more gradual control. The following three readers successfully solved Problem No. 311, and books have accordingly been forwarded to them: E. B. Lord, 3, Ingway, Harold Park, Romford, Essex; C. W. Nutt, Thrifmore, Hunts Hill Road, Highbridge, Somerset; J. H. Cook, 43, Wyndham Road, Salisbury, Wilts.

Civilian Wireless Reserve

How the Radio Amateur Has Received
Acknowledgment of his Importance as a
Valuable Branch of the Modern War Machine

IN the days before broadcasting was known in this country a body of amateur experimenters, holders of the Post Office Experimental Wireless Licence, spent much time and money in experimenting with crude apparatus with a view to extending the knowledge which was then available. Steadily they achieved remarkable results, and when broadcasting was inaugurated many of the well-known amateurs found a position with the Broadcasting Company, where their knowledge and experience was of great value. As a result of the limitations imposed on the wavelengths which were then available, the amateur experimenter was forced to use shorter waves and, although little was then known about the behaviour of short waves, the amateurs made some remarkable strides. Hitherto-unknown fields were discovered and record distances were covered with infinitesimal powers. But the amateur was not thanked for his part in the discoveries which were made. He was confined to restricted bands of frequencies, and was looked upon by many as a nuisance.

Much of the success of present-day methods of radio communication is, however, due to the pioneer work of those amateurs who spent their money and all their spare time in radio experimenting.

In this country there has been a dearth of information regarding the transmission of signals, and PRACTICAL AND AMATEUR WIRELESS, realising the importance of sound technical knowledge among amateurs published a series of articles on the subject in 1935, and as a result of these articles many amateurs acquired the necessary knowledge to attain a transmitting licence and are now "on the air."

At last the Government has realised that the many amateur owners of transmitting and receiving gear are now deserving of recognition and that they may take their place in the scheme of things, along with the A.R.P. and similar bodies. As a result an appeal has been made by the Government for amateurs to enrol as part of the reserve of the Royal Air Force, and it is the intention of the Government that the personnel of this reserve shall ultimately form part of the Royal Air Force Volunteer Reserve. Meanwhile, accepted candidates will be enrolled as civilians and will be subject to certain liabilities. During the Radio Show at Olympia the R.M.A. placed facilities at the disposal of the Air Ministry to enable recruiting to take place during the last two days of the Show, and Capt. H. Balfour, the Under-Secretary for Air, made an appeal from the television studio there. As a result a large number of recruits were enrolled and many more are hoping to be able to serve in this field.

The main details for candidates are as follows:

Age limits.—Candidates must have attained the age of 18, but not exceeded the age of 54 on the date on which the application is received. Exceptional consideration may be given to applicants with special qualifications who have passed the age of 55.



Nationality.—All candidates must be British subjects of pure European descent. They must also be the sons of parents both of whom are (or, if deceased, were at the time of death) British subjects or naturalised British subjects; a departure from this rule will only be made on the authority of the Secretary of State for Air. (Candidates who possess foreign as well as British nationality may in certain cases be regarded as ineligible for entry). Where there is doubt of nationality or descent, the burden of proof will rest upon the candidate.

Eligibility for entry.—(a) Candidates will be required to show that they have a reasonably good knowledge of wireless telegraphy and the morse code, and should preferably be holders of a G.P.O. transmitting and/or experimental licence. Candidates are not required to have had previous experience in the Royal Air Force.

(b) Disability pensioners, persons in civilian employment under the Air Ministry (i.e., in posts remunerated from Air Votes), registered medical practitioners, medical students, dental surgeons, dental students and members of H.M. Forces (regular or non-regular), police forces, prison services and fire brigades are not eligible for entry.

(c) Candidates who are unable to give a reasonable assurance that they will be resident in the United Kingdom for a period of five years will not normally be selected.

Enrolment.—Candidates who from their application forms appear to be suitable, will be enrolled as members for a period of five years in the first instance. They may be permitted to re-enrol for further periods, each of not more than five years. Normally, membership will not continue beyond the age of 60.

Liabilities.—On enrolment every member will be required to accept the following obligations:

(a) To place his services at the disposal of the Air Council in the event of emergency.

(b) To transfer to the appropriate section of the Royal Air Force Volunteer Reserve when called upon to do so.

(c) To undertake the prescribed training.

(d) To keep the Director of Signals informed of changes of address.

Service with a Foreign Power.—A member may not enter the service of a foreign power during his period of membership of the Civilian Wireless Reserve, or for five years after he ceases membership, without the consent of the Air Ministry.

Discharge from the Reserve.—Members may be discharged from the Reserve any time on the following grounds:

(a) Medical unfitness.

(b) Unsatisfactory conduct.

(c) Inability to reach the normal standard of proficiency.

(d) Services no longer required.

Training.—Training will for the most part be undertaken by the members at their homes on their own sets and will consist of exercises broadcast from the Air Ministry and the Royal Air Force Electrical and Wireless School, Cranwell. In addition lessons will be circulated to members from time to time, on which these broadcasts will be based. Members whose transmitters are used in connection with training will be allotted special call signs. Exercises with aircraft and marine craft will be arranged and Royal Air Force mobile W/T equipment will be periodically allotted to areas for exercises, and rallies arranged at various centres combined with lectures and exercises.

Training Allowances and Travelling Expenses.—When required to attend a Royal Air Force station or centre, an allowance of 6d. an hour will be paid to members for each complete hour's training subject to a maximum payment in respect of 8 hours, including meal times, for any one day's attendance. Reasonable travelling expenses incurred in travelling to and from the training centre will be refunded.

Miscellaneous Expenses and Issues.

(a) Members who possess Post Office Wireless Transmitting Licences and have reached the required standard of proficiency will be paid a sum of £2 per annum to compensate them for the cost of maintaining their sets. In addition a free issue of crystals will be made.

(b) A badge will be issued to the members.

In order that our readers may acquire the necessary knowledge we shall commence a new series on Transmitting in next week's issue, and at the same time would draw attention to the fact that our new book, "WIRELESS TRANSMISSION FOR AMATEURS," is now available for those who wish to obtain all the information without waiting for the weekly articles on the subject. The huge demand for this book resulted in all supplies being sold out early at the Exhibition, but further supplies are now available. The price of the book is 2s. 6d., or 2s. 10d. by post.

Applications for the Civilian Reserve should be made on Form 2170, and forwarded to the Under-Secretary of State, Air Ministry (Signals (C.W.R.)), Kingsway, London, W.C.2.

The Modern Loudspeaker—2

Points Regarding Acoustics, Cleaning and Adjusting, are Discussed in this Article

THERE are many amateurs dissatisfied with the results from their loudspeakers, who have gone to extremes to improve response by devices as weird as they are varied.

Many "improvements" include stiffening the cone with dope, and cutting away suspension and/or surround till only the maker's reputation holds the speech-coil in the gap. Some experimenters perforate the cone to "dissipate the sound waves"; some stiffen it with wires and matchsticks to emphasise "top." In nine cases out of ten, where faulty reproduction is evident, the blame can be laid on the receiver, transmitter or room conditions. Even the B.B.C. records are not blameless!

Response Measurement

The measurement of response is a job not lightly undertaken even with the resources of a laboratory, while adjustment by faking the cone is usually a sheer waste of time. It is an uncanny experience to step from the noise of a production shop into the almost absolute silence of a sound-proof test cabin. Yet this is the condition for response measurement, and not the kitchen table or the living-room.

On the other hand, there are methods of influencing speaker response which are open to the amateur. The most prevalent fault in home reproduction is "coloration" of response by surroundings. Loudspeakers are hung on walls, inserted in "infinite baffles" of $\frac{1}{2}$ in. plywood, stuck away in cupboards, and even stuffed in armchairs and sofas.

A sound rule with speakers for home use is to insist on a baffle at least 2ft. square, and not less than $\frac{3}{4}$ in. thick. A baffle this size can be conveniently incorporated into the normal scheme of furnishing, and will give exceedingly good results.

Cabinet resonance is another trouble, to be eliminated only by careful dispositioning of sound absorbing board and internal baffles. Owing to the widely different conditions, no suggestions, apart from trial and error, can be offered.

Room Acoustics

A word of warning, however, and that is beware of room acoustics. The spare bedroom with bare distempered walls is no place for sound experiments. Test the set out in the lounge or dining-room, where the carpet and window hangings will damp out those reflected waves that come from everywhere at once.

The question of an extension loudspeaker touches most experimenters at one time or another. In its simplest form, the answer is a permanent-magnet unit, hung on a nail on the kitchen wall. Twenty feet of twin bell wire connect it to the external L.S. terminals on the long-suffering home receiver. All very amusing, but how true to life!

The enthusiast will consider all possible points before connecting up his extension. He will investigate the pros and cons of energised V. permanent magnets, and examine the proposed location with an eye on wall cavities, steam and cooking fumes, dust and insects. He will consider phasing the two units so that each cone moves "in step," and he certainly will

arrange for the impedance of the pair of speakers to be matched to the output valve.

Impedance Matching

Impedance matching is a term which many amateurs accept without fully understanding. In any power distribution system the principles apply. The highest

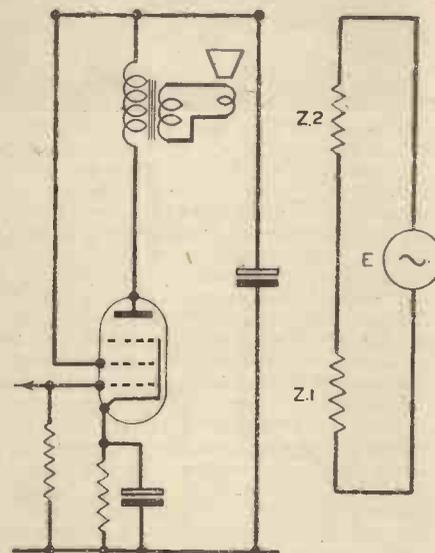


Fig. 1.—Theoretical and equivalent circuit for the output stage. $Z_2=L/S$ impedance; $Z_1=V$ valve R_a ; $E=100v$ —voltage induced by alternating component of I_a .

efficiency is achieved only if the load is matched to the driving source. Let us examine, say, a pentode output stage, the valve anode impedance being 5,000 ohms, with a loudspeaker, the impedance of which is matched to 5,000 ohms by the correct ratio transformer.

The circuit and its equivalent are shown in Fig. 1.

The wattage in the complete circuit is given by $\frac{E^2}{R}$, which in this case =

$$\frac{100^2}{Z_1 + Z_2} = \frac{10,000}{5,000 + 5,000} = 1 \text{ watt.}$$

The wattage in the loudspeaker circuit is half this, since load and source impedances are equal, and is therefore .5 watt.

If the impedance Z_2 is mismatched, say, 100 per cent., i.e., if a second speaker were connected across the first, the wattage would then be given by

$$\frac{10,000}{5,000 + 2,500} = 1.33 \text{ watts.}$$

Of this new value, only $\frac{1}{3}$ is delivered to the speakers, which is therefore .44 watt, a power loss of 12 per cent.

If, on the other hand, we assume the load to be double the valve R_a , the power developed in the speaker circuit is .44 watt, as before.

In practice, there is more at stake than efficiency alone. Distortion is a factor which depends on the valve working into its correct load, and whereas slight mismatching is negligible, serious errors give rise to appalling results.

Extension Wiring

A prevalent cause of error is the use of high-resistance extension wiring. The resistance of the line certainly should not exceed that of the speech coil. It is useful to remember that for a 2-ohm unit, the size of wire should be twin 14/0076 for a 25yd. extension, or 23/0076 for a 50yd. length.

The actual "vetting" of the home loudspeaker is an operation which calls for an unusual amount of care, but is well worth while if the set reproduction is "cracking" or rattling on heavy passages.

When the speaker has been removed from the cabinet, the dust-bag must be taken off and thoroughly cleaned. Next examine the movement carefully, and note how the cone is attached to the chassis. Remove all nuts and washers fixing the cone and suspension, and detach the magnet itself from the cradle.

If, in the case of a P.M., you place a keeper across the gap, do it gently. Actually no deterioration of flux will occur if the gap is left open, unless the magnet is dropped or overheated, which are unlikely occurrences.

Cleaning the Speaker Parts

Then the magnet is brushed inside and out with a stiff paint brush, the vacuum-cleaner assisting at this stage. The gap must now be cleared of all dirt, using a piece of card smeared with vaseline. When the gap is finally clean, wipe it out with a clean rag to remove excess vaseline and examine again.

The cone next receives attention. Dust both back and front, taking great care not to damage the frail centring device or the speech coil. Examine all joints for flakes of metal or adhesive which may drop into the coil gap later. Repair any tears to the cone, preferably using a rubber solution rather than a hard-setting adhesive. If any turns of the speech coil are showing bright patches, a touch of insulating varnish will guard against corrosion, especially in battery receivers.

(Continued on page 10)

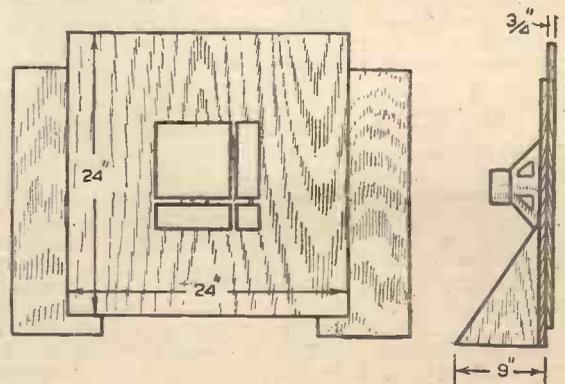


Fig. 2.—Front and side views of the suggested loudspeaker baffle.



SHORT-WAVE SECTION

A ONE-VALVE S.W. PRE-R.F. AMPLIFIER

Details of Construction of a Useful Unit for the Experimenter are Given in this Article

THE occasion often arises when the improvement of a receiver calls for modification to the R.F. portion, rather than by the addition of an extra L.F. stage, and this modification may either take the form of a change in detector circuit by the use of a different valve, say from a triode to an H.F. pentode, or by the use of a pre-R.F. amplifier. The unit described has been designed, therefore, to facilitate such an improvement to the gain of any receiver employing standard 4 or 6-pin coils, without alteration to the existing receiver wiring.

Should the receiver be for mains operation, this in no way prohibits the use of this amplifier, since the wiring, as depicted by the dotted lines in the theoretical diagram, can be altered accordingly by the use of separate negative battery return leads.

Referring to the circuit diagram, Fig. 1, it will be seen that only the essential constants are embodied, but unlike an ultra-short-wave adapter, the aerial connection to the receiver is taken directly from the anode of the X.S.G. valve.

When a twin-feeder aerial system is to be used, this can be connected immediately to the aerial and the earth terminals, ignoring the earth itself, but the conditions governing the stability of the receiver under normal operating conditions will, of course, have to be borne in mind, and it may be necessary to use an alternative method by returning the socket connection No. 2, not to chassis or earth, but to another insulating pillar terminal of the type used for that of the aerial, thus being able to separately earth the amplifier and receiver when employing L.1 for the link coupling.

The reaction winding L3 is not used when 6-pin coils are employed, but after a period of use this amplifier need not be dismantled, but can simply be converted to fulfil the needs of a monitor or standby short-wave receiver of just the one or perhaps two valves, retaining the X.S.G. but modifying for leaky grid operation, or by appropriate conversion to triode or even "L.F." pentode function with strapped screen-grid and anode.

Constructional Details

The pictorial representation Fig. 2 clearly shows the above-mentioned chassis wiring, and the diagrammatical illustration, Fig. 3, shows the simplicity of the under-chassis wiring, the connections through the chassis being numbered from 1 to 6 for clarity; Fig. 4 gives details of the chassis construction.

The coil base is supported upon three insulating pillars in order that chassis damping to the windings will be kept down to a minimum, at the same time facilitating wiring to the variable condenser, and making this as short as possible; the 4-pin coil-holder being redrilled as shown, a, b; a 6-pin coil will then fit over the insulating pillars normally when required.

A few words on the actual chassis work here will, no doubt, prove of assistance to those who are new to this class of work.

For the chassis, a strip of 18 S.W.G. aluminium measuring 7 1/2 in. by 3 1/2 in. will be required and, prior to drilling, the

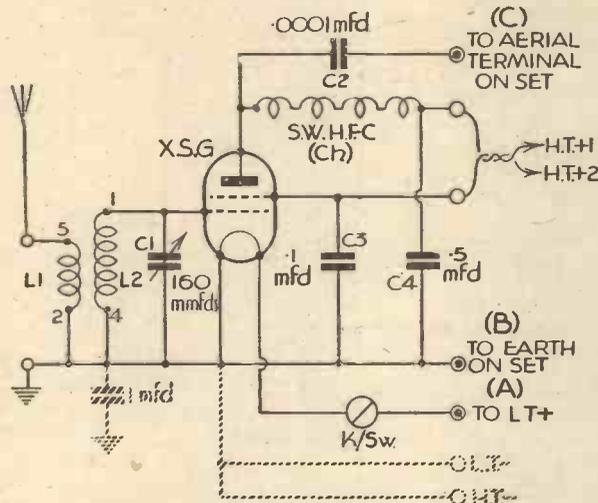


Fig. 1.—Theoretical circuit diagram of the one-valve pre-R.F. amplifier.

runners, which are 1 1/2 in. deep, should be bent carefully in a vice after scribing the guide lines.

The panel can now be cut to 4 1/2 in. by 3 1/2 in. using the same gauge aluminium, the next consideration being the marking out for the drillings. This marking should be done preferably with a fine-pointed scribering tool or the point of dividers, using a steel rule, and working on the underside and the back of the panel. Before commencing to drill, all the intersecting lines which locate the drilling positions should be counter-checked, and particularly the alignment of the socket strip. All fixing screw-holes should be made with 1/16 in. drill, unless otherwise stated.

Chassis Drilling

The only slight difficulties which may be experienced will be in the slotting required for the socket strip, and the method of neatly executing the larger holes. In the diagram of chassis drillings, it will be seen that three holes should be made for the slot,

these being 1/16 in. diameter; it only remains to remove the burrs, and file the slot to shape with round and flat files.

The hole for the valveholder can be made with a 1/16 in. drill, or as large a drill as possible, filing to the required diameter with a round fine file; the same operation applies for the dial-drive hole, and the key switch hole. Having finally checked all drillings against the diagram, the components can be mounted, followed by fitting the front panel which will have been prepared with the fixture of the drive and the dial.

Two 1/16 in. countersunk brass screws secure the dial to the front panel, and to ensure that the soldering of the drive to the surface of the nuts will be a simple matter, these should be lightly filed and coated with a little Fluxite, but it is essential to see that the drive is properly aligned before soldering.

The pointer is of the standard type supplied with the drive, but the end should be filed down to about 1/32 in. in thickness, and the length reduced by filing to 1/2 in.

When assembling, spring washers should be freely used, not only under the nuts, but also under the screw heads to ensure sound electrical contact and freedom from working loose, otherwise noisy operation will result.

Wiring Connections

The wiring can be done with either 16 or 18 S.W.G., but preferably not thinner than 18 gauge; the insulated sleeving being carried right up to the soldered joints. Keep all under-chassis components as near to the chassis as possible, but ease the H.F. choke away from the chassis

and the fixing nuts. The insulating pillars should be fitted before clamping down the coil holder, and finally rubber grummetts should be used for the anode lead and the H.T. leads, but

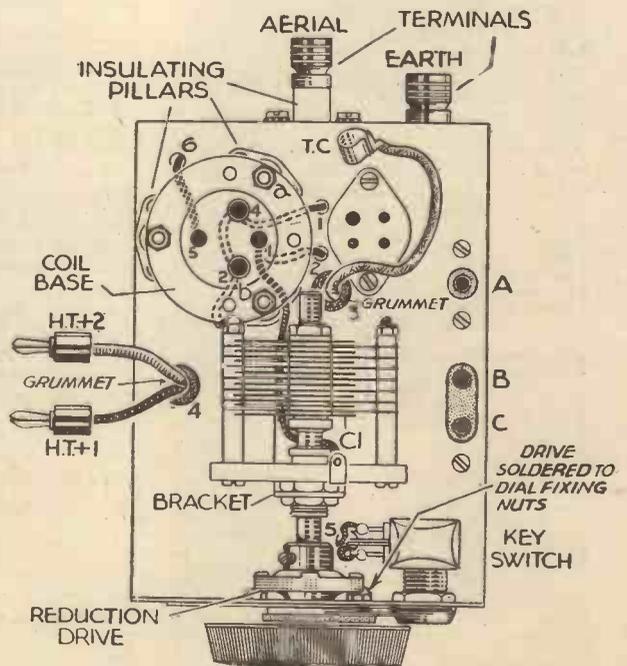


Fig. 2.—Plan view of the chassis showing layout of components.

ON YOUR WAVELENGTH



By Thermion

Similarity

NOW that the Show is over I have time to collect my wits, if any, and to view the thing in its correct perspective. I have already told you of the number of bearded people I met, and I was enchanted to stand idly by and listen to some of the remarks concerning your scribe. It seems such a pity that I have to resemble a suburban garden, like Greta Garbo (I want to be a lawn!), for there are many readers that I would cheerfully have grasped by the hand with the same fervour with which I would grasp a crooner's neck. I agree with the remarks made by Sir William Crawford when he said: "All the sets at Radiolympia look the same. The Exhibition was dull, and if it had not been saved by television, it would have been boring. Could they not find any creative artists who would give shape and form to the woodwork of their sets? They were all too much alike and uniform. . . . I think development has been too rapid. . . . I think it would have been better if you had gone more slowly. . . . Every trade needs a period of rest. . . . No home could be complete without two radios. . . . The radio trade is the worst advertised in this country. . . . There should be no second-hand value for radio in this country. . . . People are holding on to their sets too long. . . . There should be a complete research. . . ." The television demonstrations indicated that television in marketable form is really here. Although the attendance figures were down each day as compared with last year, I understand that, as I anticipated, business was better. Push-button tuning attracted a good deal of interest, as also did the set on one of the Stands which was produced in 1927, and included push-button tuning and motor control.

I learn that there is a greater interest now in mains receivers, judging from the number of queries received on our Stand.

Now that the amateur transmitter has received government recognition, in the formation, by Sir Kingsley Wood, of the Civil Wireless Reserve, there will be a great desire to obtain transmitting licences. This is evident from the fact that our supply of our new 2s. 6d. handbook, "Wireless Transmission for Amateurs," was sold

out within an hour or so of its delivery at our Stand; copies are now available.

Push-button Tuning—a Reader's View

MR. G. H. B., of Reading, submits the following viewpoints on push-button tuning:

"If the position were reversed, and the public had *hitherto relied on push-buttons* for the selection of their programmes, how they would have jumped at the possibility of this year's Radiolympia bringing them a system whereby they could obtain their stations by means of an artistically-coloured and illuminated dial, with a host of stations indicated which would have made their receiver into a veritable switch-board, in order to receive them. In other words, push-button tuning is, as you say, just another gag which gives manufacturers a chance to render obsolete sets which in all other respects are identical with the replacements, thereby 'pulling the wool over the public's eyes' in an endeavour to 'fleece' them.

"May I congratulate you on your good work in helping to clear the bad name which wireless has undoubtedly been getting among the public? I hope that sheer modesty will not prevent you from publishing this 'candid opinion,' as I am sure it echoes in the hearts of all my fellow wireless constructors, upon whom the blight inevitably falls. Long live Thermion! (Down with Crooners!)"

Miss Touchtune

I AM told that Miss Touchtune, G.E.C.'s Radiolympia "mystery" girl, walked as much as 10 miles a day during the Show. Each day she gave away a free set to a person on a different secret spot at a time known only to herself. During the Show,

hundreds of people followed her about in the hope of getting one of the prizes.

Miss Touchtune, who is in reality Miss Felicité Kirby, a film-actress, said:

"I carried a pedometer with me to see how far I would walk during the Show. My average was 10 miles a day, and one day I walked nearly 15 miles. During the whole Show I walked the distance from London to Birmingham.

"Many interesting people have spoken to me, including a lighthouse-keeper, an Indian prince, a famous K.C., and a cowboy."

Miss Touchtune also admitted that she had had several proposals of marriage, including one from an Australian sheep-farmer, and one from a Highland schoolmaster. Only those wearing badges obtainable by pressing a button on a special G.E.C. Touchtune receiver were eligible to receive the free sets. During the Show, the buttons were pressed by 40,000 people to obtain tickets, and the set, when connected up, was found to be in perfect working order.

Women and Television

THAT women are largely responsible for the television boom was revealed in a Radiolympia statement issued by the General Electric Company on the sales of television sets. An official of the firm informed me that: "By half-way through the Show we had sold all our stocks of one of our television models and, in common with other manufacturers, we can state that orders for others have been far in advance of our expectations. Women are responsible for a very large number of the orders.

"During the Show some 50,000 people visited the G.E.C. television booth, and of this number we estimate that over 60 per cent. were women. A very large number of the inquiries we have been receiving have also been from women, who have obviously been following television progress very closely, and it is unquestionably the feminine interest that has been very largely responsible for the boom.

"Another interesting feature at Radiolympia has been the great interest taken by foreign visitors in television. Visitors from America and Continental countries where there

is no commercial television at all have been astonished at the progress made by Great Britain. Many engineers came from America specially to study television at Radiolympia."

The Monday Proms.

ONE of my London readers writes: "Will you air in your columns what I am certain must be a grievance to many.

"I refer to the vocalization of the Monday (Wagner) proms. For 10 years I have occupied the same seat and used to enjoy the fine conducting and magnificent orchestra. No one, least of all myself, wants to listen to many pounds of female flesh with, I grant, a fine voice, spoiling the orchestra, and not in any way impersonating the person for whom the song was written; ditto many stonies of male flesh doing ditto.

"The most absurd thing was, not this year, three rather plain females singing and impersonating the 'Rhine Maidens' in their song.

"Last night the actual time taken was, vocal 37 minutes, orchestral 31 minutes. I enclose the programme and you will see my timing notes.

"I hope to call at your stall and leave a card, but even if I hand this to your good self, don't betray your identity, as I wish to remain the only person who does *not* wish to meet you. I prefer illusion!

"I agree about crooners, but the subject is stale—Oh, Thermion! Oh, Thermion! you really are a Myrmidon. Then why do you go on and on listening to crooners, Thermion?"

An Electric Eel That Can Kill a Man

MANY of my readers already know that the energy stored in a standard Exide battery is equivalent to that required to raise the battery to the height of Mount Everest, i.e., 30,000 feet. In their efforts to find just what their batteries can do, Exide technicians have carried their experiments so far as to procure an electric eel from South America.

These electric eels can generate sufficient electrical energy to stun a horse or even kill a man, and "Exide" as the eel is named, demonstrates his ability to produce electricity by lighting a neon lamp.

The makers of Exide batteries draw a comparison between the eel and their products by submerging an Exide battery in a tank of water and connecting a series of lamps across the battery terminals. These lamps are continually lit—although the battery remains submerged, so that everyone can see the truth in the Exide slogan: "Still keeps going when the rest have stopped."

Notes from the Test Bench

Detector Types

A DIFFICULTY which often arises when a set is being designed is what type of detector to employ. There is the ordinary leaky-grid, power grid, anode-bend and diode detector in the standard types, plus certain special arrangements which will not be used by the ordinary home-constructor. It may be taken as a general rule that the leaky-grid or power grid will prove most satisfactory. The former has normal values of leak and condenser with moderate H.T. voltage, but a power grid detector uses small values of leak and condenser but requires high anode voltage. Similarly, the anode-bend arrangement will require a high anode voltage and a high anode load, which means that the initial H.T. available must be very high to enable a satisfactory voltage to be applied to the valve. The diode avoids all of these difficulties, but requires a very large input signal voltage in order to give distortionless amplification. The anode-bend detector also gives best results with a good hefty signal, and will not be so useful on weak or distant stations. Taken all round, the most satisfactory detector for the normal type of set is, therefore, the leaky-grid.

Extension Speakers

THE fact that modern commercial receivers are now sometimes provided with high-impedance and sometimes with low-impedance extension sockets has led to difficulties in the minds of non-technical listeners. It should be remembered, however, that a modern moving-coil speaker is wound to a low impedance—that is to say, the speech coil is of low impedance. To enable the speaker to be used in a normal circuit, however, the makers fit a transformer to the speaker and this has a high impedance primary with step-down secondary to match the speech coil impedance to a normal output stage. Thus, if a normal speaker is obtained and a receiver calls for a low-impedance extension unit, all that is necessary is to disconnect the input transformer and connect the speech coil direct to the extension sockets. Some care may be necessary to obtain correct matching, although there is more latitude on the low-impedance side than may be imagined. The opposite factors hold good, namely, that a low-impedance speaker may be matched to a high-impedance output circuit merely by connecting a transformer with step-up ratio between speaker and receiver.

Practical Wireless Service Manual

5/-, by post 5/6,
helps you to trace that fault!

Although "Exide" is only 18in. long, he is a comparative youngster, and will eventually grow to 4ft. or 5ft.

His home was the Amazon River—apparently a favourite place for electric eels, as they are not known to exist elsewhere—and he was brought to London in a special tank carried on a South America-England freighter. Like an Exide battery, when "Exide" is bilious his output is feeble; but a little topping-up (on worms) soon has him right again and as active as ever. The dangerous end, by the way, is his tail—a shocking business if one is careless.

Visitors to Radiolympia saw the electric eel on the Exide Stand.

Joke!

D. P. (Liverpool) writes: "I have read in your columns some of the foolish replies of radio dealers and others; but, really, the reply I overheard the other day at a local dealer's shop beats the lot. The prospective purchaser of an all-wave set asked why television was radiated on such short wavelengths instead of on the broadcast band. The reply was 'The pictures won't stretch more than 5 or 6 metres.'"

How Perfection is Achieved

THE high grade radio set is probably the most tested article sold by the million. This opinion was expressed at Radiolympia by Mr. L. Vernon, testing chief at the G.E.C. works, through whose hands many thousands of receivers pass every year. "A whole book could be written on the tests undergone by a G.E.C. set before it reaches the buyer," he said.

"In production alone there are visual, mechanical, electrical, operational, shock, scientific, and a score of other tests and check tests for all materials, individual parts, components, assemblies and finished receivers. Release of a faulty instrument is thus well nigh impossible," said Mr. Vernon.

"One of the many testing machines every G.E.C. set in the world has passed checks up to forty circuits in a few seconds, and so accurately that it could reveal a break in a single strand of 30-strand connecting wire. Sample sets are switched on and off continuously for three months. Valves in their cartons are dropped 6 ft. on to a concrete floor and then meticulously re-examined.

"The standards themselves undergo a most rigorous process of trial and error before final approval, and even when the new receiver has passed through the factory as perfect its examination is by no means over."



Practical Television

September 17th, 1938. Vol. 3. No. 118.

Radiolympia's Television Lesson

NOW that the public have seen all the various makes of television receiver on demonstration, what lesson has been learned? Walking round the stands during the ten days, one could hear the various comments of those who understood and those who knew nothing about the subject, and it would appear that the general impression was one of surprise at the reliability of the modern transmission. It was possible to go to a

suitable cabinet, was capable of entertaining a larger crowd.

The Separate Unit

One of the most interesting features of the apparatus displayed was the add-on unit, which it would appear will do much to popularise television in the home. Hundreds of listeners have receivers or radiograms which they claim to be unbeatable, and they hesitate to dispose of them in order to

audible from their own equipment, will give them the advantage of being able to retain the existing gear and participate in television entertainment. Furthermore, these add-on units will be quite reasonable in price. In addition to this type of unit, there is also the combined sound and vision unit, in most cases having only two controls, and giving only the television programme. This type of unit may now be obtained as a table model or floor model and at quite reasonable prices.

In U.S.A.

IT is stated that television is to be on the air this month in New York. Parts of the Empire State Building transmitter have been rebuilt and everything is in readiness to put a regular programme on the air. The programmes are to be produced in the studios at Radio City, and it is stated that vision signals are expected up to a 40- or 60- mile radius. Television programmes from the Columbia Broadcasting System's new transmitter on the top of the Chrysler Tower are promised for October. The constructional work is not yet completed, however, and the coaxial cables which are to connect the studios with the transmitter are not yet installed. It is stated that English television receivers are trickling into America and are being modified to receive the 441-line American standard. In addition to these two programmes, it is also stated that the General Electric Company is arranging to transmit a television programme from their station at Schenectady, and plans are being made to launch some new type home television receivers on the American market.

In France

Full details of the domestic receivers which are being produced by several French firms have not yet been received, but some novel ideas are stated to be incorporated in some of them. We understand that a mechanical system will probably be placed



A typical dance-band session being televised from the Alexandra Palace.

stand at the time appointed for the next demonstration and, with one exception, the transmission was switched on punctually and in very few cases was an engineer needed to adjust the receiver. Passing from one stand to another one was struck by the difference in the detail of the pictures, and in one case it was especially noticed that the usual line assembly of the picture was missing. By defocusing the spot the makers had succeeded in preserving the sharpness of the picture, but the individual lines could not be seen unless one got right up close to the screen. This would appear to be the next stage in the development of the tube, and it would appear that no further increase in brilliancy is needed. Several of the stands had the receivers placed in what might be called an unscreened position without any serious loss of detail, and very few visitors seemed to criticise the sizes of the pictures which were shown. Even the smallest screen, measuring approximately 4in. by 3in., had its adherents, although naturally the largest screen of the cathode-ray tube type, in a



Here is one of the new mobile television vans leaving the E.M.I. laboratories at Hayes for delivery to the B.B.C.

acquire modern receivers. They cannot afford an additional complete receiver; and thus a simple add-on unit, providing television pictures, with the sound made

on the market as soon as experiments have been completed, but no details as to the type of equipment which is being employed have yet come to hand.

HOW WIRELESS VALVES ARE MADE

By Our Special Correspondent

The Wireless Valve that you Casually Plug into Your Set looks, at first sight, a simple affair, but in reality it incorporates some of the most Ingenious Craftsmanship of Modern Science

A VISIT to the Osram Works of the General Electric Co. has convinced me that you need to see a valve made to realise the amazing workmanship it represents. What to me is perhaps the most striking exhibit in the whole works has nothing to do with any of the processes of making a valve at all. It consists of three show cases containing 700 to 800 types of valves. No two of them are the same—each one represents some step in the evolution of the highly efficient valves with which we are blessed to-day. This evolution dates back to 1917, when the works made its first valve. So greatly has the technique improved, I was told, that most of the early valves would be absolutely useless in a modern receiving set.

Metal Components

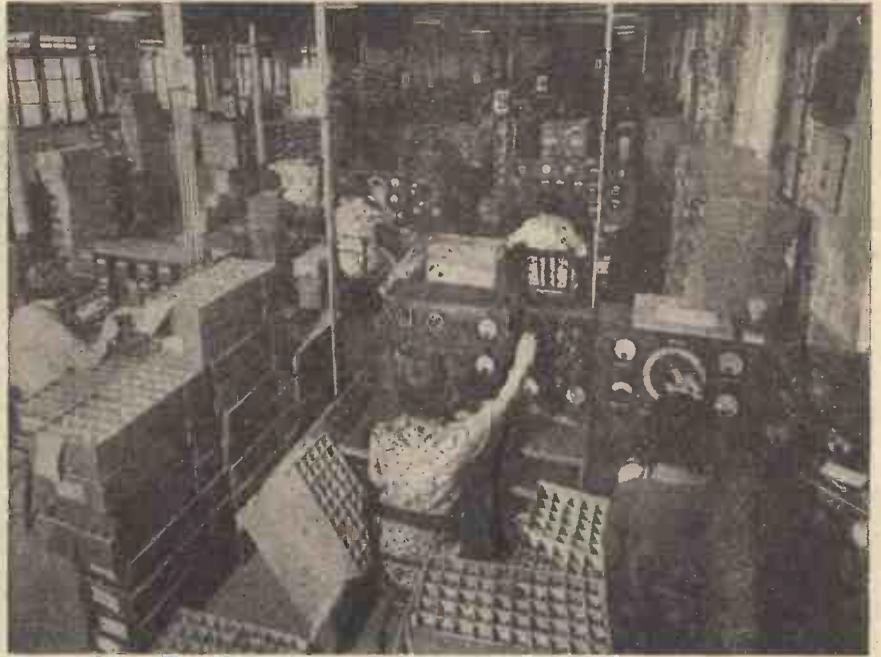
The metal components of the valves are made with astounding speed and accuracy. The machines which cut out nickel "shields," for instance, use 250 yards of nickel strip per hour, cutting out between 7,000 and 8,000 pieces.

Machines known as pinch-making machines are next used to seal the leading-in wires into the central supporting tube. In these machines the glass is made plastic, and a metal "pincher" moulds it round the leading-in wires to the shape required. Through successive processes the valve arrives at the exhaust stage, where air is withdrawn by machine pumps working to extremely low pressure. When the air is exhausted as far as possible by mechanical means, an ingenious process is used to perfect the vacuum before final sealing of the envelope. This consists of "firing" a deposit of magnesium, or other approved material, on to the internal surface of the bulb, so as to render the residual gases innocuous. A valve containing even minute traces of gas will cease to function very quickly.

Three Tests

In addition to the many examinations in the process of manufacture, three different and very rigorous tests are applied to the valve in the completed form, and any valve falling outside the prescribed limits for any feature or characteristic, is immediately rejected. In addition to this, all valves are subjected to both "static" and "chassis" tests outside the manufacturing department.

When production of a new type of valve is put in hand, a considerable amount of technical and productive effort is applied to secure manufacture on a reasonable basis.



Part of the final test section of the Osram factory.

The method of testing for mechanical faults and parasitic noises is very ingenious indeed. The valve is inserted into a "chassis" to simulate the conditions it will have to meet in use on the market, and is then tapped hard with a rubber-topped hammer. By means of a sensitive amplifier any fault is immediately discovered.

It has been found that valves, like wine, are better for maturing, and every valve before leaving the factory is subjected to a "stewing" or "loading" for two or three hours to achieve this effect.

Ingenious Jigs

The use of ingenious jigs into which the electrodes are inserted enables the girls engaged on the construction of valves to work with great speed and accuracy.

The process by which the cathode of a valve is coated with a powder consisting of a mixture of barium and strontium carbonate is typical of many others calling for great precision. The cathode, which weighs in the neighbourhood of 250 milligrammes, is first weighed, then sprayed with a thin film of coating, and then weighed again to check the accuracy of spraying.

A particularly interesting type of valve is the Y.63, otherwise known as the "Magic

Eye." This type employs some of the principles of the cathode-ray tube as used for television purposes. The valve has a cup or disc coated with fluorescent powder which glows and registers accuracy of set tuning.

The ordinary valve which you and I so casually buy for a few shillings contains an amazing number of parts. In the case of the triode hexode, for example, there are 78 parts, 17 different elements being used.

But the types referred to are by no means the only valves that are constructed by the Osram Works at Hammersmith. There are valves that you and I have never seen at all. The smallest of all is the "Acorn," which is hardly bigger than the top of one's little finger.

At the other end of the scale is a valve which stands 3ft. 6in. high, and of which the copper anode alone weighs 66lbs. This is known as the C.A.T. 14, and is referred to as a 500 K.W. valve. "CAT" does not, as one might at first imagine, stand for "cathode," but for "cooled anode transmitter," from which you will gather that it is a valve used for transmitting purposes.

Special "prams" are used to wheel valves of this type from one place to another.

THE MODERN LOUDSPEAKER—2

(Continued from page 4)

Re-assembling

When all repairs are thoroughly dry, re-assemble in the reverse order to dismantling. Gently ease the coil into the gap and tighten the chassis back on to the magnet, taking care not to distort the cradle.

To centre the coil, insert into the gap between coil and pole-piece, four slips of paper about 1in. wide and 2in. long, arranging each pair diametrically opposite each other. Pack them with additional slips of paper till the coil is just free to move, ensuring that each "feeler" is exactly the same thickness.

Then tighten up the suspension fixing

screws, remove the feelers and try the speaker out at full volume against its normal baffle. Select a heavy orchestral item with plenty of bass, and listen carefully for any rattle that indicates loose material in the gap. If you are satisfied that reproduction is clean and crisp, give each suspension screw a touch of varnish to prevent it working loose. Finally, tie the dust-bag over the unit before re-assembly into the cabinet.

This cleaning operation is not to be undertaken lightly. It is only too fatally easy to ruin the speaker by careless handling. Careful and thorough work will be repaid by "buzz-free" reception, and if the result isn't exactly equal to the actual performance, at least you are one step further on the road towards higher quality.

A PAGE OF PRACTICAL HINTS

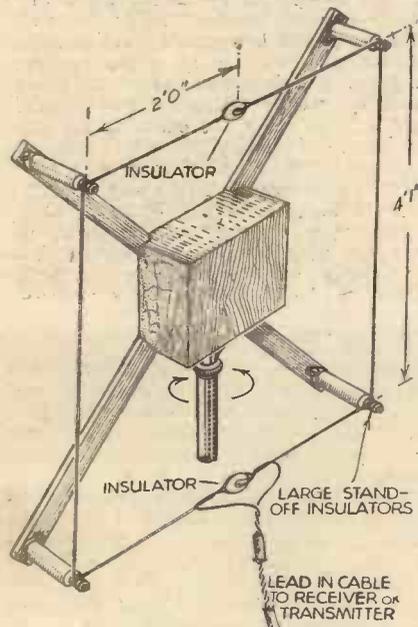
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Directional Doublet Aerial

THE aerial shown in the accompanying diagram is a half-wave doublet that has been bent back against itself; it has good directive properties without taking up much space, and has rendered a good account of itself when compared with



A directional half-wave doublet aerial.

several outdoor aerials. It is suitable for use on either 5, 10 or 20 metres for both reception and transmission. Given a compass, and a great circle map with centre on London, scientific directional listening may be undertaken, remembering that the aerial must be placed broadside on to the direction from which the desired signal is coming. It has been found that an R5 signal using an ordinary inverted-L aerial could be brought up to R7 with the doublet,

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SPECIAL NOTICE

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

which gave better results than several vertical and horizontal aerials that were tried.

The actual construction of the doublet is simple, and can be followed from the sketch, which shows the dimensions for use on 10 metres. For 20 metres, the aerial would be approximately 8ft. 3in. square, and for 5 metres 2ft. square. On this latter frequency the 10-metre aerial could be made into a full-wave for 5 metres. In addition to its use as a receiving aerial, the doublet will be found to give very good results where a small aerial is required for portable operation.—R. F. STEVENS (Romford).

Condenser Tester

THE accompanying sketch shows the circuit of a very sensitive and useful condenser tester which I have made up, after having had considerable trouble in finding small leaks in these components.

All the parts needed, which can be found in most junk boxes, are: 1 bell transformer with 3-volt or 6-volt tappings (according to valve filament used); 1 valve-holder; 1 old power or L.F. valve (an old 6-volt bright emitter will do); one .01 fixed condenser; a cheap voltmeter; a switch (a push-pull type would do); and some wire and two crocodile clips.

The method of testing is as follows: Switch on the valve by plugging the transformer into the mains, and note the meter reading. Clip the suscep-

ted condenser in the test clips and switch in by the panel switch. With a small condenser there should be no movement of the needle; if it advances there is a leak. With a large condenser, the needle should kick right back. Again, if there is a leak or breakdown the needle will advance.

If there is any advance of the needle on the first reading, without the suspected condenser in circuit, then there is a breakdown, and the condenser should be replaced.

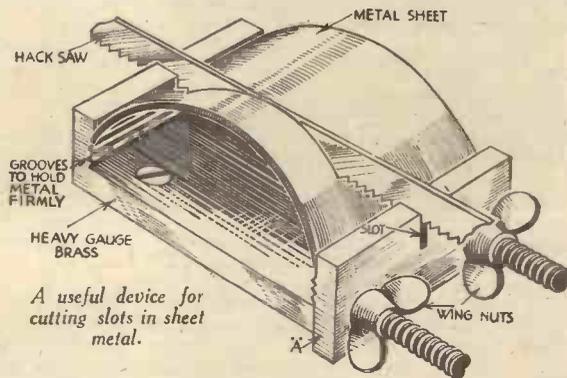
This arrangement can also be used for high-resistance continuity test, as a definite advance of the meter needle is obtained, even through a resistance of 5 meg. (the highest I have yet tried).

The whole unit can be housed in a small box, valve mounted inside lying long-wise, with switch, meter and test leads mounted on the top panel, as shown. The transformer may be left outside, or fitted inside, as desired.—F. R. CHRISTIAN (Clapham Park).

A Slot-cutting Device

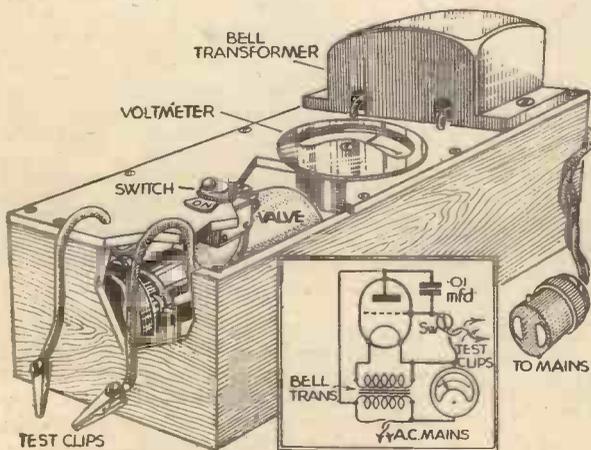
THIS fitment is very useful for cutting slots or square openings in aluminium or other sheet metal.

By slackening the two wing nuts, the part "A" is sprung out, and the metal



A useful device for cutting slots in sheet metal.

is restored to its normal flatness. Any length or size of opening or slot can be cut with professional accuracy by adjusting the wing nuts. The illustration shows clearly the simple construction of this useful fitment.—B. WILLIAMS (Walthamstow).



Pictorial sketch and circuit diagram of a handy tester.

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The New Aberdeen Transmitting Station

A Brief Description of the New Broadcast Transmitting Station near Aberdeen which was put into Service Last Week

THE new station, which will replace the old Aberdeen transmitter which has been in service for nearly fifteen years, will considerably improve reception in Aberdeen and the neighbouring districts. The wavelength will be the same as that of the old transmitter, namely, 233.5 metres (1,285 kc/s per second), but the power will be increased from 1 kW. to 5 kW.

The programme transmitted by the new station will be a composite one as before, and will contain items originating in the Aberdeen studios. Facilities for producing

motor-generator sets which provide low-tension current for the larger valves in the transmitter. A small room leading out of the machine room contains the pumps for circulating cooling water to these valves.

Control Room

The control room contains amplifiers, a radio check receiver and general testing apparatus on one side, while on the other side is the apparatus which keeps the transmitter on its allotted wavelength. The remaining piece of apparatus in the

of a single mast insulated from earth at the base. The mast is 250 feet high and has at the top a capacity ring (actually a number of turns of wire supported by eight radial rods). A red light is mounted on the top of the mast as a warning to aircraft.

The Power Supply

The power supply for the station is obtained from the mains of the Aberdeen Corporation Electricity Department at a pressure of 400 volts A.C., with an auxiliary supply at 230 volts A.C. This is brought to the station by underground feeder from the Corporation's sub-station, which is approximately half a mile from the site.

Reception

The principal improvement which listeners in Aberdeen itself should notice is in the quality of reception, while in all districts other than those fairly close to the site of the old transmitter the programme should be received at slightly greater volume. The distance at which satisfactory reception can be obtained will be increased, particularly along the coast to the north and south of the city.

Some listeners living very close to the new station may find difficulty in cutting out its transmissions in order to receive programmes from distant stations, particularly with unselective receivers. With reasonably modern receivers no serious difficulty is likely to be experienced.



In the transmitter hall: checking the operation of the transmitter, and recording meter readings in a logbook.

these local programmes will be considerably improved when the new studios now under construction in Beechgrove Terrace are completed. Programmes from Edinburgh, Glasgow or any other B.B.C. studio centre will be brought to the station by the special telephone circuits which form the simultaneous broadcasting system. The new station is situated at Redmoss, about two miles south of Aberdeen.

The Building

The station building has a single storey and is of modern design. It is built of brick, rendered externally, its approximate dimensions being 68 feet long by 44 feet wide. The building is similar in design to that at the Penmon station in North Wales, and contains a transmitter room, machine room, control room and other subsidiary rooms.

Within an enclosure in the transmitter room is the transmitter itself and facing it a desk at which the programme is controlled and checked. This differs from the practice at most previous stations where the programme-control desk is in the control room.

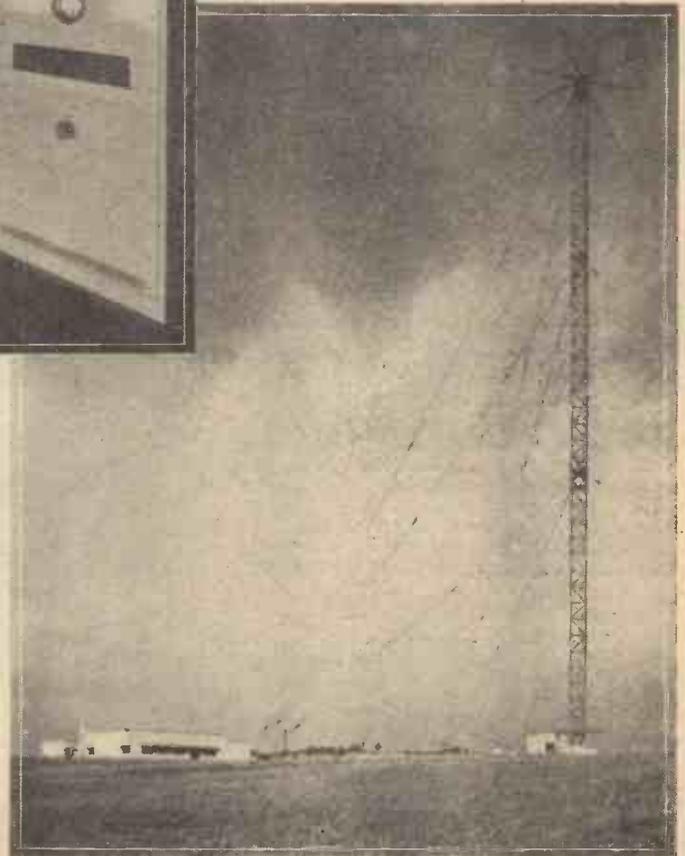
The machine room contains a switch-board from which the incoming power supply to the station is distributed, and the

control room is a transmission monitoring set which is used to measure the performance of the transmitter and to provide a ready check on its operating conditions.

As is the practice at all B.B.C. transmitting stations, the more important parts of the equipment are duplicated and so arranged that the spares can be brought into use with the minimum of delay in case of breakdown.

The Aerial

The output of the transmitter is conveyed by a tubular feeder to a small building near the base of the mast in which are the necessary coupling circuits for transferring the energy to the aerial itself. The aerial, as at other modern B.B.C. stations, consists



General view of the new Aberdeen station and mast aerial.

Listeners who may require advice on reception are invited to write to the Controller (Engineering), Broadcasting House, London, W.1. Reports on reception of the new station will be welcomed and should also be addressed to the Controller (Engineering).

The Aerial and Interference

Modern Methods of Combating Interference from Various Electrical Sources Outside the Home — By W. J. DELANEY

THERE are still hundreds of listeners who are unable to obtain clear reception owing to the proximity of unsuppressed trolleybus or tramway systems, or from nearby electrical signs and machinery. An analysis of complaints which we have received would tend to indicate that in the majority of these cases the listener is living in a flat or over a shop on a busy street where back-garden accommodation is limited. Thus the usual suggestion to erect the aerial out of the field of interference fails to provide a satisfactory solution owing to the very limited space available. There are, however, effective means of combating the trouble,

and trolleybus and similar installations also radiate the interference, but in practically every case it is found that such disturbance is radiated in a horizontal direction with greatest strength, and very little radiates in a vertical direction—in other words it is polarised in a horizontal plane. The interference dies away very rapidly, and if an interference measuring device is used it will be found that the field could be plotted more or less as shown in Fig. 1. We therefore arrive at the fact that the majority of radiated electrical interference will be found at levels below normal roof height, and thus to get out of the area of interference we must get on to the roof or above it.

Roof Aerials

Therefore, the simplest method of locating an interference-free aerial is to put it up on the roof, or support it above the roof on masts. But even so, the wire leading from the aerial to the receiver will travel through the field and thus may bring matters back to the starting point. To overcome this, however, the leading-in wire may be screened—with the screen effectively earthed—and thus interference-free reception should be obtained. There are, however, one or two snags in such an arrangement. Firstly, the screened leading-in wire will result in a

the normal field of interference already mentioned. Thus, if this aerial is erected above a chimney stack we may be reasonably sure that it will be capable of picking up signals clear of interference. There are two further points in this type of aerial, the first of which is that the leading-in cable or feeder is designed in conjunction with the transformers to be resonant at certain points in the normal broadcast band, and the makers have arranged the peaks to coincide with the wavelength of Luxembourg and Radio-Normandie. With such an aerial, therefore, improved signal strength will be provided on these stations. The Skyrod is supplied alone, or with a further wooden mast which will enable it to be erected 12ft. higher.

Community Aerials

This is one way of overcoming the interference, but there is another way which may be found preferable in certain circumstances. When the special impedance-

(Continued on page 15)

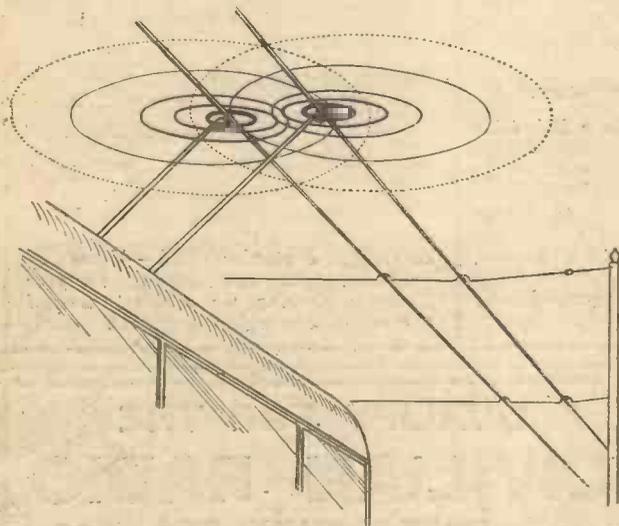


Fig. 1.—Interference from trolleybuses is mostly radiated in a horizontal direction.

and in these days it is unnecessary for anyone to put up with interference backgrounds to normal broadcast reception. The two schemes which are undoubtedly the most effective in cases such as the above are the employment of special aerials, and there are now two very good types available. One has been in existence for some time but is not so well known as it should be, and the other is a new idea in this country, and was seen for the first time in public at this year's radio exhibition. The idea underlying this second suggestion is not new but has only just been perfected and made available to the general public.

Fields of Interference

Before going into these two schemes it would be advisable first to make it perfectly clear how the interference spreads and why the aerials are necessary to cut out the trouble. Firstly, in most modern homes there are electrical appliances of one kind or another, most of which radiate interference, generally caused by sparks emanating from make-and-break contacts. Many modern devices are, however, supplied by the makers ready fitted with suppressors, but the majority of existing apparatus is not so fitted. The field of interference of such equipment is not very large, but it will definitely be within the bounds of the house. Electric signs fitted outside a building,

heavy signal loss, and secondly, the length of aerial which can be erected on the average roof is limited in length. These difficulties are overcome in the modern system by using a special leading-in cable, with matching transformers at each end to overcome the loss, and by using a vertical aerial with very good pick-up properties. In the new Belling-Lee Skyrod, the aerial is a 12ft. length of metal, made in sections, each of which is properly welded and bonded, and at the bottom of this aerial rod is the first of the transformers. This is inside a metal screen and in addition is so wound and arranged that it is at right angles to

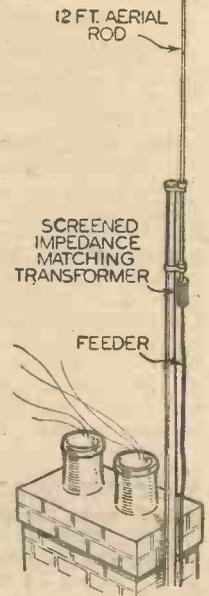


Fig. 2.—An ideal aerial for interference areas.

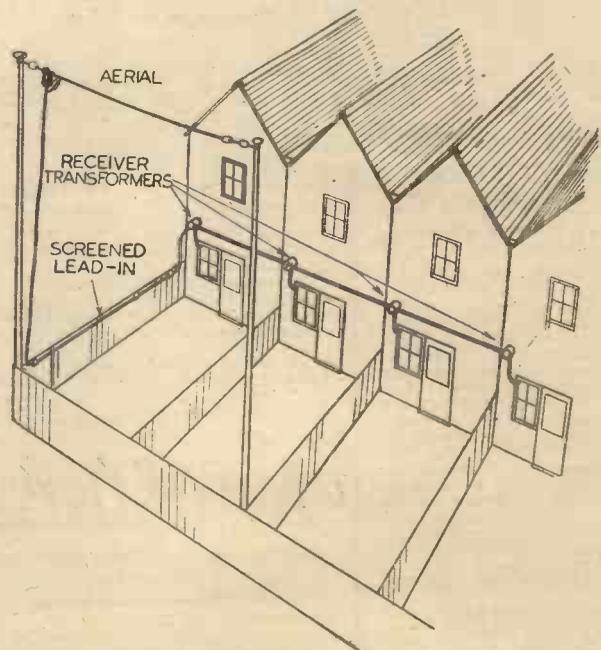


Fig. 3.—A single aerial may be erected out of the field of interference and connected to several sets by means of special transformers.

IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, September 14th.—Promenade Concert: Brahms, from Queen's Hall, London.

Thursday, September 15th.—The Birth of a Hurricane, a talk.

Friday, September 16th.—A commentary on the International Sheep Dog Trials, from the Municipal Golf Course, Southport.

Saturday, September 17th.—County Water Polo Final, commentary from West Ham Baths.

REGIONAL (342.1 m.)

Wednesday, September 14th.—Advance in the Air, a programme introducing a series of talks on Aviation.

Thursday, September 15th.—Radio Burlesque: Orchestral programme.

Friday, September 16th.—Heloise and Abelard, by Charles Lefeaux.

Saturday, September 17th.—Promenade Concert, part 1, from Queen's Hall, London.

MIDLAND (297.2 m.)

Wednesday, September 14th.—Neapolitan Song Festival.

Thursday, September 15th.—Compton Wynyates, the story of a house, feature programme.

Friday, September 16th.—Variety programme.

Saturday, September 17th.—Gramophone records: Tunes made famous by Fred Astaire.

WEST OF ENGLAND (285.7 m.)

Wednesday, September 14th, Eastward Ho, a talk.

Thursday, September 15th.—Week-end Away: Wiltshire Again, a talk.

Friday, September 16th.—A recital of West Country Folk songs.

Saturday, September 17th.—Sports Special, a feature for fans, Season 1938-9, No. 4.

WELSH (373.1 m.)

Wednesday, September 14th.—Musical Comedy Hour: orchestral and vocal programme.

Thursday, September 15th.—In Memory of Llewelyn Williams: An eye-witness account of the unveiling ceremony at Brownhill, Llangatock, and a feature programme based on the life of Llewelyn Williams.

Friday, September 16th.—Music by Welsh Composers: Orchestral programme.

Saturday, September 17th.—Band concert.

NORTHERN (449.1 m.)

Wednesday, September 14th.—Told on the Night Shift: After Midnight, a short story.

Thursday, September 15th.—Commentary on the Senior Manx Grand Prix and the Presentation of the Grand Prix Trophies from the Palace Ballroom, Douglas, Isle of Man.

Friday, September 16th.—Morecombe Merriment—2.

Saturday, September 17th.—Children's Hour: A Policeman in the Punjab, by North Regional Director.

SCOTTISH (391.1 m.)

Wednesday, September 14th.—Dance music from the Concert Hall, Empire Exhibition (Scotland).

Thursday, September 15th.—The Black Eye, a comedy by James Bridie.

Friday, September 16th.—Scottish Dance music.

Saturday, September 17th.—House of Music: An entertainment in four storeys showing the different musical tastes of a complete household.

Outside Television Broadcasts After Dark

OUTSIDE broadcasts by television have been largely confined to hours of daylight when, of course, most of the major sporting events are taking place, but the B.B.C. staff at Alexandra Palace realise that many set owners are not able to tune in during the day, and are therefore planning a series of outside events which can be included in the evening transmissions.

One of the first will be a Television Ball in the Pinewood Club, adjoining the famous studios, where the mobile units will be encamped on September 23rd and 24th. Later it is hoped to televise boxing matches from the National Sporting Club premises at Earl's Court, and to set up the cameras at Harringay and Wembley for ice-hockey and similar sports.

Get back that P-U-N-C-H in your set!

Now for the long evenings—and the realization that your set is not all that it could be. It may be "valve tiredness" . . . maybe anything. But you can quickly track down the trouble if you have an AvoMinor—quicker still if you have the popular text-book on trouble tracking—"Radio Servicing Simplified."



RADIO SERVICING SIMPLIFIED

6th Edition

This valuable text-book, written in the light of the latest radio knowledge, takes the reader in easy stages through the whole routine of testing modern radio receivers. It clearly explains the causes of faults in receiving and amplifying apparatus; describes all tests in detail. Also shows how to use radio testing instruments. 150 pages. Numerous diagrams and graphs. A real "enquire within" for radio enthusiasts.

2/6

Post Free 2/10

An accurate meter is vital in testing. The AvoMinor is a precision instrument which provides unique facilities for tracing faults. A single meter, it has 13 different ranges measuring current, voltage and resistance with accuracy.

In case with instruction book, leads, testing prods and crocodile clips 45/-

DEFERRED TERMS IF DESIRED

13 Meters 'n ONE

Current
0-6 m/amps.
0-30
0-120 "

Voltage
0-6 volts 0-240 volts
0-12 volts 0-300 volts
0-120 volts 0-600 volts

Resistance
0-10,000 ohms
0-60,000 "
0-1,200,000 "
0-5 megohms

The
D.C.
AVOMINOR

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ELECTRICAL MEASURING INSTRUMENT
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WRITE FOR FULLY DESCRIPTIVE LITERATURE
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QUALIFY FOR THE CIVILIAN RADIO RESERVE

with this wonderful new book

WIRELESS TRANSMISSION FOR AMATEURS

The importance of amateur transmitting has been recognised by the Government, as well as by radio manufacturers. This recognition has been implemented by the formation by Sir Kingsley Wood of the Civil Wireless Reserve, which invites all amateur transmitters to join. This is work of first National importance, and there is a big demand amongst experimenters for a book which will explain, not only how to build amateur transmitting sets, but also how to learn the morse code and obtain the licence. WIRELESS TRANSMISSION FOR AMATEURS deals with the subject in a simple yet fascinating way, and the text is rendered even more lucid by the use of many practical and easily understood diagrams.

HAND THIS FORM TO YOUR BOOKSELLER

who will get you WIRELESS TRANSMISSION FOR AMATEURS for 2/6, thus saving postage. Alternatively send the form with 2/6 to the Publishers and the book will be sent direct to you.

The Book Publisher, **GEORGE NEWNES LTD., Tower House,**
Southampton Street, Strand, London, W.C.2.
Please send me by return one copy of WIRELESS TRANSMISSION FOR AMATEURS, for which I enclose Postal Order for 2/6.
P.O. No. is
Name Address

George Newnes, Ltd.

P.W. 17938

THE AERIAL AND INTERFERENCE
(Continued from page 13)

matching transformers are employed with a screened lead-in they enable more than one receiver to be fed from a single aerial under certain conditions, and therefore it may be found that in some localities several houses are so situated that they cannot place their aerial clear of interference, but the end house of a row is well clear of it. In this case, a really good aerial may be placed in that garden, and all of the houses fed from a single transformer at the aerial end. This is known as a community aerial, and one important advantage is that if each listener subscribes to the cost of installation a really first-class aerial may be erected with good high masts, and they may then all obtain the advantage of the aerial improvement. The same type of screened and matched feeder is employed, and the receivers connected to it may all be adjusted independently without any interaction or interference.

Mains Interference

With these two types of aerial it should be possible completely to eliminate the pick-up of interference, but it must be remembered that complete freedom will only be obtained when every source of noise is removed and therefore, a suppressor should be included between the mains and the receiver in the case of mains apparatus, and in severe cases it may also be desirable to enclose the receiver in a completely earthed metal box. Quite a lot of interference may be picked up on the wiring of a modern receiver, although a metal chassis is employed. It should be remembered that the bottom of the chassis is open, and thus, to complete the screening it may only be necessary in most cases to place a sheet of aluminium or other metal on the bottom of the cabinet so that the chassis stands on this and screens the internal leads. Most grid and anode leads which are exposed on the upper surface of a modern chassis are already screened, and screened caps are provided for the valves, and thus it should not be necessary to complete screening round the entire cabinet.

Finally, in all cases it should be remembered that the main principles to be followed are to erect the aerial out of the field of interference, to avoid any pick-up of the interference at any part of the complete installation, and to ensure that every joint from aerial to earth is rigid and properly made so that noises will not be introduced when the aerial system or any associated equipment moves under the action of wind or anything else.

BOOK RECEIVED

"SCIENTIFIC RIDDLES," by Sir J. Arthur Thomson, M.A., LL.D. 384 pp. Scientific Book Club, London. 2s. 6d. net.

Here is an interesting volume which deals in a popular manner with the various problems and marks of interrogation with which all nature bristles. Some of the little mysteries which we encounter in our daily lives, such as the origin of life, the evolution of the instincts, remain unsolved; others, like the homing of birds, and the orchestration of our bodily functions are in process of being solved, and this book tells you how and why. It is the aim of the book to foster the inquisitive spirit by selecting examples of the thousand-and-one scientific riddles and to discuss them in non-technical language in an endeavour to increase the interest in our life.

SHORT-WAVE BARGAINS

● NEW N.T.S. TESTED CIRCUITS ● BAND-SPREAD TUNING ● AMAZING VALUE PLUS—

FREE VALVES!

New S.G. 4 BANDSPREAD SHORT-WAVE KIT

WAVERANGE 9-200 METRES.

LIST VALUE £4 19 6 **BARGAIN CASH C.O.D. 49/6**



OR YOURS for 3/6 down and 12 monthly payments of 4/3.
A real station center for loudspeaker and 'phone work. Supplied absolutely complete, this new N.T.S. Kit represents an amazing bargain. Never before has such an efficient, easy-to-tune 4-valve short-wave been offered to the enthusiast and the beginner for the enjoyment of the thrilling transmissions to be found on the short waves. Listening in on the short waves is an amazingly interesting hobby, and the importance of it has been recognised by the Government—hence the formation of the Civil Radio Reserve. Only N.T.S. are in the position to offer such a wonderful bargain and you should hurry and post your order NOW.

- As illustrated, 4-valve aperiodic H.F. reacting detector and 2 L.F. resistance and transformer coupled circuit. ● Pentode output. ● Slow motion bandspread tuning SIMPLIFIES WORLD-WIDE LISTENING. ● LOW LOSS reaction condenser. ● Air-spaced bandspread and tank condensers. ● Special ANTI-BLIND-SPOT CONDENSER. ● Calibrated scales in degrees and 10ths.
- L.F. transformer. ● 2 H.F. chokes. ● Aperiodic H.F. Amplification. ● 3 six-pin coils (12-26, 22-47, 41-94 metres).

FREE! NEW N.T.S. SHORT-BOOK

Containing full descriptions with photographs of the complete range of bargain Bandspread and World kits and amplifiers with useful data for enthusiasts. Post coupon NOW for your FREE copy.

NEW 2-VALVE BANDSPREAD KIT

List Value £3 19 6 **BARGAIN 39/6**

Bandspread tuning is one of the outstanding features on this excellent receiver, which renders short-wave reception as easy as that on the broadcast bands. As simple to build as the 3 or 4-valvers. COMPLETE KIT, comprising high-grade components only. 3 coils, 12-94 metres, and building instructions. 2 matched British battery valves, Det. and Pentode output, given FREE. List value £3-19-6. Bargain 39/6 or 2/6 down and 12 monthly payments of 3/6.

NEW 3-VALVE BANDSPREAD KIT

List Value £4 7 6 **BARGAIN 42/-**

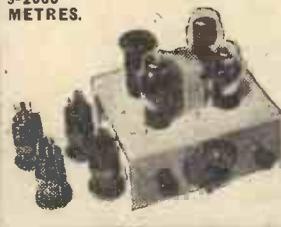
Again, bandspread tuning plays its all-important part in the simplification of short-wave reception on this splendid new N.T.S. receiver. You will be amazed and delighted at the number of stations that roll in at the twist of a knob—clear, vivid, powerful. A truly wonderful triumph of N.T.S. Short-Wave designers. COMPLETE KIT for loudspeaker and 'phone work, appearance, and comprising all parts like the 4-valver illustrated. Includes 3 coils 12-94 metres, wiring diagram and comprehensive instructions. 3 matched British battery valves comprising efficient Detector, L.F. and distortionless output Pentode given FREE. List value £4-7-6. Bargain 42/- or 2/6 down and 12 monthly payments of 3/6.

2/6 DOWN

BUILD FIVE SHORT-WAVE OR ALL-WAVE SETS

9-2000 METRES.

FOR THE PRICE OF ONE with this **New N.T.S. "PENTA-KIT"**



- Short-Wave Adaptor
- Short-Wave Converter
- 1-Valve All-Wave
- 2-Valve All-Wave
- 3-Valve All-Wave

Designed specially for efficient short-wave or all-wave work. 3 Short-wave ranges. Employs famous B.T.S. self-locating 6-pin inductors with wave range of 9-2000 metres. Kit comprises slow-motion tuning and reaction condenser, L.F. transformer, all-wave and short-wave chokes, fixed condensers, reedy drilled steel chassis with all holders fitted, engraved slow-motion dial, 6 coils and all instructions. 3 matched British battery valves comprising highly efficient Detector and L.F. and Pentode output given FREE. List value £4/10/0. Bargain 42/- or 2/6 down and 12 monthly payments of 3/6. ONE OF OUR MOST OUTSTANDING OFFERS.

2/6 DOWN

SPECIAL OFFERS

New light weight super-type HEAD-PHONES, recommended for short-wave work and testing. LIST VALUE 15/- BARGAIN 3/6 Postage 6d. extra.



- SPEAKERS. 1 M's, well-known makes, 8in. cone, for Power or Pentode, 12/6. Goodmans and Celestion 6 1/2in. FM's, 7/6 Mains Energised. Rola, 6 1/2in. cone, Pentode Output 2,500 ohm, 10/6. ALL NEW.
- TRICKLE CHARGER, 2v. 1 amp. Model, Metal Rectifier, 10/-
- STRAIGHT THREE Chassis, less valves, fully tested, 12/6.
- KNOBS. 1 doz. assorted control knobs, 1/-
- VOLUME CONTROLS, POTENTIOMETERS. Well-known makes, all values up to 1 meg., 2/-; with switch 2/6.
- VALVE SCREENS. 3 portion, latest type, 1/- each.
- MARKET'S GUARANTEE 11 DECCA brand new 1938 6-valve all-wave AC receivers. 12-2,000 metres, Spread Tuning, AVC, P.U. sockets, provision for ex. speaker. Beautiful cabinet. 5 watts output. List 13/ gns., N.T.S. price 7 1/2 gns. cash or C.O.D., or yours for 7/6 down and 18 monthly payments of 10/-. Brand new, sealed cartons. Model 99.

4/11
POST 9d. EXTRA

SPLENDID N.T.S. BARGAIN

SPECIAL NEW OFFER.—Bargain parcels comprising universally ready-drilled brand-new steel chassis, transformer, 6 resistances, 6 condensers, 2- or 3-gang tuning condenser, reaction condenser, potentiometer, choke and coil; for battery or mains sets. State which when ordering. Amazing value for constructors and servicemen; will save you £ 2 1/2's. Yours for 4/11, post 9d. Order early.

3 MATCHED VALVES

(Value 35/-) FOR 5/6!

Complete with 3 valveholders, and post free. AN investment for every set owner and constructor. 3 matched, brand-new world-famous Philco 2-volt battery-type valves, comprising 2 S.G. H.F.'s and 1 Output Pentode, packed in original cartons. Three different valve types indispensable for modern constructors' circuits (available on request) using any number of valves, invaluable also for replacement purposes. Offered to you at a fraction of manufacturer cost... a real scoop in N.T.S. bargains. Order now while supplies hold out!

New Times Sales Co.

56 (P.W. 4), LUDGATE HILL, LONDON, E.C.4. City 5510.

Please send me CASH/C.O.D./H.P.:

together with your Free new illustrated Short-Wave and Amplifier Booklet and Bargain Lists.

NAME

ADDRESS

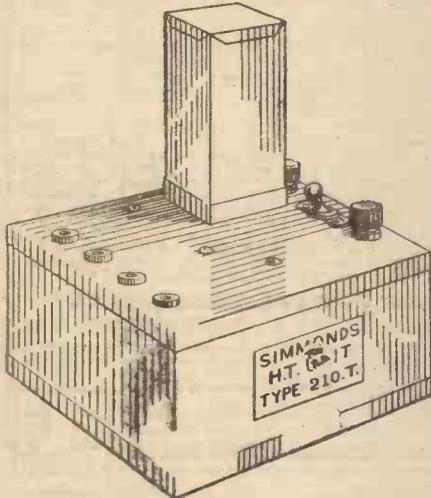
EST. 1924.

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NEWS FROM THE TRADE

Simmonds H.T. Unit

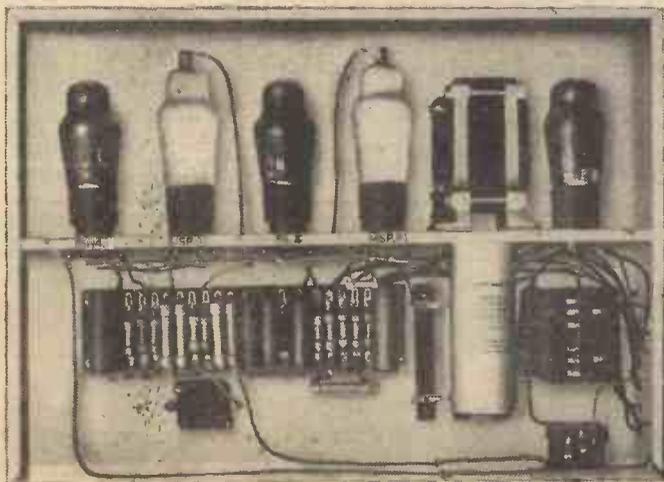
THE supply of high-tension voltages from a small accumulator is common practice in car-radio apparatus, but the scheme has not yet become very commonplace for ordinary domestic receivers. The listener who has no mains facilities is normally forced to use H.T. batteries, and owing to expense he is generally restricted to 120 or 150 volts. Unfortunately, the battery quickly falls to a somewhat lower voltage, and for the main part of its life the receiver is being run on a rather inefficient voltage. All the difficulties appertaining to battery supplies may, however, be over-



A 2-volt H.T. unit with vibratory rectifier.

come by using the mains unit which is fed from a battery, and which converts the low voltage into an interrupted supply which is in turn stepped up to the necessary high voltage for supplying H.T. The Simmonds unit illustrated above is designed for operation from a 2-volt battery and delivers 120 volts at 10 mA. Other models are available as follows:

MODEL	CONSUMPTION		OUTPUT		PRICE
	Volts	Amps.	Volts	M/a	
210 T	2	1.2	120	10	£3 5 0
410 T	4	.5	120	10	£3 5 0
610 T	6	.34	120	10	£3 5 0
220 T	2	2.7	135	20	£3 10 0
420 T	4	1.13	135	20	£3 10 0
620 T	6	.65	135	20	£3 10 0
Replacement Vibrators for all above models (Old one must be returned)					9 6



One of the Television Units, from the new Haynes Radio range.

The unit illustrated was tested on a standard three-valve receiver with an S.G. H.F. stage, and results were most satisfactory. There was no hum or radiated interference, and a very small 2-volt cell was used to operate it. We may recommend the unit in confidence, but it should be borne in mind that the type of unit should be carefully chosen according to the load of the receiver with which it is to be used.

Car-Radio Installation

AN interesting book, entitled "Guide for the Installation of Car Radio Receivers," has been produced by Masteradio, Ltd., of 1, Newton Street, High Holborn, W.C.2. This deals with all the problems of car-radio, including interference, and has several blank pages for the insertion of memoranda. The book may be obtained on application to the firm in question, price 1s. They can also supply a neat car aerial for undercarriage use, with which no drilling is required. This costs 15s. 6d.

Haynes Radio

THE new season's catalogue is now ready and illustrates the various Haynes Radio products. These include amplifiers employing the Duophase circuit, table-model receivers, radiograms, loudspeakers, amplifiers, mains transformers, microphones and television equipment. The illustration below shows one of these, and it will be noted that the layout and design is greatly simplified. This is the Line Time Base, and costs £8 complete. A similar unit for the frame time base is available at £7 10s. Special tuner units for either local or local-distance reception are also supplied by Haynes Radio, and these, together with the various types of amplifier available, enable the constructor to assemble a really good domestic broadcast receiver. Full details

will be found in the catalogue which may be obtained on application to Haynes Radio, at Queensway, Enfield, Middlesex.

Evrizone Super Tuner

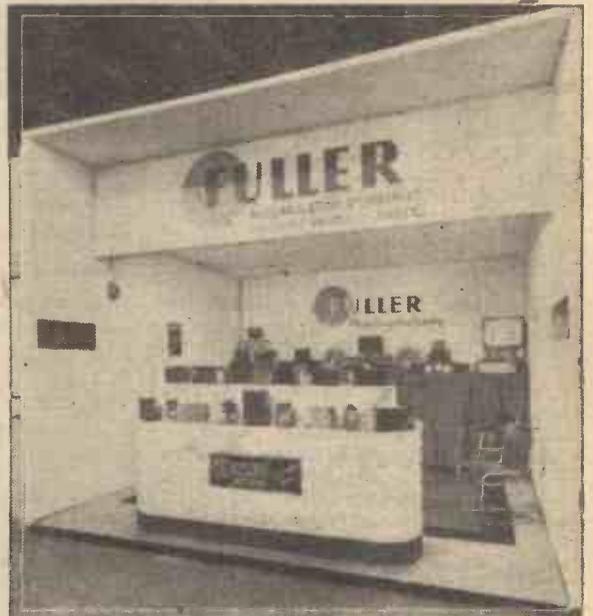
FOR constructors who wish to build a modern all-wave superhet, but have their own preferences in certain parts of the circuit, the Evrizone Super Tuner should prove of interest. This consists of a complete unit on a tinned steel chassis covering five separate ranges—60 to 36

kc/s, 37 to 15.5 mc/s, 15.5 to 7.5 mc/s, 8.1 to 3.9 mc/s, and 4.05 to 1.7 mc/s. Frequentite trimmers, low-loss coils and a special type of wave-change switch are fitted, and only seven connections are necessary to bring the tuner into circuit, which should consist of an H.F. stage, 1st detector, separate oscillator, L.F., etc. Band-spread tuning by means of ganged condensers is utilised, and clock-face tuning dials for both band-setter and band-spreaders are provided. The price of the unit is £4 10s., and blueprints of the coil unit and of a suitable receiver are supplied for 2s., post free. These are included free to purchasers of the unit.

G.E.C. Television Set Records

RADIOLYMPIA orders for G.E.C. television sets have come in so well, we are informed, that the factories at Coventry are working overtime.

"At the outset of the show we were able to supply sets on demand," a G.E.C. official stated, "but now we are having to have five or seven days' notice. If orders continue at this rate during the coming



The neat stand showing Fuller components at Radiolympia.

week we shall need from ten to fourteen days.

"All the original Radiolympia stocks of two of our models are already depleted. These are the 37-guinea console model, and the 23-guinea vision-unit.

"Hutton's record Test score did a great deal to help sales, because of the great crowds he attracted to the show. Many people did not realise till they watched the match what a very advanced stage television reception has reached.

"Another factor that has influenced sales is that people realise that prices are now so reasonable that they cannot be expected to fall again for a long time."

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM.

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

ITEMS OF INTEREST

Putting the Wire in Wireless

THERE can be hardly anyone who still thinks that a wireless set is an instrument without any wires, but at the same time there can be very few people who realise what a colossal amount of wire is needed to bring radio entertainment into their homes. The General Electric Company estimate that since Radiolympia, 1937, they have used 200,000 miles of wire in the manufacture of radio sets—enough to wind eight times round the Equator.

"This figure, of course, takes into account the use of multi-strand wire for such purposes as the aerial coil," a G.E.C. official explained, "but it must be remembered that each strand of multi-strand wire has to be made and tested with as much care as single-strand wire.

"The gauge of some of the copper wire used in the production of G.E.C. sets has to be accurate to 1/10,000th of an inch.

"All the wire we use is subjected to the most stringent tests. There is, for example, the pin-hole test. The wire is put through an apparatus which can detect a blemish even as small as a pin-hole in it, and if there are more than a certain number of 'pin-holes' in a certain length, the whole supply is rejected."

"One in a Thousand"

ANYONE who sees for the first time the amazing ease with which the press buttons on the Philips 753 receiver can be altered to any desired group of medium and long-wave stations, may be inclined to wonder how such extreme simplicity can be combined with the essential quality of tuning accuracy. To change the station setting, it is only necessary to press a button, wait for the tuning pointer to come to rest, and then tune in the station in the normal way with the manual tuning knob.

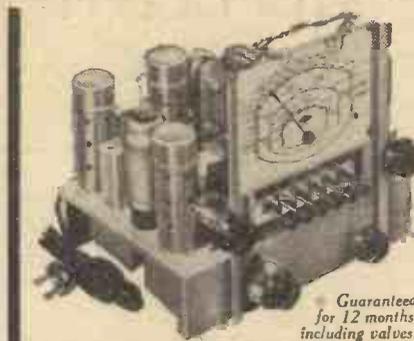
Once the working of the mechanism is understood, however, it becomes immediately apparent that "dead centre" accuracy is as much an integral part of the design as is the ease of changing the station settings, due to the extremely clever mechanical system of station selection of the Philips motor-driven system.

Without going into a lengthy explanation, it may be said that the basis of the design is the use of eight selector drums—one for each station button. Pressing a button starts the tuning motor, and this causes the drums to revolve. As soon as the particular drum reaches the point corresponding to the station to which it has been set, a locking pin attached to the key that is depressed drops into a locking hole in the drum, thereby stopping it dead on the station and at the same time switching off the motor.

To set the button to a new station, it is only necessary to turn the tuning mechanism by means of the manual tuning knob, so that the position in which the drum is locked corresponds to the tuning point of the new station.

The "dead centre" accuracy, which is also an important feature of the system, depends on the amount by which the position of the drum can vary when it is locked by the pin, and the mechanism of the Philips motor-driven system has been so carefully thought out and made that the greatest variation which is possible is less than one part in a thousand!

MODERNISE YOUR OLD SET



Guaranteed for 12 months, including valves.

6-VALVE ALL-WAVE A.C. MODEL 909.

SPECIFICATION: As illustrated. Advanced 6-valve 8-stage A.C. superhet, 3-watt high-fidelity output. 4 Wave-ranges, 10-25, 22-63, 200-550, and 900-2,600 metres. Circuit: pre-R.F. selector coupled to R.F. amplifier transformer coupled to triode hexode frequency changer, bandpass I.F. transformer coupled to I.F. amplifier, bandpass transformer coupled to double diode triode providing rectification, A.V.C. and first stage L.F. amplification, resistance-capacity coupled to output power pentode. Illuminated, station-named calibrated dial. Six-station Press-Button Tuning. Manual tuning, 50:1 ratio Combined on-off switch and volume control. Tone control. Size 11 1/2 in. x 9 1/2 in. h., 8 1/2 in. deep. Supplied complete with all valves, knobs, and escutcheon. Guaranteed, fully tested. Cash or C.O.D. £8:19:6 or 10/- down and 18 monthly payments of 11/3.

MODEL 908.

SPECIFICATION: Modern 5-valve 7-stage A.C. superhet, with 3 wave-ranges: 18-2,000 metres. Six station Press-Button and Manual (30:1) tuning. Illuminated station-named calibrated dial. Combined on-off switch and volume control. Tone control. 4-position switch for 3 wave-bands and gram. Circuit: R.F. amplifier, followed by triode hexode frequency changer bandpass coupled to I.F. Amplifier, followed by double diode output pentode giving 3 watts audio output. Full-wave rectifier, with smoothing circuit. Supplied complete with 5 valves, knobs and escutcheon. Guaranteed, fully tested. Cash or C.O.D. £7:29:8, or 7/- down and 18 monthly payments of 10/3.

If required with Matched Speaker add 27/6 to cash price or 1/9 to deposit and each monthly payment.

PETO-SCOTT CO., Ltd. 77 (Pr.4), CITY ROAD, LONDON, E.C.1
Telephones: Clerkenwell 5011 and Old 9875

FIT A PETO-SCOTT 1939

PRESS-BUTTON ALL-WAVE CHASSIS

Replace your set now with a Peto-Scott chassis and a really modern receiver will be yours at a considerable saving in cost. The range of Peto-Scott combined press-button and Manual control receivers come as a blessing to those who wish to enjoy radio with no fuss or bother whatsoever. The buttons of each set are pre-set for six of the principal stations, switch on, press a button—and that's all! Changing the settings to other stations from time to time is a simple task accomplished in a few seconds without even opening up your set. For ordinary Manual tuning and all-world reception the right hand knob is flicked slightly to one side. The Peto-Scott Press-Button Unit has none of the fragility and complication of electrical systems. It is a positive mechanical action, unaffected by climate or atmosphere, and, by test, the most reliable. The only "power" required is a gentle pressure of the finger. All models in general appearance as illustrated with similar dial, tuning and press-button arrangements.

MODEL 905. Battery and A.C. Mains. Supplied complete

A.C. MODEL. Wave-range 10-2,000 metres. Station-name dial. 4-valve, 6-stage circuit, with variable-mu triode hexode frequency changer, bandpass coupled to H.F. pentode as I.F. amplifier, also bandpass coupled to double diode output pentode, providing rectification delayed A.V.C. and 3 watts output. 6-station press-button and manual tuning. Volume and tone controls. Chassis size 11 1/2" x 9 1/2" h., 8 1/2" deep. Guaranteed, fully tested. Cash or C.O.D. £8:19:6 or 5/- down and 18 monthly payments of 8/10.

BATTERY MODEL. Sensitive 4-valve, 7-stage circuit with

filter to triode pentode frequency changer, Litz-wound transformer coupled to H.F. pentode as I.F. amplifier similarly coupled to double diode triode followed by output pentode. Wave range and chassis size as A.C. model. 6 station press-button and manual tuning. Station-name dial. Low H.T. consumption. Guaranteed fully tested. Cash or C.O.D. £5:12:8, or 5/- down and 18 monthly payments of 7/-.

If battery type chassis required with matched moving coil speaker add 21/- to cash price or same deposit but add 1/4 to each monthly payment.

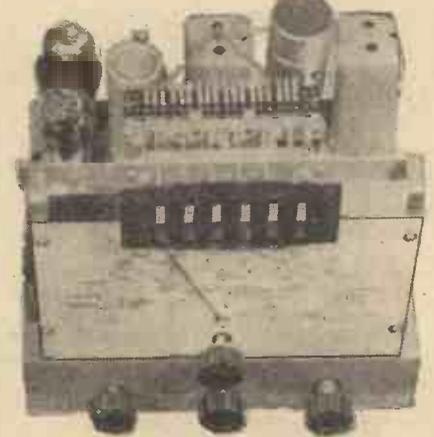


SEND NOW for beautifully illustrated catalogue fully describing all above sets in chassis form and complete with speaker and cabinet. We are stocking all leading makes of receivers, accessories and testmeters available on lowest easy terms. Get our quotation first.

ARMSTRONG 7-STAGE

All-Wave Radiogram Chassis incorporating Push-button and Manual Tuning, supplied complete with 8in. Matched Moving-Coil Speaker, model A.W.3PB. Price £7 18s. 6d. complete.

Call at our Showrooms and hear this latest chassis. Specification: New method of Push-button Tuning incorporating genuine Silver Mica Condensers to obviate station drift, principal Medium Wave Stations and Luxembourg can be obtained by the Push-button method. All latest refinements, including large Tuning Scale calibrated in degrees and station-names on all wavebands. Short-wave covers all principal bands from 15.9 to 50 metres. Volume and Tone Controls work on Gramophone as well as Radio, Pick-up Leads may be permanently connected. Moving-coil speaker made especially for chassis.



Packing and Carriage Free. 7 Days Trial. Carriage Pa.d. Armstrong 12 months guarantee. The above is only one of many attractive models and full details will be sent on application. 8 New Models, send for Catalogue. ARMSTRONG MANUFACTURING Co. 100, ST. PANCRAS WAY (Formerly King's Road), CAMDEN TOWN, N.W.1. Phone: GULiver 3105.

ELECTRADIX BARGAINS

SMALL A.C. MAINS MOTORS.—Enclosed self-start. A.C. 1/80 h.p. with pulley. Type 40, 1,500 revs., 18/6. Type 36, 1,200, 1/25 h.p. G.E.C. 3,500 revs., 27/6. Induction, 1/10 h.p., 3,500 revs., 35/-; 1/2 h.p., self-starting, 1/22 revs., 55/-. SMALL D.C. MAINS MOTORS.—1/10 h.p., Type 60, 220 v., K.B. series, 1,750 revs., 15/-. Ditto, 1/40 h.p., G.E.C. 250 v. series, 2,000 revs., 16/-. Ditto, 1/13 h.p., Croydon 110 and 230 v. shunt, 1,700 revs., 30/-. M.G. for A.C., 220 v. to 100 v., 1 amp. D.C. 60/-, 100 v. 15/-. All fully guaranteed.



ROTARY CONVERTERS for A.C. sets on D.C. mains. 7-watt P.M. model, 35/-; 15-watt 220 D.C./220 A.C., ball bearings, lam. field, silent running, enclosed, 65/-. Larger sizes 50 watts, 100 watts and 200 watts to 3 k.w. M.G. D.C. 220 v. to 6 v. 5 amps, 65/-; DOUBLE CURRENT GENERATORS, D.C., 600 volts 100 mA., and 6 volts, 3 amps, 20/-; FIXED CONDENSERS for motor interference, smoothing jobs, 5,000 Mansbridge 1 mfd. Condensers to clear at 2/- doz., 20/- gross. Large range of H.T. Condensers up to 8,000 volts.

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AUTUMN VARIETY BROADCASTS

READERS will be interested to know that John Watt, B.B.C. Director of Variety, guided by the results of last winter's research scheme, in which 2,000 variety listeners kept a log of their listening, has prepared a schedule for autumn variety broadcasts that revives a number of established favourites, and introduces several new series of programmes featuring mystery, romance, and general interest.



John Watt, B.B.C. Director of Variety, at his desk with piles of correspondence relating to one of his questionnaires.

The following selection shows the varied character of the programmes:

- "Monday at Seven," with Inspector Hornleigh investigating further baffling crimes, returns to programmes on October 17th; a fifty-minute show to be broadcast every Monday.
- "Puzzle Corner," formerly a feature in "Monday at Seven," will be developed. As a twenty-minute "brain dusting" programme in which the listener may take part, it will be broadcast every Monday evening immediately before "Monday at Seven," from October 17th.
- "For You, Madame," a new type of programme—mainly for women—with a romantic flavour, will be broadcast fortnightly on Tuesday nights from October 18th.
- "The Legionnaires," a series of the "Beau Geste" type, each of its programmes having a self-contained "plot" and rousing male choruses, to be broadcast fortnightly on Tuesdays from October 4th. From October 18th, it will immediately follow "For You, Madame."
- "Matinée," a fortnightly programme from October 3rd, featuring Dorothy Hogben's Singers and Players.
- "What Happened at 8.20?" a number of variety-mystery programmes, for which well-known authors of detective stories have been commissioned to write scripts, will be broadcast on alternate Fridays, from October 7th.
- "Famous Music Halls," a new interest programme to alternate with "What Happened at 8.20?" on Friday nights from October 14th, will review the history of eight notable halls in various parts of the country. Each programme will end

with an excerpt from the stage of the theatre under review.

"Music Hall" will return to programmes on September 24th. It will alternate, as the big Saturday night variety show, with:

"Sing Song," which, in view of its success during the summer, is being continued, its time reduced to one hour.

"In Town To-night" will begin its sixth season with its 167th performance on October 8th. The programme will include studio interviews by only one interviewer instead of several as before; and five minutes of the half-hour will be devoted to microphone interviews at street corners in London, the Home Counties and, later, the provinces.

"Band Waggon" will resume its melodious journey on October 5th, with "Big-Hearted" Arthur Askey back] as

resident comedian, Richard Murdoch, and Phil Cardew and the Band Waggoners.

"Scrapbook for 1923" will be broadcast on October 11th and October 13th, and "Scrapbook for 1903" will be included in programmes early in December.

Another "Stargazing" feature is being prepared for broadcasting in the first week of November.

Howard Thomas is writing the script for the third "Showmen of England" programme, to be broadcast on October 25th and October 26th. A fourth may follow before Christmas.

"You Shall Have Music," with Louis Levy conducting the Augmented Variety Orchestra, will be continued fortnightly from October 10th.

Dance band productions during the quarter will feature Jack Payne, Geraldo, Carroll Gibbons, Benny Frankel, Jack Hynton, and Eddie Carroll and their bands.

"Kentucky Minstrels" will return for three broadcasts during the quarter.

Three day-time variety shows, "Afternoon Calling," will be broadcast weekly from October 6th. They will feature a suburban couple—Mr. and Mrs. Whiffleton" (played by Charles Penrose and Fay Dawn); a half-hour "musical at home" programme.

There will be further "Band Boomerang" programmes, the first on October 7th, in which one band in London and another in America will play alternate numbers.

Three relays of dance bands—one a month—will come from Continental capitals, the first on October 4th, alternating with three others from America, the first on October 21st.

LETTERS FROM READERS

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).

A DX Log from Newcastle-u-Lyme

SIR,—I enclose a log of the best DX amateur signals on 14 mc/s 'phone and C.W. received here during the month of August.

HK3LC, J2XA, K4EVC, 5AG, 6BNR, PPR; NY2AE; PK1MF, MX, VY, 4DG; PY1MH, 2CK, U9ML; VE3AH, NF, 4OB, 5AHB, EF; VK2AEK, AGJ, AIB, KZ, 3HG, 5CS; VQ2HC, 3HJP, 4KTB; VU2BG; W5ACA, CYC, EHM, GEE, 6BUO, CQS, GRL, GVM, HFB, HLP, IKQ, JK, KY, MCG, NGA, NTR, OI, ONG, OZT, PCS, PMA, PWR, RK, RZ, 7EGV, FCD, FJS, FWR, GGE, GK; ZL3FZ, GR, 4FT, and ZS6DM.

The receiver is a battery 0-v-1, using 'phones, and the antenna is an inverted "L," 30ft. top, ENE-WSW, about 25ft. high at mast end. Hoping this will be of interest to other readers.—H. OWEN (Newcastle-under-Lyme, Staffs).

From a Reader in the Canary Islands To the Experimenters :

SIRS,—Before anything else, my very sincere thanks for the trouble you have taken over the queries in my first letter to you, especially for the circuit given in a following number of PRACTICAL AND AMATEUR WIRELESS, which is exactly what I wanted as a baseboard, or chassis, on which to start work.

I have just received two numbers together, in one of which I see you have published my description of the test panel. In the second one is your article explaining the fundamental difference between a "straight" and a "superhet"; this, in conjunction with your advice from the start, is making me rather favour a superhet as my "super-super set"—but time and experiments will show.

Since I started wireless as a hobby I have collected a lot of "junk"—not so much useless as old-fashioned—and my idea is to build up five receivers with this stuff, plus a few new oddments, if necessary, and then, with the experience so gained, start serious work on my own set. As valves are unfortunately not to be found in my junk boxes, I have ordered a few new ones, round which I shall build the above sets; actually, I think about seven will be enough, as I shall use as far as reasonable the same type of valve in each similar stage in each set. If by any chance the set or sets merit it, I shall get valves for it permanently.

First of all, there is the test panel, but though I am still waiting for the parts I ordered they should soon be here.

Second: a small 3-valve set for local station use, i.e., 200 to 500 metres approx., though I expect to be able to get European stations with it during the winter. This must be simple to operate, and will, if successful, be relegated to the nursery. The circuit will be: 1 H.F. stage, H.F. pen. as detector, and power triode output.

Third: a 3-valve S.W. receiver—say,

10 to 100 m. using plug-in coils—this, if successful, will make a good standby to my future set, or be useful for DX work when the other is required by the family for entertainment purposes. Circuit: 1 H.F. stage, H.F. pen. as detector, and ordinary triode output, 'phones generally.

Fourth: a 4-valve set, with three ranges, and necessary switching, say, 13 to 50 metres, and 200 to 500m. This, if successful, I shall pass on to my father, in place of his present set which is one of my first efforts. Circuit: 1 H.F. stage, tri. or H.F. pen. detector, driver and Class "B." Stentorian L.S. (new, if warranted).

Fifth: a 4-valve portable, for taking into the country on picnics and so on; ranges, 13 to 50 m., and 200 to 500 m., plug-in coils or switching. Circuit: 1 H.F. stage, det., L.F., pen. (or tetrode).

Sixth: a 5-valve radiogram—wave-ranges, 13 to 50 m., 200 to 500 m., 800 to 2,000 m. approx. Class "B" output, but otherwise still very hazy as to other details, except that it will have one H.F. stage.

You will have noticed that all sets have an H.F. stage, and this is to minimise any possible interference with other receivers, as aerial reaction is prohibited here by the regulations.

Incidentally, am I correct in supposing that a tuned H.F. stage does help to minimise interference if the reaction is turned up too high by mistake? I don't think it avoids it altogether.

All these receivers will be "straight," as the parts I have, and wish to use, are not suitable for superhets.

Once again my most sincere thanks for your most helpful advice, and with your permission I intend to write you occasionally with notes as to how I am getting on with my "Junk Box Experiments."—F. LAWSON (Las Palmas, Grand Canary).

PS.—I hope "Thermion" got excessive recognition at Radiolympia.

[We were very interested in your letter, and the details of the set construction work you have planned, and shall be glad to hear of the results of your experiments. You are correct in your supposition that a tuned H.F. stage helps to minimise radiation interference.—Ed.]

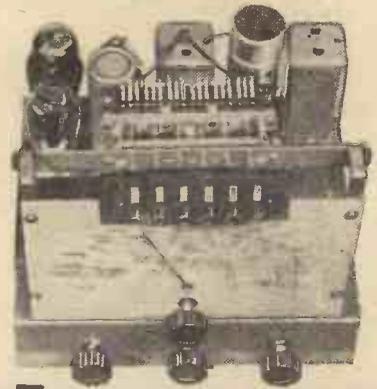
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3 MINUTES FROM SCHAUS

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ON THE AIR

Extended Broadcasts from Colombia

HJ1ABP, Cartagena, on 31.25 m. (9.6 mc/s) may now be logged nightly on weekdays until G.M.T. 06.00; the programmes are extended for a further hour on Sundays. Concerts usually open with the playing of Sousa's march, *El Capitan*, the interval signal consisting of three chimes—the last one on a high-pitched note—every fifteen minutes, with an occasional bugle-call. Address: Radiodifusora Cartagena, S.A., Apartado Postal, 37, Cartagena (Republic of Colombia), South America. Other stations in that city are HJ1ABE, *La Voz de los Laboratorios Fuentes*, previously on 31.58 m. (9.5 mc/s), and now reported on 61.73 m. (4.86 mc/s), with a power of 5 kilowatts; HJ1ABM, an experimental transmitter working on 21.23 m. (14.125 mc/s), 1 kW., and HJ1ABD, *Ondas de la Heroica*, also 5 kW., on 62.11 m. (4.83 mc/s).

Altered Wavelength

HS8PJ, Saldaeng, Bangkok (Siam), so far on 31.58 m. (9.5 mc/s), has slightly altered its frequency, and will now be found on 31.55 m. (9.51 mc/s), in order to be free of interference. The power of the station has been increased to 10 kilowatts. Broadcasts are carried out every Thursday between G.M.T. 13.15-15.15, and at the same time on Monday on 15.77 m. (19.02 mc/s).

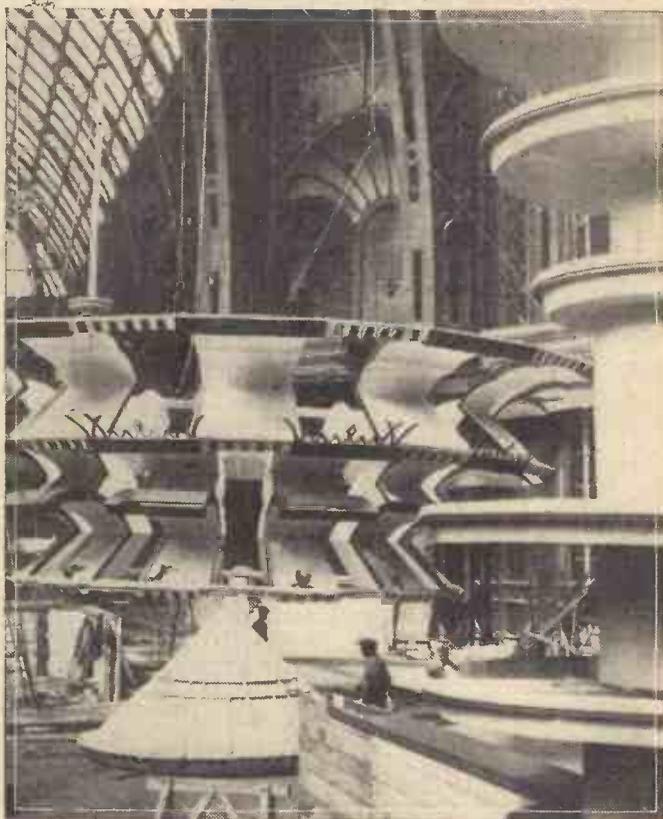
Cubans also Increase Power of Broadcasts

It is officially reported that both COCD and COCX, Havana (Cuba), have increased the power of their transmitters

to 5 kilowatts; they work on 48.94 m. (6.13 mc/s) and 25.75 m. (11.65 mc/s) respectively. For COCD reports should be addressed to: *La Voz del Aire*, S.A., Avenida de los Presidentes y 25, Vedado, and for COCX, to Señor Francisco Lavin, Casa Lavin, Avenida de Bolivar, 76, both being situated at Havana (Cuba).

The Extension of Prague-Podebrady

TO its existing short-wave network the Czechoslovak Government is adding two 30-kilowatt stations which will be opened towards the end of the year, namely, OLR7C, on 13.86 m. (21.64 mc/s) and OLR7B, on 13.91 m. (21.565 mc/s). OLR2C, now on 49.06 m. (6.115 mc/s) will operate on 48.62 m. (6.17 mc/s) with a power of 30 kilowatts after January 1st, 1939.



Work has commenced on the Radio Exhibition to be held at the Grand Palais, Paris. Here is one of the stands in the course of erection.

YV5RS

YV5RS, at Caracas, not so far logged, is a 250 watter, on 51.41 m. (5.835 mc/s). The address is: Radiodifusora YV5RS, Estudios Universos, Caracas (Venezuela).

BATTERY SET DEMAND UNDIMINISHED

THE undiminished demand for battery-operated radio sets, despite the constant extension of electricity supply to the outlying districts of the United Kingdom, is a sales factor of special significance to the radio trade this year. Commenting on this development recently, a sales executive of the General Electric Company, Ltd., said:

"Battery sets still represent from one-quarter to one-third of the total home consumption of receivers, and although no substantial increase is recorded, in reality the battery set demand reveals that thousands of new buyers are making up for the ever-increasing transition to electrically-operated receivers of every type.

"We attribute this to the extremely high performance quality of the modern battery receiver, the longer life and improved characteristics of present-day batteries, and the inclusion of luxury features on a par with those on the best mains-operated sets.

"All the evidence proves that in the country districts there is still a very large untapped market for battery sets of good quality; and that even where electricity exists a good battery model still enjoys a considerable popularity.

"As a result," said this executive, "we have increased our battery set range for 1939 to four types, three of them all-wave models, while luxury features include the latest press-button tuning system. Battery set owners are among the most critical of listeners, and sets for this market must be beyond reproach."

RADIO PARS FROM THE U.S.A.

DEON CRADDOCK, WLW blues singer, who began to reduce two months ago, again has that "school-girl" figure. She reduced by swimming, golfing and other outdoor activities.

RIKEL KENT, WLW casting director, who shaved his upper lip three years ago after wearing a moustache for several years, again is cultivating a hirsute adornment.

NIXSON DENTON, sports editor of the Cincinnati *Times-Star*, who is teamed with Red Barber in the WLW Sports programme, 6.15 p.m., E.S.T., daily except Sunday, spends his odd hours cruising the Ohio River aboard his craft the *Jeep*.

JAMES LEONARD, WLW announcer, is vacationing in Washington, D.C., his former home.

BILL EDWARDS, of the WLW announcers' staff, dashes home at noon daily to see his two-months-old daughter, Julia Beverly, get her daily bath, then dashes back to tell how she splashed him with water.

JOHAN CONRAD, recently of KWK, St. Louis, has been appointed to the special events department of WLW and WSAI. With the addition of Conrad to the WLW-WSAI staff, the Crosley stations now have two Variety Award winners.

RADIOLYMPIA ATTENDANCES

The following are the official attendance figures for Radiolympia.

	This Year.	Last Year.
Wednesday ..	8,418	9,246
Thursday ..	13,245	14,743
Friday ..	9,290	12,156
Saturday ..	21,106	29,482
Monday ..	12,052	13,205
Tuesday ..	13,094	14,943
Wednesday ..	18,007	20,507
Thursday ..	16,738	19,744
Friday ..	12,352	13,027
Saturday ..	21,000 (app.)	27,035
Tótal	145,302	Total 174,088

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Wireless Constructor's Encyclopædia	5/-	5/6
Everyman's Wireless Book	3/6	3/10
Television and Short-Wave Handbook	3/6	3/10

RADIO CLUBS & SOCIETIES

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

BRADFORD SHORT-WAVE CLUB

THE above club is now preparing for the winter session, which begins with the annual general meeting on Friday, October 7th, followed by the annual social on October 14th. Visits are continuing every Friday to other amateur stations via the ether, CW being the mode of travel along the channels of the 7 m/c. band. G3NN would appreciate any reports,

which must be sent to the Bradford Short-Wave Club, Bradford Moor School, Killinghall Road, Bradford. Arrangements are being made with the hope of being able to hold an exhibition of transmitting and receiving apparatus, full details of which will be announced as soon as possible. Any further information regarding the club may be obtained from the secretary, S. Fischer (2BMO), 10, Highfield Avenue, Idle, Bradford.

WORTHING AND DISTRICT SHORT-WAVE CLUB

ON Sunday, September 18th, this club will hold another of its outdoor listening tests and all interested are invited to attend. The club will meet near the Cissbury Hotel, Findon Road, Worthing, at 10.15 a.m. and will proceed to the top of Cissbury Hill, where four groups will be arranged.

Later on the club is going to hold a competition for members only. A small entrance fee will be charged and a prize will be awarded to the winner.

Although the club has increased its membership, new members are required, and all interested in short-wave radio are invited to attend our meetings, which are held on alternate Thursdays at the Literary Institute Committee Rooms, Montague Street, Worthing. Next meeting on September 15th. Any further information can be obtained from the hon. sec., Mr. D. Boxall, "Braeside," Greenlands Road, Durrington, Worthing.

THE ROBERT BLAIR RADIO SOCIETY

THE above society will hold its first meeting of the new session on September 21st at 8 p.m. A hearty welcome is extended to anyone to attend our meetings at any time. The society hopes to have an interesting term and that some useful work will be accomplished. The technical adviser (2DYK) hopes to be on full licence soon.—Hon. sec., A. R. Richardson, 24, Mercers Road, London, N.10.

CANNOCK AND DISTRICT AMATEUR RADIO SOCIETY

THE above society held its first meeting on Sunday, August 21st. Mr. Ball (G6SW) was elected chairman, Mr. D. Whitehouse (G2YV) hon. secretary, and Mr. K. Greenaway (2FAH) hon. treasurer. It was decided to hold a meeting on the first Sunday of each month, and to pay 6d. at each meeting. A clubroom is under consideration, and it is proposed to equip it with gear when a licence can be obtained. At the next meeting a junk sale will be held, and this will be divided into two parts. Firstly, the real junk gear, the whole proceeds of which will be given to the club funds, and secondly, other gear, 25 per cent. of the money from this being also retained by the club.

Six members attended the first meeting, and all interested are invited to write to the hon. sec., D. M. Whitehouse, Trumwyne House, Cannock, Staffs, for further particulars.



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.

M. O. (Nairnshire). The Centaur Three is the only one in our blueprint list which will answer your requirements. We cannot recognise the unit referred to.

E. E. S. (Driffield). It is possible to modify the set and we hope to publish details at an early date.

J. P. H. (Cork). We hope to give details which will be of use to you at an early date.

T. R. P. (S.E.6). Messrs. Peto-Scott can supply any of our receivers ready wired and tested.

L. H. B. (Hudleigh). We hope to publish the A.C. version shortly. The address in question is Brit. Gen. Mfg. Co., Brockley Works, Brockley, London, S.E.4.

T. C. D. (Barnstaple). We regret that we have no blueprints of a set of the type mentioned.

T. E. B. (Dublin). We do not supply blueprints of commercial receivers and suggest you get into touch with the Mullard Company, who may be able to assist you.

F. E. S. (W.C.1). We have not published a set of the type mentioned, but will describe such a receiver within a few weeks. It was on view at Olympia, and is an 8-valve (plus rectifier) "communications type" set.

S. J. P. (Enfield). The idea is not new, and we have described receivers in which it was employed. Generally speaking, the grid return is taken direct to H.T.—, and a resistance is included between H.T.— and L.T.—. This has to be chosen to provide the bias voltage according to the total anode current flowing through it.

S. E. P. (St. Leonards-on-Sea). We have not published a design of the type you require, but hope to make this one of the features of a series to be given during the season.

P. H. (W.6). We cannot recommend a receiver unless you use the parts which we specify. Some of your components may be defective or unsuitable, and therefore the best plan is to obtain new parts and follow a design carefully.

S. R. (Nottingham). We regret that we have no blueprint for the set in question.

G. C. (N.7). The current is very low, and we imagine that some wrong connection exists. Could you let us have a circuit or wiring diagram?

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speaker with poor response to weak signals. Because however

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Edited by F. J. CAMM.

2/6, or 2/10 by post from Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

BRIEF RADIO BIOGRAPHIES

Dorothy Holbrook

THE rapid rise to fame of Dorothy Holbrook as a band leader of what is now recognised as the most famous all-ladies' band in Europe prompts many thousands of her fans to inquire into her past history.

In her early days Dorothy learned music

available, and her musical education was placed firstly in the hands of Professor Armstrong and afterwards with the late Dr. Keaton, the organist of Peterborough Cathedral, who was then regarded as one of the greatest authorities on harmony in the country.

People sometimes think that had she taken up literature as a profession, instead of music, Dorothy Holbrook would have been amongst the best sellers, for on looking through some of her early efforts, one can see that her knowledge of life and study of character would have undoubtedly taken her far in that direction. However, Dorothy stuck to music in which sphere she has no doubt had great success; although she soon abandoned the particular side of the profession for which she had really studied. After two or three seasons of very successful pianoforte recitals and concerts on many of the famous London concert platforms, some of which are now closed, Dorothy felt she could do better, financially, by running popular bands and orchestras.

Back to the city of her birth she went and thought it would be somewhat of a novelty if, as a lady, she was to direct an entirely male band. Success immediately met her in this direction, and for four years she ran two of the most successful bands in the Midlands, and her date sheet was always full. It was natural that such a charming lady was bound to fall to Cupid's bow, and so she

married and gave up her musical career professionally for a short time. It was inevitable, however, that such talent as possessed by Miss Holbrook could not remain dormant for long. Owing to the fact that her husband was connected with voluntary Hospital life she devoted most of her leisure time to promoting

charity concerts of a celebrity nature on the South Coast.

It was whilst arranging one of her usual Saturday accordion broadcasts with the Coventry Hippodrome orchestra that she conceived the idea of running a ladies' band, which in the first instance she intended should be an accordion orchestra. Hearing that there was an accordion competition at the Hippodrome the following week, she attended the performances, listened to most of the competitors, and obtained from the management the names and addresses of the lady accordionists that were in the competition. Afterwards she gave these girls auditions and advertised for others and eventually formed the "Harmony Hussars."

It is considered that the "Harmony Hussars" is one of the best dressed bands, and no one can deny that in their red, silver and blue uniforms, with red top boots and high plumed hats, they certainly do present a spectacular sight. She moves her girls from place to place in a special luxury 32-seater coach fitted up with every comfort for the girls, and the equipment weighs approximately three tons, together with 46 instruments, valued, at £3,000, which also travel by road in a motor truck specially designed and decorated for the purpose.

Tribute must be given to the energy of Dorothy Holbrook, for since she started in November, 1936, not only has she delighted both seen and unseen audiences, but has employed many artists in the variety world in addition to her own girls. "I wonder," she says, "if people realise some of the things at the back of a ladies' band. I paid over £200 in various insurances, costume and uniform makers benefited to over £400, to say nothing of scenic artists and petrol companies. For conveying the band alone I used over 2,500 gallons, so one can safely say that something goes round as well as music."

Although success has come to this efficient artist, she never appears to hurry or worry about the future. It is rather surprising in this world of hustle how such a quiet and reserved person could have become so popular, but perhaps after all that is the reason for her success. Without any side or boast, or pretensions to her brilliancy, one who knows her realises that it is her considerate and reserved manner that makes her so popular; her loyalty to her girls and friends is one of her great qualities, and those that have the good fortune ever to meet this lady radio, screen and recording band leader, will always remember that Dorothy Holbrook is as charming as she is modest.



Dorothy Holbrook in her Hussar's Uniform.

from her grandfather, a strict, well-disciplined Roman Catholic who lived entirely for his organ, but it was not until Dorothy was seven that her parents decided that her musical talent should be utilised for her future. Her father, who was an outfitter in Peterborough, provided his daughter with the best tutor

DUBILIER CONDENSERS AND RESISTANCES

IN the new season's catalogue issued by Dubilier Condenser Co., in addition to the already well-known designs, several new patterns are included which should be of interest to radio and television service engineers and home constructors. A new series of ceramic condensers is listed, and there is also a new type of air dielectric, low loss trimmer condenser. Amongst the other components included in the catalogue may be mentioned metallised resistances, volume controls, motor radio suppressors, and a popular line of carded condensers and resistances.

PILOT RADIO

AN attractive brochure issued by Pilot Radio, Ltd. gives full particulars of the new season's range of the well-known Pilot receivers and radiograms. The receivers listed include various models from the 53A.C., priced at 11 gns., to model U-106A.C., priced at 25 gns. Many users of radio prefer a console model and three fine examples of this popular type of receiver are listed, viz., model C-53A.C., a 5-valve superhet.; model BTC-530A.C., a 5-valve all-wave superhet., fitted with the Pilotone system of push-button control; and model PTC-36A.C., a 6-valve all-wave console with piano tuning. In this model the latest form of Pilot rotor dial is incorporated, which is illuminated from the rear, thus enabling all stations to be tuned and logged with ease. In the radiogram section is included model RG-53A.C., a 5-valve superhet. instrument priced at 22 gns. (A.C.-D.C. model, 24 gns.); and model RGA-583A.C., an 8-valve all-wave superhet. radiogram, with automatic

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To save readers trouble, we undertake to send on catalogue of any of our advertisers. Merely state, on a postcard, the names of the firms from whom you require catalogues, and address it to "Catalogue," PRACTICAL AND AMATEUR WIRELESS, Geo. Nurnes, Ltd., Tower House, Southampton St., Strand, London, W.C.2. Where advertisers make a charge, or require postage, this should be enclosed with applications for catalogues. No other correspondence whatsoever should be enclosed.

record changer, priced at 35 gns. The Pilot di-pole balanced aerial kit, complete with screened receiver transformer and screened aerial transformer, is also listed.

ARDENTE TOUCH-PHONE SYSTEMS

A NEAT folder has just been issued by the Ardente Acoustic Laboratories, Ltd., giving particulars of their efficient loudspeaking communication systems for home or business use, for providing rapid inter-communication without the use of house telephones. Each complete system comprises a master and sub-unit or units, or a number of station units, housed in neat black cabinets. The "Duo-call" system is for

use between two points in any building. A touch of the switch on the master unit gives instantaneous contact, enabling free conversation with persons within 20ft. of the sub-station unit. The "Selecta-call" system provides inter-communication between a master unit and from 2 to 10 remote stations, while the "Multicall" is a master to master selective loudspeaking inter-communication system, enabling private two-way conversations to be carried on between any two stations. It is possible with this system for five separate and distinct private conversations to take place simultaneously without break-through or interference. A special unit is also available for the use of persons who are deaf or hard of hearing.

BULGIN PRODUCTS

THE new Bulgin catalogue is more complete than ever, and between its covers is listed a distinctive range of British-made components designed to fill the requirements of every section of the radio industry. The small components include valve adaptors, chokes, coils of all types, fixed condensers, ganged condensers, slow-motion drives, fuseholders, insulators, jacks and plugs, knobs, mains connectors, resistors, switches, transformers, and valve-holders. Aerials and aerial equipment, and a portable self-contained deaf aid unit are among the many other items listed. A new feature of the catalogue is a profusely illustrated section dealing with small metal parts and sundries, and in addition, several show-carded lines are illustrated. This useful catalogue, which should be in the hands of every constructor and experimenter, is priced at threepence.



QUERIES and ENQUIRIES

Valve Noise

"I have had an A.C.-D.C. commercial set for the last few months, and there has been a constant hiss like escaping steam or gas jet. This comes on more when it is on foreign stations, but is only slight on North Regional. I have had it seen to but it still persists. What can I do?"—S. S. (Sheffield).

It is quite possible that the noise is merely that commonly referred to as valve hiss. When valves are working at maximum efficiency there is often a background, and when you adjust your set for foreign stations it will be working at maximum efficiency. Reaction sometimes gives a sound similar to that described, although this is followed by a howl when reaction is pushed further. On the other hand, a faulty valve can give rise to a similar type of noise, generally traced to faulty cathode insulation. Also, a defective electrolytic condenser will give an audible warning of its impending failure by a hissing or ringing noise.

Car Radio Performance

"I have a four-valve transportable of my own make. It goes perfectly well in normal surroundings, but it does not work in the car. Seeing no mention of cause or remedy in your paper I take it that it is incurable, but I would like to know if there is any cure for it, and if so what it is."—F. C. R. (Elle).

The reason is probably to be found in the fact that your car has an all-metal body. This acts as a very efficient screen and thus the self-contained aerial of your set is unable to pick-up signals. The cure or remedy is to use a car aerial mounted either on the roof or beneath the running boards and to connect the lead-in to one side of the frame aerial—or to an aerial terminal if one is provided.

Dipole Aerial Connections

"I made a short-wave set some time ago in which I used standard 6-pin plug-in coils. As I have not been very satisfied with the performance I am thinking of modifying my aerial system to use a dipole with twin feeder lead-in, but am uncertain how I should connect the two feeder wires. Is it necessary to use a special input coil for this purpose or can I adapt it for use with my set?"—H. W. (N.W.9).

The aerial may be coupled to your coil in a very simple manner. All that is necessary is to disconnect the connection now made from earth to the lower end of the primary winding on the coil. This end must then be taken to another socket or terminal on the set and then the two ends of the feeders are joined to the existing aerial terminal and the new one. In other words, the feeders are joined to the ends of the primary winding. A separate earth connection may, or may not be necessary with the remaining part of the circuit.

Hurricane on Medium Waves

"I built up your Hurricane receiver some time ago when you first published it, but only obtained empty coil formers, which I wound for the short waves. I have now lost the original issue and am not certain whether you said this could be used satisfactorily on the medium and long waves, and if so I wonder if you could tell me whether standard coils could be used."—S. S. (Gomshall).

The set is of the "all-wave" type, utilizing a .0005 mfd. tuning condenser and it may, therefore, be used for medium and long-wave work. Standard coils were employed in the set and therefore you may obtain standard medium and long-wave

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.

plug-in coils so that stations on the broadcast bands may be obtained. You can, if you desire, obtain a complete kit of coils for this particular set, so that all waves from 9.5 up to 2,000 metres may be used. The cost of the medium-wave coils is 5s. 6d. per pair and the long-waves, 6s. 6d. per pair.

Undistorted Output

"I am rather confused regarding the term 'output' as it appears that there is often a discrepancy in the various figures which are given. For instance, a catalogue states that a valve has a dissipation of 60 watts and yet the output was stated to be only 13 watts. When two of these valves were used in push-pull it was claimed that nearly 30 watts was obtained. Can you explain these points to a beginner?"—H. C. T. (Andover).

The output varies according to the use of the valve. In L.F. or receiver work, the output referred to is the undistorted speech output, but when the valve is used as the amplifier in a transmitter, the wattage dissipation (which is the first figure you mentioned) is of greater importance. The dissipation is the maximum permitted figure, and is the product of anode volts and anode current. If this is exceeded the anode may run hot and the valve will be damaged. In the L.F. working, the figure is that which is delivered to the

loudspeaker. In valves in push-pull a greater amount of distortion may be permitted as it balances out in the two stages, and, therefore, slightly more than double the output of the two separate valves can be obtained. The actual increase is generally about 25 per cent.

Negative Feed-back

"I have two KT.66's, and propose to make up a two stage amplifier with these valves in push-pull. I understand that improved results will be obtained if I use negative feed-back, and should like to know the values of feed-back resistance for these valves. I am using a Ferranti AF5cc transformer and an L.63 for the input."—H. M. I. (Nottingham).

The makers' recommendation for the valves in question is 100,000 ohms for the feed-back resistance, coupled to the centre-tap through a .25 mfd. condenser. They indicate that the two sections of a split secondary transformer be joined through 5,000 ohms resistors, and each half shunted by a .1 megohm resistance. The feed-back condenser should be taken direct to the end of the secondary, the 5,000 ohm resistance being joined between this point and earth.

Short-wave Unit

"I have a six-valve D.C. mains set which is great and I would like to fit a short-wave adapter, separate, to this set. Could you let me know where to get a unit which would be suitable for this set?"—R. F. (Gifford Worthing).

It is difficult to recommend a unit for a commercial receiver, as some of these are not suitable for use with simple short-wave units. Special whistle-interference suppressing circuits are sometimes included which prevent the satisfactory operation of a short-wave converter, although it is generally possible to connect the output from a short-wave adaptor, through a transformer, to the pick-up terminals where these are fitted. The best plan, therefore, is to write to the makers of your particular set and obtain their views on the use of a converter or adaptor, and they may be able to supply the necessary unit for converting the set.

Crystal Types

"I am going to build a crystal set for experimental use, and should be glad if you could tell me which is the most reliable crystal to use. I believe there are several different types, but I am uncertain regarding their merits."—G. F. (Brighton).

FROM a reliability point of view, the carborundum crystal cannot be beaten. This requires an applied potential, but the contact consists of a steel plate with firm pressure and thus when once adjusted it is hard to upset it. On the other hand, various crystal combinations will prove more sensitive although delicate in their adjustment. Zincite and tellurium, for instance, is almost as good as carborundum when a good spot has been found, and is not very easily upset. If you require a crystal of this type the Red Diamond unit supplied by the Jewel Pen Company, of 21-22, Gt. Sutton Street, London, E.C.1, may be recommended. This was used in our crystal set described in the Show numbers.

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

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS		No. of	D.C. £5 Superhot (Three-valve)	1.12.34	PW42
CRYSTAL SETS.		Date of Issue	Universal £5 Superhot (Three-valve)	31.7.37	PW44
		Blueprint	F. J. Camm's A.C. £4 Superhot	—	PW59
			F. J. Camm's Universal £4 Superhot 4	—	PW60
			"Qualitone" Universal Four	16.1.37	PW73
Blueprint, 6d.					
1937 Crystal Receiver 9.1.37 PW71					
STRAIGHT SETS. Battery Operated.					
One-valve : Blueprints, 1s. each.					
All-wave Unipen (Pentode) PW31A					
Beginner's One-valver 19.2.33 PW85					
Two-valve : Blueprints, 1s. each.					
Four-range Super Mag Two (D, Pen) PW36B					
The Signet Two (D & LF) 20.8.36 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, 2LF (Trans)) June '35 PW1					
Cameo Midget Three (D, 2 LF (Trans)) 8.6.35 PW51					
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) PW33					
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					
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen) 29.8.36 PW66					
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)) 6.12.36 PW72					
The "Rapid" 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) 26.2.38 PW87					
The "Hurricane" All-Wave Three (SG, D (Pen), Pen) 30.4.38 PW89					
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					
Mains Operated.					
Two-valve : Blueprints, 1s. each.					
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A.C.-D.C. Two (SG, Pow) PW31					
Selectone A.C. Radiogram Two (D, Pow) PW19					
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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) PW36C					
D.C. Premier (HF Pen, D, Pen) 31.3.34 PW35B					
Ubique (HF Pen, D (Pen), Pen) 28.7.34 PW36A					
Armata Mains Three (HF Pen, D, Pen) PW38					
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) "All-Wave" A.C. Three (D, 2 LF (RC)) 11.5.35 PW50					
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) PW54					
Mains Record All-Wave 3 (HF Pen, D, Pen) 5.12.36 PW70					
All-World Ace (HF Pen, D, Pen) 29.8.37 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.					
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F. J. Camm's 2-valve Superhet 13.7.35 PW52					
F. J. Camm's £4 Superhet PW38					
F. J. Camm's "Vitesse" All-Waver (5-valver) 27.2.37 PW75					
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A.C. £5 Superhet (Three-valve) PW43					
D.C. £5 Superhot (Three-valve) 1.12.34 PW42					
Universal £5 Superhot (Three-valve) 31.7.37 PW44					
F. J. Camm's A.C. £4 Superhot PW59					
F. J. Camm's Universal £4 Superhot 4 PW60					
"Qualitone" Universal Four 16.1.37 PW73					
SHORT-WAVE SETS.					
One-valve : Blueprint, 1s.					
Simple S.W. One-valver 9.4.33 PW88					
Two-valve : Blueprint, 1s.					
Midget Short-wave Two (D, Pen) PW38A					
Three-valve : Blueprints, 1s. each.					
Experimenter's Short-wave Three (SG, D, Pow) 30.7.38 PW30A					
The Perfect 3 (D, 2 LF (RC and Trans)) 7.8.37 PW63					
The Band-Spread S.W. Three (HF Pen, D (Pen), Pen) 29.8.36 PW68					
PORTABLES.					
Three-valve : Blueprints, 1s. each.					
F. J. Camm's B.L.E. Three-valve Portable (HF Pen, D, Pen) PW65					
Parvo Flyweight Midget Portable (SG, D, Pen) 19.6.37 PW77					
Four-valve : Blueprints, 1s. each.					
Featherweight Portable Four (SG, D, LF, Cl. B) 15.5.37 PW12					
"Jmp" 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 23.7.33 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 AW337					
Twenty-station Loudspeaker One-valver (Class B) AW449					
Two-valve : Blueprints, 1s. each.					
Melody Ringer Two (D, Trans) AW338					
Full-volume Two (SG det., Pen) AW392					
B.B.C. National Two with Lucerne Coil (D, Trans) AW377A					
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1934 Ether Searcher; Chassis Model (SG, D, Pen) AW419					
Lucerne Ranger (SG, D, Trans) AW422					
Cosor Melody Maker with Lucerne Coils AW423					
Mullard Master Three with Lucerne Coils AW424					
£5 5s. Three; De Luxe Version (SG, D, Trans) 19.5.34 AW435					
Lucerne Straight Three (D, RC, Trans) AW437					
All-Britain Three (HF Pen, D, Pen) "Wireless League" Three (HF Pen, D, Pen) 3.11.34 AW451					
Transportable Three (SG, D, Pen) WM271					
£6 6s. Radiogram (D, RC, Trans) WM318					
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					
Iron-core Band-pass Three (SG, D, QP21) WM362					
1935 £6 6s. Battery Three (SG, D, Pen) WM371					
PTP Three (Pen, D, Pen) WM389					
Certainty Three (SG, D, Pen) WM393					
Ninety Tube 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					
"A.W." Ideal Four (2 SG, D, Pen) 16.9.33 AW402					
2HF Four (2 SG, D, Pen) AW421					
Crusader's A.V.C.4 (2HF, D, QP21) (Pentode and Class B Outputs for above: Blueprints 6d. each) 18.8.34 AW445					
Self-contained Four (SG, D, LF, Class B) Aug. '33 AW445A					
Lucerne Straight Four (SG, D, LF, Trans) WM350					
£5 5s. Battery Four (HF, D, 2LF) 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.					
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Class B Quadradyne (2 SG, D, LF, Class B) WM314					

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Issues of Practical Wireless 4d. Post Paid.
 Amateur Wireless 4d. " "
 Practical Mechanics 7d. " "
 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.

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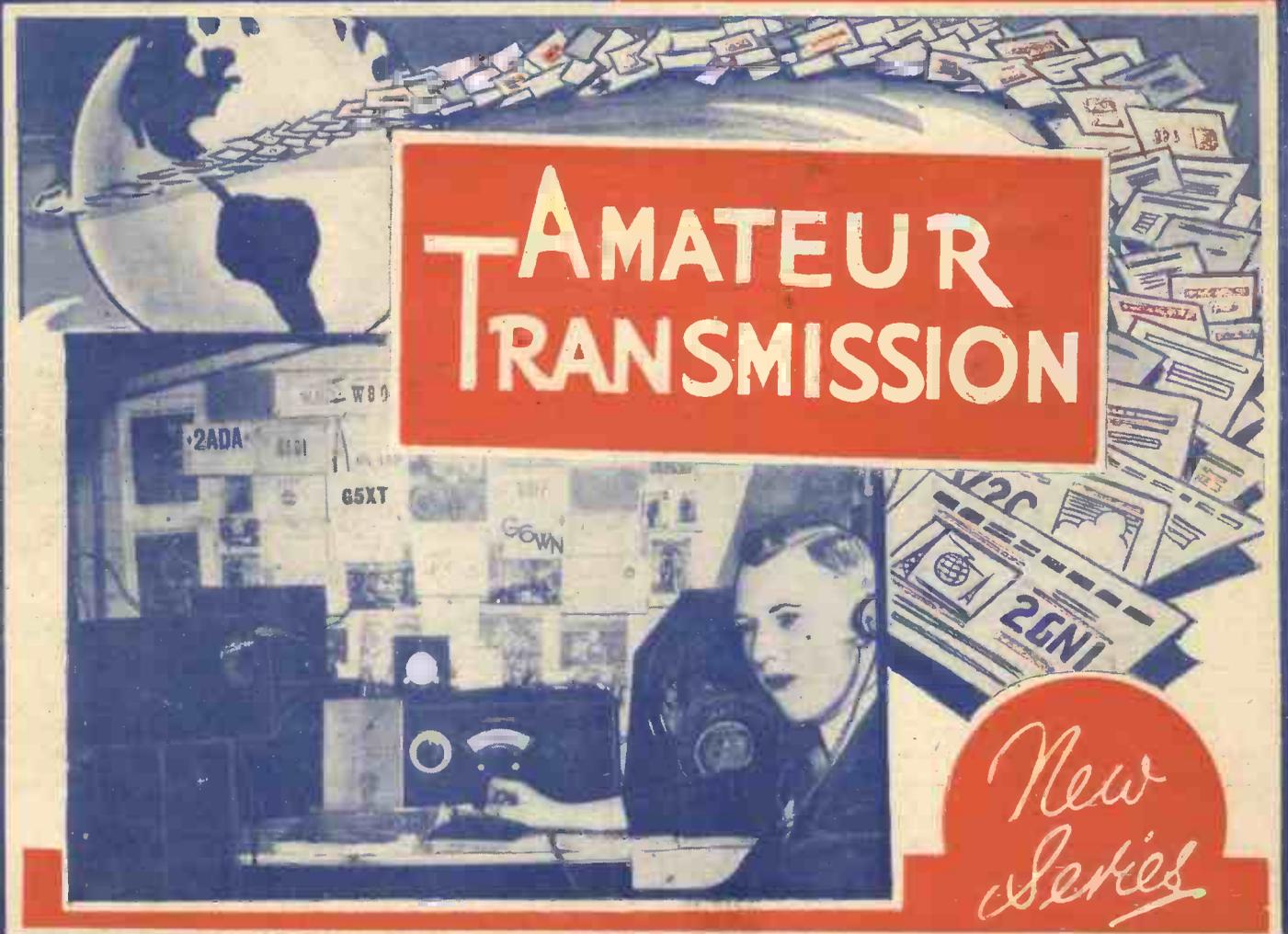
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Edited by F.J. CAMM

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Publication

Vol. 13. No. 314.
September 24th, 1938.

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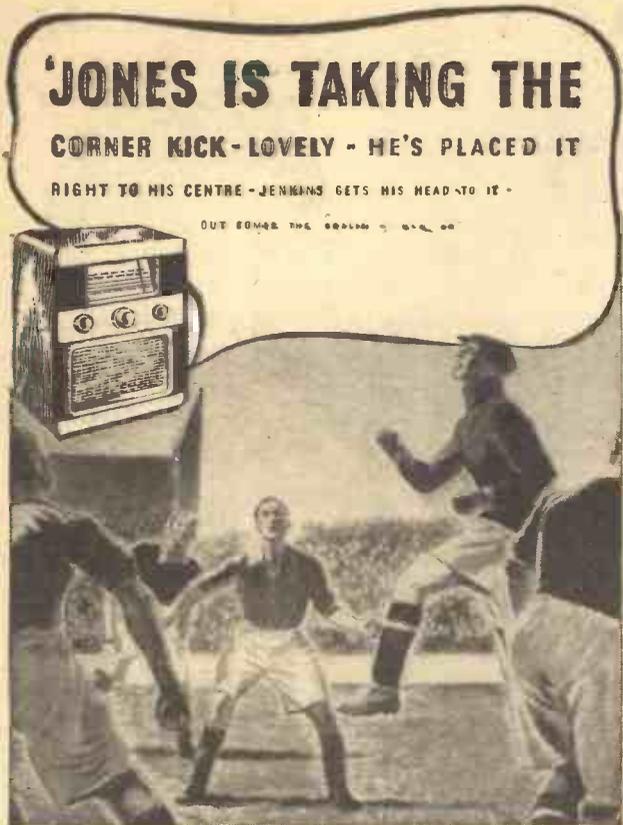
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R398

... and then the set goes DEAD
and you say

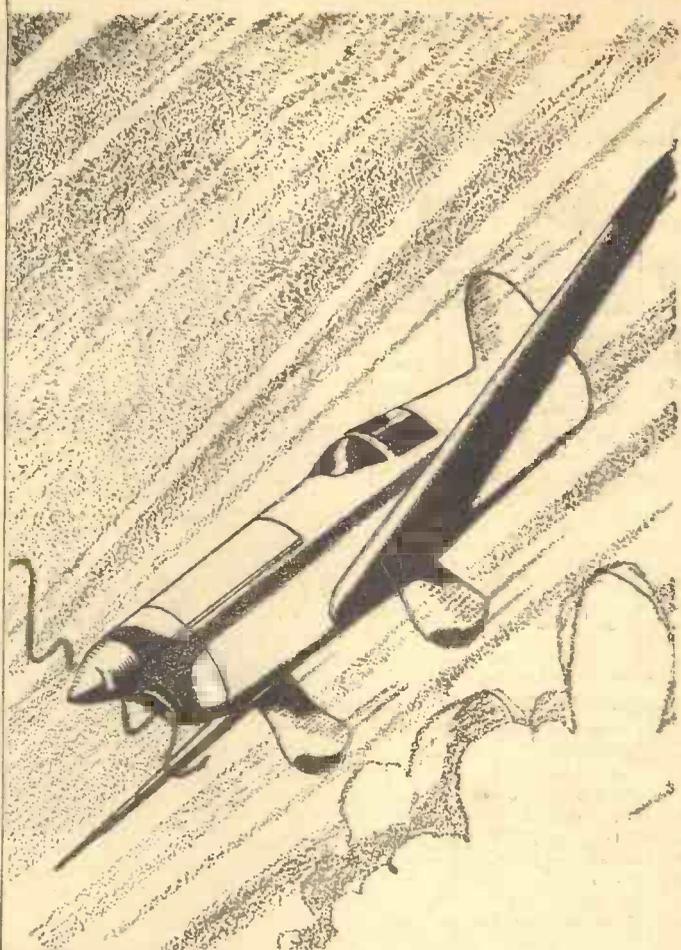
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Contents of this week's "FLYING," on sale Friday, September 23rd, include:—

LIFE IN THE AUXILIARY AIR FORCE
An article published in response to requests for information.

THRILLING FLIGHTS THROUGH HISTORY
An account by Professor CHARLES of his flight over Paris in 1783.

CIVIL AIR GUARD NEWS
The latest news of activities all over the country.
WERNER VOSS—A VERY GALLANT ENEMY
By JOHN C. HOOK.

FLIGHT IN THE INSECT WORLD
By CLIFFORD W. GREATOREX, F.Z.S.

MODEL SECTION

Also:

BIG PHOTOGRAVURE PICTURE SECTION, FICTION, GOSSIP OF THE WEEK, ETC.

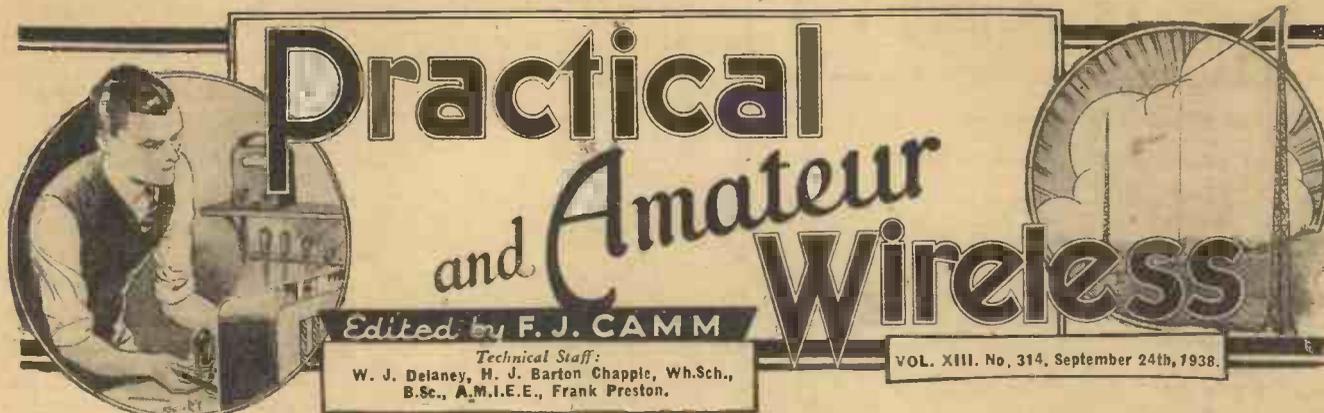
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3^d. EVERY FRIDAY

Simplified S.W. Tuning—See Page 42



Practical and Amateur Wireless

Edited by F. J. CAMM

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

VOL. XIII. No. 314. September 24th, 1938.

ROUND *the* WORLD of WIRELESS

Amateur Transmitting

WE begin a new series of articles on the subject of amateur transmitting in this issue, and by following the information given it should be possible for any enthusiastic amateur to acquire the necessary licence to enable him to carry out transmitting experiments. It must be emphasised, however, that transmitting apparatus must not be built until a licence has been obtained, and all of the preliminary work of testing and acquiring the necessary technical knowledge must be carried out on a dummy or artificial aerial. This licence will be the first to be obtained, and no tests have to be passed. Before you go "on the air," however, you must pass a test sending and receiving the Morse code at 12 words per minute. However, it is not difficult to obtain this degree of skill provided that you settle down to the task and listen as much as possible on the amateur bands to the various signals which are sent out. It takes some little time to get the necessary papers through, but provided that a sound knowledge is first obtained no difficulty should be experienced. For those who wish to obtain the necessary knowledge quickly, we recommend our latest book, "Wireless Transmission for Amateurs," which costs 2s. 6d., or 2s. 10d. by post.

New Marconi Mast

THE Research Station of the Marconi Company, at Great Baddow, Essex, is shortly to erect a series of 80-ft. lattice masts for use in connection with the station. Permission has now been obtained from the Chelmsford Rural District Council and work is proceeding.

Railway Public Address

THE success of the public address equipment already installed in certain termini of our larger railways is leading to an extension of the schemes. The apparatus is employed for directing passengers during busy periods and much congestion is avoided and time saved by the ready dispersal of crowds to the appropriate platforms. We understand that the Great Western Railway has ordered a comprehensive unit to be fitted at Torquay.

B.B.C. Music Programmes

THE B.B.C. announces a new issue of the Music Programmes Pamphlet containing details of advance music programmes and other general information concerning music to be broadcast during the fourth quarter of 1938. The pamphlet may be obtained for 2½d. post free on application to 35, High Street, Marylebone, London, W.1, or for 2d. on personal application to Broadcasting House, or any B.B.C. Regional office.

Various bans have been imposed and lifted and now the Preston North End and Arsenal match for September 26th will be broadcast from Highbury, the link between the stadium and the Alexandra Palace being by radio.

P.A. on Steamers

PUBLIC address equipment has now been installed on some of the famous Clyde pleasure steamers, and by means of suitable mikes and loudspeaker distribution, passengers are kept entertained and also informed of important places of interest during the voyage.

Television at Sheffield

ANOTHER successful long-range television reception is reported, this time from Sheffield. The manager of the radio department of J. G. Graves, Ltd., in conjunction with two colleagues, has successfully picked up the B.B.C. transmission on a standard receiver installed at Dore More, a suburb of Sheffield. The distance from Alexandra Palace is approximately 160 miles.

Radiolympia Attendances

THE final figures for the Radio Show are now available and indicate that the total attendance for this year was 145,588 compared with 174,818 last year. The total number of visitors to the television studio was 37,407.

Dame Marie Tempest

ONE of the greatest actresses of all time will be heard in the National programme on September 25th, playing the part of one of history's greatest queens. The play will be "Victoria and Disraeli," produced by John Cheate, with Dame Marie Tempest as Queen Victoria.

Night Ride

A NON-STOP cycle ride from Llanddeussant, Glamorgan, to Tamworth, Staffordshire, will be the subject of a talk by Katherine Thomas, on September 29th. Miss Thomas has been teacher of Art and Physical Training at Tamworth Senior School since 1933 and spends her week-ends and vacations walking or cycling alone. In 1936 she cycled in Bavaria and the Austrian Tyrol. In that year also she did a non-stop ride from Skegness to Carmarthen in thirty-six hours.

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Variety Mansions

A NEW idea in variety is to be introduced on September 27th, when listeners will be taken over to a remarkable block of service flats somewhere, one imagines, in London, where they will hear a number of artists doing their acts in something of a domestic atmosphere. The item will be included in the National programme.

Televised Football

ARRANGEMENTS have now been completed to enable professional football matches to be televised by the B.B.C.

ROUND the WORLD of WIRELESS (Continued)

Symphonic Music from W8XAL

A HALF-HOUR of symphonic music, transcribed, with announcements in Spanish, has been inaugurated over W8XAL, the Crosley international short-wave radio station. Titled "Musica Clasica," the new series is heard from 11.30 p.m., E.S.T., to midnight, Mondays, Tuesdays and Thursdays. This gives two special Spanish programmes to Latin-American countries via W8XAL.

New Indian Broadcasting Headquarters

CONSTRUCTIONAL work is proceeding with the new broadcasting headquarters of All-India Radio in Bombay. There will be seven air-conditioned studios, located on the fourth floor of the building, and one of them will be the largest in the A.I.R. system, and will have accommodation for a studio audience.

Gilbert and Sullivan Music

REGINALD BURSTON will conduct the B.B.C. Midland Orchestra on September 29th in a programme of music from the Gilbert and Sullivan operas. The arrangements of selections from "The Pirates of Penzance" and "The Yeomen of the Guard," are by Victor Hely-Hutchinson.

Two High-power Stations for Belgium

THE Institut National Belge de Radio-diffusion has decided to replace the two existing transmitters at Veltheim (near Louvain) by two more modern 100-kilowatt stations to be erected near Wavre, south of Brussels. Work will be started on their construction without delay.

SOS for Lost Poodles

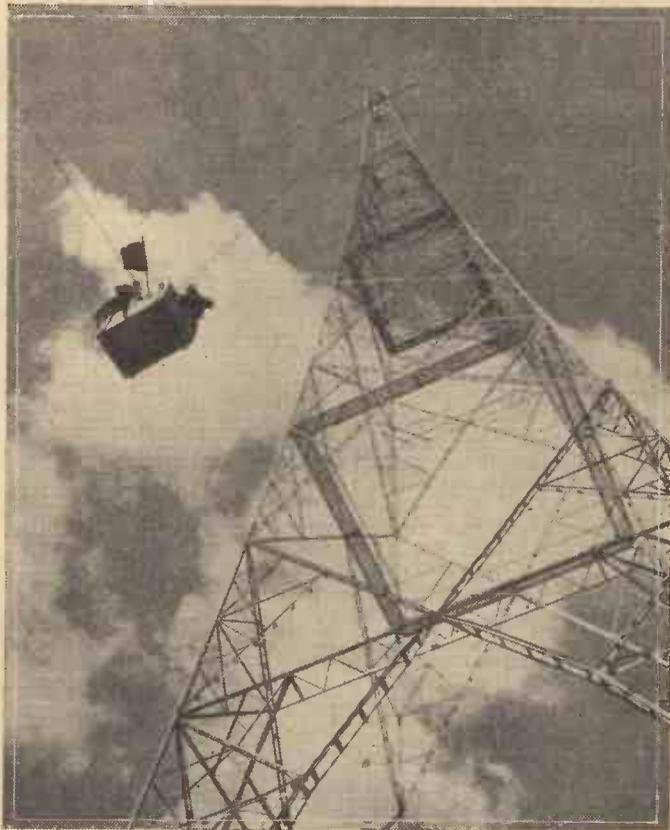
IN view of persistent requests from listeners the Paris broadcasting station known as Radio 37 is devoting a few minutes daily to a description of any dog lost in the French capital, with details of reward offered and name and address of its sorrowing owner.

A Sign of the Times

IN the small parish of Unter-Grombach (Germany) the local council has replaced the Town Crier by a loudspeaker. Every evening at 8 p.m. the Burgomaster from the Mayor's Parlour broadcasts all local news and official announcements. The transmission is preceded by the ringing of

INTERESTING and TOPICAL NEWS and NOTES

the conventional Town Crier's bell followed by the call: "Achtung! Achtung! this is your Burgomaster speaking."



The new aerial tower at Beromünster, constructed by the Swiss engineer, Rudolf Dick, of Lucerne. The illustration shows workmen being hauled to the top of the tower in a wooden cradle.

Coventry Hippodrome Orchestra

THE Coventry Hippodrome Orchestra, which has one of the longest records of broadcasts in the region, will broadcast a programme of popular music from a studio on September 25th. William Pethers will conduct and Jack Wilson will be the pianist for Myers' "Chasing Moonbeams."

"Les Misérables"

OWING to certain difficulties of casting, the B.B.C. have decided to postpone the production in serial form of "Les Misérables" until after the New Year.

Its place will be taken by an adaptation by H. Beaufoy Milton of Charles Reade's famous novel, "The Cloister and the Hearth," in which Terence de Marney will be heard as Gerard. The producer will be Peter Creswell.

Competes with N.B.C. and Columbia

UNDER the direction of Elliott Roosevelt, second son of the President of the United States, twenty-three Texas stations have joined the network of the Mutual Broadcasting System, thus making a chain of 107 transmitters.

The World's Radio Transmitters

ACCORDING to recent statistics the number of radio stations in the world is now roughly 36,000, of which 8,000 are land transmitters, the rest being mobile plants installed on ships, etc. Most of the land stations are monopolised by the communication services, thus leaving roughly 1,800 stations for the use of broadcast entertainments. Of these approximately two-thirds are situated in the American continents.

Some Linguist

HAROLD SCHULTZ, a member of the Stuttgart (Germany) studio staff may claim to be the world's most versatile announcer inasmuch as it is stated that he speaks no less than 290 languages and dialects! The gift would appear to be a family heirloom as his father was able to converse in twelve different tongues, and was only surpassed by his uncle who, in his lifetime, had mastered twenty foreign languages. When only nine years of age Schultz began to study Italian, one year later French and then English; at the age of fifteen he was learning several languages at one and the same time.

High-power Station for Tunis

THE French Government is installing a high-power station at Tunis (North Africa) which should be ready for operation by the end of the year. Tests are expected to take place within the next few weeks. The call will be: *Poste Impérial de Radio-diffusion, P.T.T. Tunis*. In the meantime a temporary 1-kilowatt station broadcasts radio programmes daily on 215 m. (1,395 kc/s) from G.M.T. 11.00-13.00 and from 18.15-19.30.

"On Wenlock Edge"

THIS song cycle, by Vaughan Williams, will be sung on October 2nd, by Henry Wendon (tenor), accompanied by the Whinyates String Quartet (Seymour Whinyates, Veronica Gotch, Dorothy Everitt and Helen Just), and John Palmer (pianoforte).

SOLVE THIS!

PROBLEM No. 314

Caruthers had an A.C./D.C. mains receiver which had been cleaned up and which failed to give signals after the cleaning. He had obtained quite good results until the cleaning process and in an endeavour to locate the fault he removed the chassis. He decided to make a stage-by-stage test and obtained a tester which had a plug to be inserted in place of the valve. He switched on and then took out the H.F. valve ready to insert the tester, but noticed that the remaining valves still glowed. What fault did this indicate? Three books will be awarded for the first three correct solutions opened. Address your envelopes to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Strand, London, W.C.2. Envelopes must be marked Problem No. 314 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, September 26th, 1938.

Solution to Problem No. 313

As Wrigley had connected the valve he was using the screening grid acted as an anode and accordingly was not obtaining any improvement over the original valve. The top cap is, of course, the anode.

The following three readers successfully solved Problem No. 312 and books have accordingly been forwarded to them: J. E. James, 80, Negaham Road, Liverpool, 7. O. R. Schofield, 58, Musters Road, West Bridgford, Nottingham. R. Sandall, 361, Hatfield Road, St. Albans, Herts.

The Amateur Transmitter

THE importance of the work of amateur radio enthusiasts has been recognised by the appeal of the Secretary for Air for their co-operation.

This is not the first time that official recognition has been given to the valuable services which the amateur movement has to offer. In all parts of the world, in times of emergency and distress, the true radio enthusiast, more universally known as "ham," has stepped into the breach and rendered inestimable service to civilisation in general. They have maintained communication when all other means had failed; they have been the means of help and supplies reaching people isolated by storm, flood and earthquake, and they have maintained contact between the world and exploration parties, to mention but one or two of their practical demonstrations of their value.

Sir Kingsley Wood appealed, in particular, to those who already possess P.M.G. transmitting licences, but, as he is requiring at least 7,000 volunteers, and as there are only approximately 4,500 licensed transmitters, including A.A.s, it is obvious that he is also depending on the response of the "ham" who has not reached the transmitting stage, but who is doing good work on the listening side, and who has as his goal the ownership of a full or A.A. permit.

Although the appeal has been made through the urgency of the demand, it cannot be overlooked that it offers a wonderful opportunity for the enthusiast to

non-professional. Admittedly, it indicates as a dictionary would state, "one who cultivates a study or art for the love of doing so, and not for gain"; but it means much more than that.

Short-wave communication, and that

opinion but, so far as the P.M.G. is concerned, the term station holds good and, after all, it is no worse than shack or den.

It is usually possible for the enthusiast to secure some spot in the household where he can rig his apparatus, more or less permanently, and get down to business. Whether the site obtained is ideal or not only goes to make things easier for him or, on the other hand, presents an opportunity for showing his resourcefulness and developing his ingenuity. Whatever the conditions might be, however modest the rig, does not matter one iota. It represents an enthusiast's station and, as such, it will receive as much consideration from the rest of the

Dealing with the Activities of the Amateurs; What Constitutes a Station, and Outlining the Valuable Experimental Work Open to the Genuine Enthusiast By L. O. SPARKS

is the hobby of the radio amateur, involves not only a study of the subject and the science of wireless in general but, by the very virtue of its objects, it develops a standard of conduct and comradeship which would be difficult to excel.

The amateur movement does not tolerate social snobbery. Nationality or creed is not allowed to form barriers to block the cause and objects of "hams" the whole world over. In fact, the "ham" spirit forms a lasting and ever-increasing bond between all amateurs irrespective of country or position.

A high standard has been set by the pioneers, and it is up to every newcomer to maintain that level and prove himself worthy of the traditions associated with this world-wide movement.

What is an Amateur Station?

The term "station," when used in relation to amateur short-wave communication, is used to denote a radio installation, either receiving or transmitting or both, which is operated with the sole object of carrying out one or more phases of the work common to all matters. Many may prefer the words "shack" or "den" and feel that "station" is rather too superior or savouring of affectation. Well, that is a matter of

"ham" fraternity as that owned by the big fellow. It is the enthusiasm and work done that count.

Station Requirements

No two stations are alike. The selection of gear and equipment depends on so many things, some of which are beyond the owner's control, that it is only possible to suggest items which should be made or secured as the opportunity or demand arises.

The receiver, for example, might be a modest one-valve or a multi-valve communication job; whichever circuit is used the main essentials are: stability, sensitivity, selectivity, high signal/noise ratio and ease of control.

The beginner will do well to commence with the most simple circuit and, as the "touch" and experience are gained, elaborate on the original until a more ambitious receiver is evolved. Experiment, and keep on experimenting until you

(Continued overleaf)

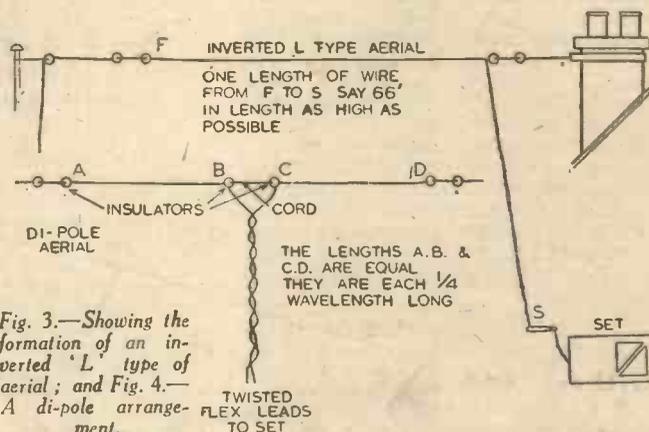


Fig. 3.—Showing the formation of an inverted 'L' type of aerial; and Fig. 4.—A di-pole arrangement.

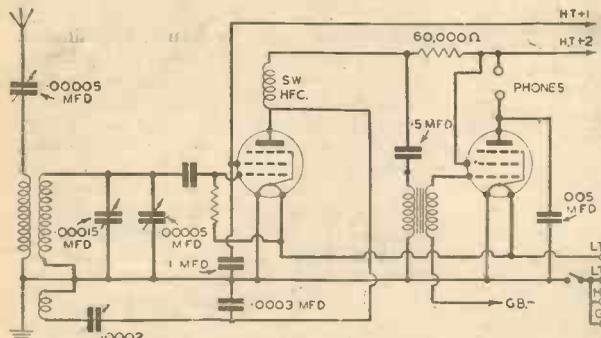


Fig. 1.—A typical two-valve for S.W. reception, using an S.G. valve and detector.

step in and receive first-class tuition and practical experience with receiving and transmitting apparatus. There are a great many, however, who will require reliable and concise information to augment their knowledge and practical experience, and, as usual, the Editor has anticipated such requirements and instituted a new series of transmitting articles which will appear weekly in these pages. There is also, of course, the book "Wireless Transmission for Amateurs," which, although only released at Radiolympia, is already selling at a rate which proves its value, and its ability to satisfy a growing demand for an English publication on transmitting matters.

The Amateur

One cannot take a dictionary definition to define the status of a radio amateur, other than so far as it applies to one being

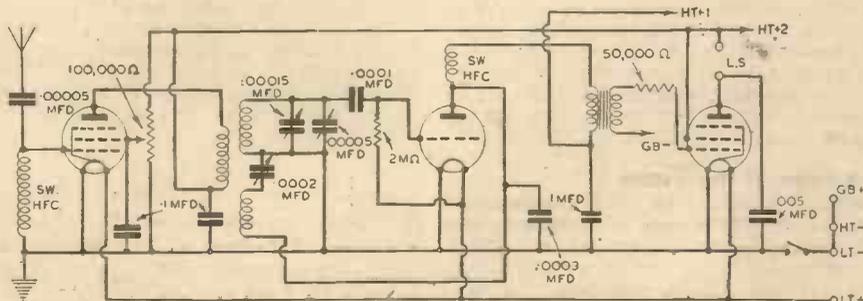


Fig. 2.—A useful three-valve combination, with one stage of untuned H.F. amplification.

THE AMATEUR TRANSMITTER

(Continued from previous page)

feel that you are getting the maximum results from the material available.

A good two-valver (Fig. 1), battery or mains operated, can produce some amazing results under capable hands, but, unfortunately, its selectivity is not too good. To overcome this defect, a stage of H.F. amplification can be added (Fig. 2), and the combination H.F., Det., Output or L.F. and Output, forms a most useful arrangement but, again, the selectivity is not that of a superhet, though its signal/noise ratio will, undoubtedly, be better.

Band-spreading should be employed, and particular attention paid to the selection and layout of the components, using, for preference, a metal panel and chassis for their mounting.

The H.F. stage should consist of a screened-grid or H.F. pentode valve, transformer or tuned-grid coupling being used to feed the detector. The question of tuning the H.F. stage or not can best be settled by experiment, but it is invariably found that below, say, 60 metres the gain produced by tuning does not warrant the additional control apart from the possibility of instability. An untuned H.F. stage can prove most useful on all the lower bands. It will act as a "buffer" between aerial and the detector, and eliminate many of the troubles due to aerial design or location, uneven loading of the detector input, blind spots, and unsatisfactory reaction.

Aerial

A good aerial is well worth all the trouble which might be involved in erecting it;

height and freedom from surrounding earthed objects are the main requirements. Pay particular attention to insulation at points of suspension, and use one length of wire from the free end to the receiver.

Numerous types are available for the experimenter. If interference from man-made static is present, the horizontal section must be erected as high as possible,

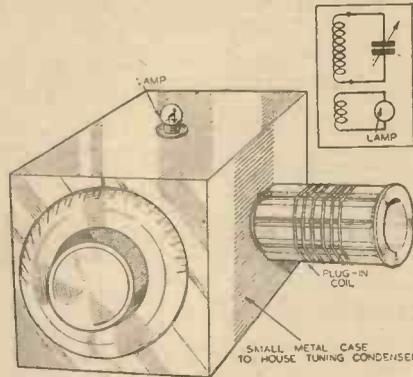


Fig. 5.—The circuit and suggested construction of an absorption wave-meter.

and use made of screened down-lead, or one of the interference-free devices which are now available. A good inverted-L aerial (Fig. 3) is usually very satisfactory if conditions are normal. The over-all length should not exceed 66ft., the down-lead being so fixed that it cannot sway, and so that it is not too close to the house. For those troubled with interference, man-made, a di-pole system (Fig. 4) with twisted down-leads will be better, but when erecting

this type care must be taken to see that the horizontal lengths are measured accurately.

Avoid long lead-in wires running through the house, and keep them well clear of all electric lighting and power wiring. See that the earth wire and actual earth connection are efficient, and of low resistance. Where possible, always use a buried earth tube, plate or mat. House piping is not always satisfactory.

Apparatus

Meters are very essential in any station. It is not necessary to purchase costly apparatus, but at least one good high-resistance voltmeter, preferably multi-range, and a reliable milliammeter are necessary for checking and testing purposes. It is far better to wait a little longer and secure good instruments than purchase cheaper articles of doubtful reliability.

A wave-meter should also be available, as it allows stations to be identified by checking their wavelength, and it can prove most helpful when coils are being constructed and tested. A simple and efficient meter is not difficult to make; the absorption type (Fig. 5) is quite satisfactory, and has the advantage of not requiring batteries or valves for its operation. When it is constructed, it can be calibrated, and a tuning chart compiled by checking it against stations of known wavelengths.

Frequency meters of the oscillatory type are, of course, more advantageous than that mentioned above, but as this article is only concerned with outlining the elementary requirements of a station, they must be left, together with more explicit details of other essentials, to future articles.

TELEVISION PROGRESS

Taking Stock

IT is generally conceded that the concerted television effort made at this year's Radiolympia show was an unqualified success. Although the quality of the signals fed to the individual stands varied from time to time the results judged from the public point of view were good. All day long the stands showing television sets in operation were crowded with visitors who were not just mildly interested but gave expression to their desire to learn more about the capability of the individual sets with a view to purchase. Naturally, the standards of performance varied because of the price factor but, viewing the whole situation generally, the following points seemed to be outstanding. First of all the pictures showed really excellent detail, while screen brightness was particularly noticeable. Bearing in mind that only in a few cases were special precautions taken to make sections of the stands dark, this feature was the subject of considerable comment. Although members of the public could not handle demonstration sets themselves it was quite obvious that the new season's television sets have been made extremely simple to operate. One knob vision control was the slogan used by one pioneer company. There was a marked freedom from optical and electrical distortion, while in nearly every case there was a wide viewing angle, this enabling a large assembly of people to watch the transmissions in comfort. The bulk of the sets had black and white pictures with a good half-tone gradation, and there was a marked absence of synchronising doubles, the pictures remaining steady with-

in the cabinet mask limits. In one or two cases the total number of valves used in the sets had been reduced to an astoundingly low figure, while the mains consumption was often as small as 150 watts.

A Regular Visitor

ABOUT this time each year David Sarnoff, president of the Radio Corporation of America, visits Europe to carry out an investigation into radio and

television developments. The latter is his prime object at the moment with a view to comparing it with what it is anticipated the World's Fair will show next year in New York. It is stated that his investigations in England, France and Germany have determined him on a line of action which will endeavour to bring American television more into line with the advanced stage reached by the B.B.C. service. If that is the case, then there is sure to be a race between the two continents for a supremacy, which should prove beneficial to the whole radio public.



The new broadcasting studio at Hilversum.

A Serviceman's Diary

An Account of a Few of the Faults Which Have Been Traced and Remedied by Simple Means—but Not Always Without a Considerable Amount of Testing.

DESPITE my fairly extensive equipment of meters, oscillators and the like, I frequently find that the majority of the most obstinate faults are traced without their use. There are times, in fact, when meter tests make matters more confusing, although this must not be taken as a suggestion that a set of good meters is not an essential part of the serviceman's equipment.

A case in point arose recently when a small superhet which had previously behaved extremely well became unstable. Decoupling components were examined and voltage readings taken at various points in the set—but without avail. After some time it was decided to increase the capacity of the decoupling condensers, which were electrolytics; as soon as a 4-mfd. condenser was connected in parallel with that used in conjunction with the detector decoupling resistance, the set returned to normal.

Falling Capacity

But when the original condenser was removed from the circuit and only the test component left, the set was perfectly stable. A rough test of the electrolytic condenser suggested that it was sound, but a more thorough check proved that its capacity had for some reason fallen from 4 mfd. to less than 1 mfd. It is of interest to note that this particular fault has turned up fairly frequently during the past few weeks, although generally producing different effects.

I was called out to a fairly old "straight" set which howled very badly when tuned to the sidebands of the local station—which was about 12 miles away. This peculiar form of H.F. instability occurred only in connection with the nearby transmitter, the set tuning normally to all other signals. In this instance the source of trouble was traced by measuring the anode voltages to the different valves. It was found that almost the full 250 volts was reaching the second H.F. anode, despite the inclusion of a 5,000-ohm decoupling resistor. The resistor had become internally short-circuited, and when it was replaced the set again ran satisfactorily.

Condenser Open-circuited

A similar form of trouble in another set was traced to an open-circuited by-pass condenser, which was used in conjunction with the voltage-dropping resistor. The condenser was of the tubular type and while examining the chassis it was prodded accidentally. One of the wire ends came adrift; it had probably been loosened when soldering a connecting lead to it, but had remained in contact with the condenser itself until shaken away by vibration.

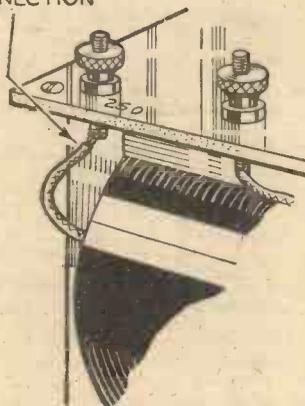
Volume Control—Nil

With another set it was found that at some times the variable-mu volume control in the cathode lead of the H.F. valve had no effect, reproduction being at "full blast" throughout. At other times the control gave the required effect. Examination showed that the moving arm was close to a bare lead running from the

"cathode" end to the by-pass condenser. It was so close that sometimes the two touched, so shorting out the variable resistor and earthing the valve cathode.

"Cutting out" of the set after it had been running for half an hour or more was another trouble experienced. In this case the set was an A.C. superhet. At first the on-off switch was suspected, but when it was seen that the heaters still

LOOSE CONNECTION

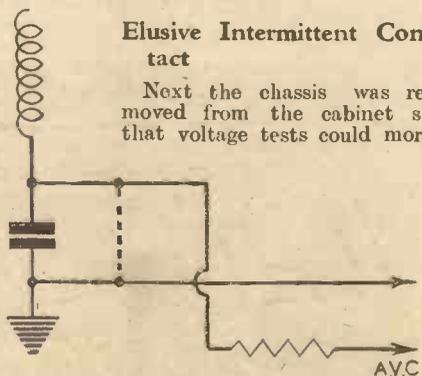


A loose connection between the transformer secondary winding and the terminal resulted in the set going off after running for a short time.

glowed although the set was "off," it indicated that the switch was O.K. Since the trouble always started after the set had been switched on for some time, and as it cleared itself when the set was left off for an hour or so, it was thought that the fault might be in the rectifying valve, which was known to be an old one. As a test a replacement was tried, but this did not make the slightest difference.

Elusive Intermittent Contact

Next the chassis was removed from the cabinet so that voltage tests could more



A.V.C. action ceased due to the end of the by-pass condenser touching the chassis and shorting the A.V.C. line, as indicated by the broken line. The same trouble can arise due to shorting of the condenser wired in parallel with the A.V.C. diode load resistor.

easily be carried out immediately the speaker became silent. But, surprisingly enough, the set ran continuously for a full evening without any sign of a fault. Perhaps the trouble had righted itself; un-

fortunately, it had not, for when the chassis was replaced the trouble re-started. This time it was taken out of the chassis without switching off and voltage test made. It was soon found that there was no H.T., although the L.T. circuit was in order. The mains transformer was suspected and removed for examination. A continuity test of the H.T. secondary did not reveal any fault, and then it was seen that one of the leads to the secondary terminals on the terminal plate was just touching its terminal. Of course, when the test was made the transformer had cooled down fairly well.

It was assumed that the lead just made contact when the transformer was cool, but left the terminal as the windings expanded due to heating.

Electrical Interference

This fault brings to mind another connected with the mains transformer—but that was not known for a long time after tests were started. The trouble took the form of an intermittent howl of terrific strength. After spending a good deal of time checking decoupling and H.F. components it was noticed that the flexible lead to one of the H.T. secondary terminals of the transformer was badly frayed. And it was also seen that there was a minute spark in the region of the connection, this being visible only when the back of the set was shielded from the light. The conclusion drawn was that arcing at this point was producing H.F. interference which was picked up by the set.

Car-radio Crackles

A car-radio receiver that we had installed suddenly started to give trouble in the form of crackling; this was pronounced only when the car was being accelerated or being driven at low speed in top gear. It was also noticed that the frequency of the crackles varied with the speed of the engine. Obviously, the cause was to be found in the ignition system, but where? The car had magneto ignition and a suppressor was included in each sparking-plug lead—as is usual when a magneto is used. It was only by making a careful examination of the plug leads that we found that one of these was not making contact with the tag connector at the plug end. The performance of the car was apparently not affected because the spark was jumping the small additional gap between the wire and the tag. The spark was, of course, producing the interference.

A very similar trouble, but one with which the crackling noise was at higher frequency, was quickly traced, in a car with coil ignition, to the fact that the owner had fitted a set of extra spark-gap devices in the ignition leads. These, incidentally, are used to "intensify" the spark, and are often found to improve the performance of the engine. But they are certainly not in the interests of car-radio because, when coil ignition is used a single resistor-type suppressor is generally used in the main high-tension lead, individual plug leads not being "suppressed."

The Modern Loudspeaker-3

A Brief Account of the Tests which Commercial Loudspeakers Undergo Before Their Inclusion in Receivers

MANY old stagers will remember the time when loudspeakers were tested in a large and airy sound-proof room, an output of two per hour being a good average. The field supply was a "courtesy title," there being little provision for measurement, and all speakers before test were "brutalized" with a 50-cycle supply. This usually scoured all

Field and Speech Coils

The test instrument itself is usually a Wheatstone Bridge, reduced to its simplest form (Fig. 1). When the field coil has been checked, the speech coil resistance is tested in turn. This also has a copper standard. Finally, field and speech coils are "meggered" to frame at 500 volts D.C., the test limits being usually 20 megohms (Fig. 2).

In some factories it is considered advisable

or its connections reversed, a large reading will be obtained on the voltmeter.

The units that pass these electrical tests are then delivered for aural examination. The speaker is clamped to a small baffle, the speech and field connections being made automatically to spring-loaded contacts. The test baffle is clamped in turn to the test rack (Fig. 4), and the main baffle doors shut. This action switches the energising current into the field coil, and eliminates the risk of shock to operators handling the equipment.

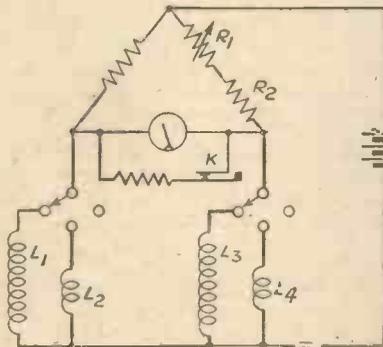


Fig. 1.—Circuit of resistance test, Wheatstone Bridge type, for loudspeaker test. R1 is calibrated in % of R2. L1 L3 Std. and Test fields. L2 L4 Std. and Test speech coils. K is meter shunt key, normally closed, to prevent inductive "kick" of field from damaging meter movement.

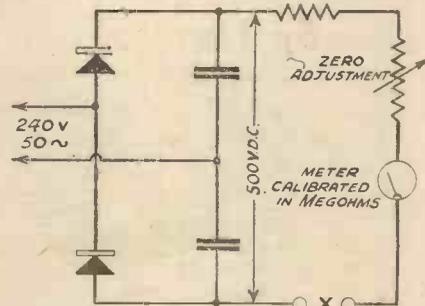


Fig. 2.—Megger test for insulation. Mains voltage rectified by voltage-doubler circuit.

to test the field coil inductance. An A.C. continuity test is usually employed, consisting of an A.C. source and a valve voltmeter calibrated in "Impedance" (Fig. 3).

At the same time a test for the "hum-

Testing Procedure

The test commences by applying a variable frequency input to the speech coil and measuring the resonances on a voltmeter connected across the supply. As the coil approaches resonance, its impedance rises, and consequently the applied voltage increases due to the decreased load. This is a sure test for resonance, and is carried out over the frequency band from 32 to 8,000 cycles per second, while the voltmeter readings are noted.

Various methods have been tried of obtaining a permanent record of the response curve. A favourite device is the sound-proof tunnel, the test speaker being inserted at one end, and a microphone at

the manufacturing dirt out of the speech coil gap, and it certainly did sort out the sheep from the goats. Any speaker that passed the 50-cycle test ought to have been good!

After this rather savage processing, the test speaker was clamped in a dummy cabinet, and a music source depending on the tester's personal taste, fed to the speech coil. They were indeed the golden days of radio!

Nowadays with the first delivery of the new batch of speakers, the Acoustics Department gets busy. Response curves are checked against the original unit used by the laboratory, and Test Specifications issued to the Production Shops covering the following points:—

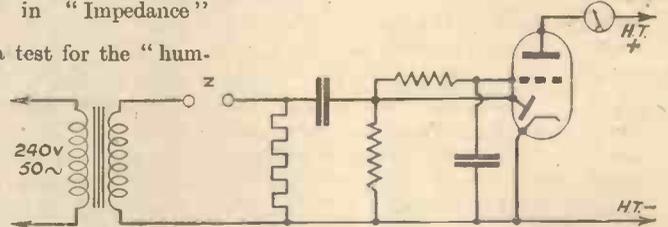
1. Field coil resistance.
2. Speech coil resistance.
3. Insulation resistance of both 1 and 2.
4. "Humbucking coil" connections.
5. Performance.

The loudspeaker arrives at the test point by slide or conveyor belt, and is connected up for the preliminary tests. Modern practice favours multiple test gear, and the three resistance tests are all taken on the same instrument.

In some cases the field resistance is utilized to develop automatic bias, and the tolerance is, therefore, rather close, in the region of ± 3 per cent.

Copper has a high temperature coefficient compared with the resistance wire usually employed for standards. Since a temperature change of 10° C. will cause a resistance variation of 4 per cent., it is necessary to ensure that all deliveries reach room temperature before coming to the test point. The test standards are also wound of copper, and the possibilities of temperature errors thus reduced.

Fig. 3.—A.C. continuity test. Voltage developed across R is rectified by valve-voltmeter. Meter can therefore be calibrated in terms of "impedance."



bucking" coil connections will be taken. A low reading A.C. voltmeter is connected across the speaker input leads, and the field excited with alternating current. The "humbucking coil" is normally wound in opposition to the speech coil, and any "hum" induced in the latter is balanced out by the reversed voltage in the former. Should the humbucking coil be omitted

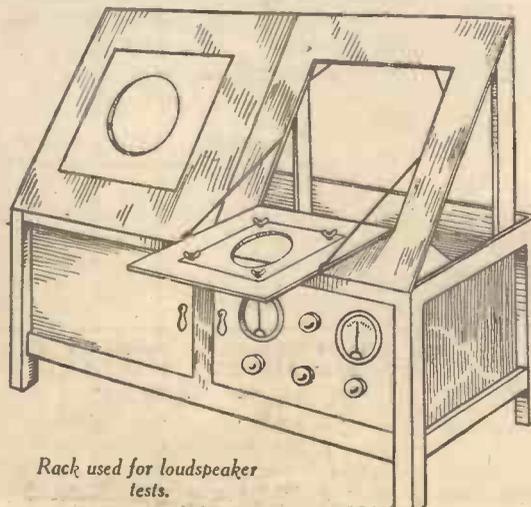
the other. The speaker is fed from a variable frequency source, while the microphone output is rectified and a curve plotted against a frequency base. By an ingenious combination of spot-light galvanometers and oscillating mirrors a photographic record can be made, or a tracing obtained, of the spot-excursion over the frequency range.

It is on occasions like these that the true effect of a baffle is seen, for if the speaker is not firmly clamped, or a door not fastened, a major resonance may be entirely suppressed.

The speaker response having been checked, the volume is turned to overload point and a search for possible faults conducted. Frequency doubling is immediately noticeable if present, and various "sizzles" and "buzzes" come into prominence as the frequency is slowly varied through the test band. At the same time, the test speaker is compared aurally against the standard for sensitivity.

Music Test

Finally the audio-frequency is switched out and a music test follows. The choice of



Rack used for loudspeaker tests.

(Continued on page 44)

ON YOUR WAVELENGTH



Beards at Radiolympia

F. F., of Bognor, which thinks it desirable to add Regis to its name (apparently being such an obscure spot that no one will be able to locate it without a second name!—or perhaps the local people are most anxious to be in keeping with the modern times, which thrive on double-barrelled names,) refers to my recent paragraph about those youngsters who, often lacking in ability and intelligence, need to adopt the veneer of a beard on the assumption that wisdom grows with beards. He thinks that they were art students, and that thousands of them live around Earls Court and Baron's Court. He says that the craze for art students to cast away the razor started in London in 1924, when it was imported by an English art student who had been to Russia. Young men came down from the North of England (like Arnold Bennett, who came to see the Cup Final and forgot to go back) on scholarships from Provincial Art Centres. They arrived looking very neat and clean shaven; they soon got the craze and grew beards. I think my correspondent is right, for it is the ambition of many Northerners and others to gravitate South at an early age, armed with introductions from the local minister to other Northerners and others in prominent positions in London. They are so inexperienced, and so obviously callow, that I suppose a beard hides their youth. However, I do not see why these people should choose the wireless trade.

That Mystic Ray

R. T. H., of Birkenhead, who bombards me with letters about inventions and inventors, sends me the following letter about the mysterious rays to which I have referred. Here is his letter:—

“If I had a motor-car—that would not go

Do you think that I would sell it? Oh dear no!

I'd wait until another car passed that way

And broke down the 'fluence of the Secret Ray.’

“That sounds as good an explanation of those two cars that pulled up for no

By Thermion

reason at all as any other I can think of. Pure coincidence alone might be the cause—it *could* happen, though not very often, I agree. There are no end of possible, if unusual, reasons that could be suggested, and I would rather credit any of them than the “Secret Ray” theory. It will be very interesting to read some of the “explanations” if you publish them.

“Now about those Whiskers-At-The-Show—loathsome fungus that they are. But, don't forget that human beings (males) look most like human beings when they cultivate what nature has decreed, and it is us clean-shaven chaps that look least like human beings, who, in the adult stage, do have this facial jungle all over their faces if they let Nature have her way. Not that I admire the beastly things, I just hate them, and I know the sort of posing poodles that indulge in them.

“One more little stanza, and I must close,

“If you've got whiskers on
It will rile Thermion
When he visits the Radio Show.
It's wireless, not whiskers, he's
gone there to see
So don't let your face fungus grow.’

“How Sparkling! How Brilliant!
And Oh! How very, very true!”

A Reader's View of Radiolympia

M.F.S., of Friern Barnet, expresses his views on Radiolympia thus: “I managed to get time off and

went to see this ‘most interesting Exhibition,’ which you called Radiolympia. If you had called it the Woodwork or Furniture Exhibition I should have agreed with you, as I haven't seen a better show of polished wood for a long time. As for the internals and working parts there were not many being shown. Home construction: I should not mention it, as it seemed to be completely taboo. (I think there were only Messrs. Bulgin, Eddystone, and Wingrove and Rogers who were showing or doing anything for the home constructor. More power to them.) If there were others there I must have missed them in looking for the ideal. I didn't miss them because of the crowds, as the attendance was very poor; I was able to walk about in comfort from stand to stand very easily. As for the ‘right type of public’ being there, it depends on what you mean by this, but my opinion is that the majority were only there to see a free show, many sitting on the seats in some of the booths when I arrived, and this was some time before the Show started. I suppose I must have missed a sight by looking at the Show stands first, I believe I did, as I found it the most uninteresting show. As for the much vaunted Push-Button tuning: I cannot see anything very clever or wonderful in it; seems like an attempt to flog a dying horse, to me, with a great fanfare of publicity. Some of the firms had very clever systems, and I liked the one with the motor tuning. As for the Television: no doubt it is all very clever, I do not say otherwise, but who will want to sit at home in the dark to look at a hole about five square inches (taking one particular receiver for table use) to make their eyes ache? I found two or three like this, whatever the distance one stood from the receiver. Taking it all round I don't think it is good enough yet to risk several pounds on one, not even to give the family a treat, while I continue with my home construction in the back parlour. All the best.”

A Note for Avoch Fans

IN wishing me lots of 73's William Forsyth, a member of the B.L.D.L.C. who resides at Bank House, Avoch, Ross-shire, asks if

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM.

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

other readers in that district would get into touch with him.

Seizing a Wireless Set

THE Ipswich Magistrates ordered a radio-gramophone to be confiscated because the owner had not taken out a licence. The defendant was also fined £1 and 1 guinea costs. The proceedings were taken out of the Wireless Telegraphy Act of 1904, which gives authority to the police to seize apparatus at an unlicensed wireless station. The Post Office officials stated that the case was one of the most troublesome they had experienced, as an official had visited the defendant's house no fewer than 25 times.

Silent Hearths

AN evening paper recently published a leading article under the title "Silent Hearths." With mental pictures of widows and orphans I read the article only to find that it dealt with homes which are not served with radio. Although eight and a half millions of people listen in there are still three and a half million homes without radio. The writer of the article asks where these homes exist, and what it is which cuts them off "from the greatest boon of modern science." I do not know whether we should criticise these three and a half millions, or whether we should consider them as the intelligentsia. Personally I do not want to know what the Prime Minister says, for I am quite certain that it will be lacking in real interest like the rest of the claptrap which is spoken by politicians, most of whom believe that the population consists of nitwits. Similarly, Sir Kingsley Wood, Mr. Hore-Belisha, and the rest are unlikely to make an utterance in which I would be interested. Politics and radio do not mix. I remember listening some years ago to a statement by the Rt. Hon. Philip Snowden when we went off the Gold Standard. I do not think that any utterance of any person, public or private, has ever incensed me to the same extent. He invited us all to consider that we were sitting in a room having a friendly chat, and went on to explain the most elementary thing about finance, evidently presuming that we did not know how many pence made a shilling. He then made frequent use of the word "sitooation," and talked a lot of utter nonsense which could not stand the scrutiny of a schoolboy. Previously Mr. Ramsay MacDonald had spoken about the "sitooation" in the "wurrrrrrld."

Notes from the Test Bench

Tracking Faults

IT is sometimes found that a receiver, after being in use for some time, fails to give the same performance on the long waves as when the receiver was first used. Several cases of this kind have been investigated lately, and it has been found that in the majority of cases the trouble has been identical. The coils were of the modern type where the medium-wave winding is a solenoid, but the long-wave section is pile wound. The turns are held in place with some sort of adhesive, and the heat generated by the valves in the receivers has, in the cases mentioned, softened the material with the result that the turns have shifted. In order to re-match the coils the can of the defective one has to be removed and to adjust both coils to the same value it will be necessary also to remove the other can. To prevent instability a sheet of metal (earthed) will have to be placed between the coils and disposed so that it is equidistant from each. This may prove a rather delicate operation—depending upon the types of coil and circuit in use.

S.G. Detectors

WHEN an S.G. (or H.F. pentode) valve is used as a detector, the voltage to be applied to the screen is very critical. This is because the anode component, which is usually a resistance, reduces the voltage on the anode and the usual 60 or 80 volts specified for a screen is thus too large. In many cases only 24 volts or so may be needed for best results, and therefore, when using this type of detector, some time should be spent in finding the most suitable voltage for the screen, and it will be noticed that apart from the stability, the signal voltage is considerably modified by the potential on the screen.

Mains Voltage Conversion

THE majority of mains receivers or mains apparatus available in this country is designed for an input of 200 to 250 volts, but some imported apparatus is rated for an input of 100 to 110 volts. It is possible to use the apparatus designed for a low input on high voltage mains, or high-voltage apparatus on low-voltage mains, by including a special transformer, provided, of course, that the mains are A.C. The transformer is roughly a 2 to 1 component with suitable windings to carry the current, and any good mains transformer manufacturer can supply suitable components. For D.C. apparatus it may be possible to use a special line-cord resistance such as is used in American receivers.

Now, I am a person of average intelligence, and do not like to have my leisure time wasted by listening to so-called talks by people who I am quite sure have an even lower standard of intelligence than I possess. So it may be well that the many hearths are silent from a radio point of view because three and a half million people have become disgusted with the way radio is being used for propaganda instead of for entertainment.

Back Issues

THOSE readers who for one reason or another wish to dispose of back issues might usefully adopt the suggestion of W. W. B., of Folkestone, who writes:

"Some eighteen months or so back I was in the same predicament as your correspondent Mr. Wareham, of Ashford, Middlesex, having a large number of back copies on hand and not knowing what to do with them. Eventually I stabbed two holes near the back of each copy and strung them book fashion not more than about a dozen copies to each block, so that they could be used in consecutive order. These I addressed to the men's ward of the local hospital. I found out some time afterwards what an appreciative welcome they had. My supplies continue.

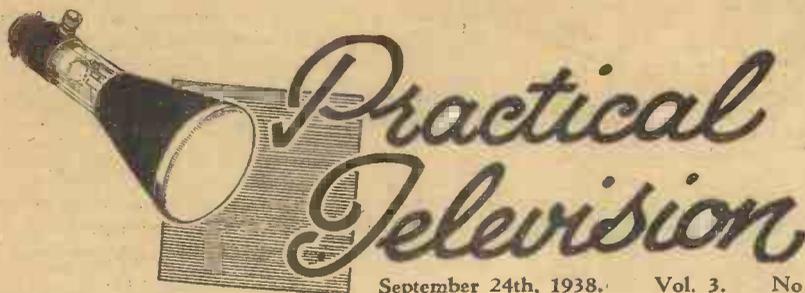
"No doubt there are many more of your readers who would be pleased to pass on their back numbers to their local hospital."

The Etheric Aerial

J. W., of Derby, enters the lists and has his piece to say concerning the subject of the etheric aerial. This is what he says:

"Surely the excruciating theory adumbrated by your learned correspondent is of an esoteric nature rather than wirelogerminous, as suggested. Although I have no experience of boiling down electromagnetic devices, the results of any attempts of mine of hotting up the Sunday left-overs suggests that the programmes emanating from Mr. McC's devices would be rather dry! Also the effluviatzi resulting from the conjunctivity of such varying thicknesses of tyromagnetic and dammeogoandgetit wires would result in a visit from the local Sanitary Inspector, or the ditto Fire Brigade, A.R.P., R.I.P., and Uncle Don Bradman and All! Who was it said 'Hitch your wireless to a star'? (But not a movie one!)"

Disentangling the above, I gather that J. W. does not, will not, cannot, or must not possess an "etheric" aerial.



Practical Television

September 24th, 1938. Vol. 3. No. 119.

A Larger Studio ?

DURING the course of Radiolympia the B.B.C. producers and engineers had their first experience of working in what is claimed to be the largest Television Studio in the world. This was arranged so that four independent stage sets were capable of operation without in any way upsetting the layout. It is common knowledge that at the Alexandra Palace one of the biggest difficulties with which the authorities have had to contend is that of the cramped studio space. The B.B.C. officials who visited Olympia were so impressed with the enormous advantages accruing from large studio space that it is certain the whole problem associated with this part of the work will be investigated thoroughly within the next few weeks. For this fact alone, all possessors of television receivers will feel that Radiolympia has justified itself from their point of view, and it is hoped that any plans which have already been drawn up will be modified to enable additional structural alterations to be made at the Alexandra Palace in order to meet this very urgent need.

The G.P.O. and Interference

THE General Post Office are to be congratulated on the very thorough manner in which they have tackled the problem of electrical interference in so far as it affects the operation of television receivers. In a very large number of cases it has been found that the receiver sound and picture signals are satisfactory, and are capable of giving sustained entertainment value. This has, however, been offset or marred by forms of electrical interference which have ruined either the quality of the picture, the quality of the sound, or in some cases both. The Post Office have for some time now given a satisfactory service to listeners by locating interference with ordinary radio reception, and eliminating it in a quiet but efficient manner. This service has now been extended to viewers, it being borne in mind that the ultra-short wavelengths have peculiarities which need a most thorough investigation in order to eliminate this bugbear of television reception. It is interesting to note that a special pamphlet has already been prepared by the Post Office authorities dealing with the main causes of interference in television reception, this at the same time describing the methods of suppression which are now available. It is an open secret that many manufacturers are devoting a good deal of research with a view to eliminating this difficulty. As soon as this can be accomplished successfully, the market for television receivers will be increased very materially, and in addition the range over which signals can be received considerably extended. It has already been suggested that Parliament, through the Postmaster-General, will next session introduce some form of legislation, and make it compulsory for the fitting of anti-interference devices on those forms of apparatus which cause interference not only to television, but also on broadcast sound. It is certain, however, that even if

this happens, a period of grace will be given before the Bill becomes operative, and in this interim period, research work on interference will undoubtedly continue.

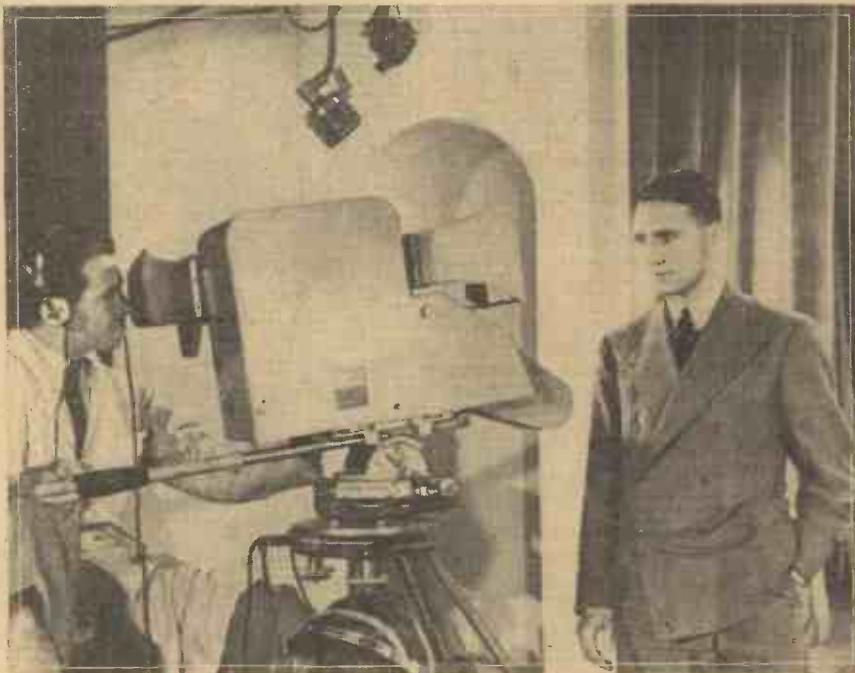
British Television Abroad

THERE have been very many foreign visitors to this year's Radiolympia, and not the least of the items which impressed them was the demonstrations of television featured on the individual manufacturers' stands. So impressed have been many of the American executives that already orders for receivers have been placed with the idea of adapting them to suit the experimental transmissions which have

reasonable prices charged for commercial sets, and the world is watching the efforts of British manufacturers with the keenest interest, and no doubt the plans of different countries will be based very primarily on the experience obtained with the service now followed by the B.B.C.

Defining the Service

THE Federal Communications Commission of America have been studying the various classes of visual broadcast stations, and have now issued what, in their opinion is a satisfactory definition of the different forms of public broadcasts. This has been found necessary because in that country there now exists facsimile broadcasts which endeavour to provide pictorial and printed information in a manner which can be easily assimilated. The Commission have, therefore, stated that the term "Visual Broadcast Station" is applied to one which carries on the broadcasting of images for general broadcast reception. These are then sub-divided into a Television Broadcasting Station which means one licensed for the transmission of transient visual images of moving or fixed objects for simultaneous reception and reproduction by the general public. As opposed to this is the term "Facsimile



Len Hutton, the record-breaking Yorkshire and England Test cricketer, being televised in the "Picture Page" programme from the B.B.C. television studio at Radiolympia.

been conducted for such a long time from the Empire State Building by the National Broadcasting Co. This transmitting equipment has been overhauled, and the programme resumed to the extent of one hour's transmission per day. It is learned that the receivers so far imported have been quite successfully adapted to suit the American standards, and no doubt this will in time provide an excellent export market for British manufacturers. It has been usual for America to lead in many developments, but in this case Britain has a full two years' start. Germany is making an effort to inaugurate its own television service within the next few weeks, and in consequence the German visitors to Radiolympia have studied carefully the receiver designs in order to assist them in making their own production plans. They have admitted, quite frankly, that they have been astonished at the clarity of the pictures, and the

Broadcast Station" which is applied to one transmitting images of still objects for reception by the general public. It is also interesting to note that the same Commission, in authorising the use of adjacent carrier frequencies for the transmission of sound and vision, stated that the lower carrier frequency shall be employed for the transmission of the vision signals, while the higher carrier frequency is to be employed for the accompanying sound. This is contrary to the method used in this country. It surely would have been a better plan to employ the higher carrier frequency for vision signals as this would provide a better modulation percentage on the carrier for a given frequency sideband, which with high-definition television is so enormous. It will be interesting to watch the standards adopted by the different countries when they inaugurate their own individual television service.

TelevIEWS

Television for Schools

AT the recent British Association Meeting the Educational Section dealt with the prospect of television becoming common in schools. Certain film companies have made a special point of producing films to assist in the education of the young mind, but as a general rule the cost of the apparatus is rather excessive. With television, however, the receiver is reasonable in price and there are very many of the present programme items which are wholly suited to education purposes. Another big factor which must be borne in mind is that both radio and television broadcasts are a change in the ordinary scholastic routine, and in that way they offer new material which appeals to the imagination of the child. This would apply particularly to backward children, and also to the lazy scholar who found difficulty in concentrating his attention on a dull textbook, but would have his interest stimulated by viewing and listening to educational items received in this way. It seems certain that as the service grows, special sections will be allocated for school purposes, and by having lecturers of outstanding personality in a central studio, all schools having television equipment within the range of the service will take advantage of this form of education.

Another Method of Scanning

ALTHOUGH the schemes which have been proposed, tried, and abandoned for television scanning are legion, new ones still keep making their appearance. This is all to the good, for it prevents the science becoming static in its development and spurs those employing reasonably satisfactory schemes to continually effect improvements. An idea has now been suggested which shows a radical difference from those methods which rely on rotating discs or drums, or even any form of electronic scanning. The idea is to have a beam of light which is rapidly interrupted at its source, so positioned that the emerging rays pass through a stack of glass plates fixed in position with reference to the light. These plates are purposely arranged to be of different lengths and thereby introduce a progressive delay in the emergence of the beam. This has the effect of breaking up the lamp beams into separate spots and to still further increase the delay factor the light beams are forced to traverse a zig-zag reflective path inside the stack of glass plates. The original unbroken light ray which is thereby converted into a succession of light spots is then constrained to pass through a slot in a transversely moving screen which is in front of a film which it is desired to televise. At the back of the film is a "bank" of small photo-electric cells or the usual form of mosaic screen having a photo-sensitive surface. This provides the television signal which is conveyed to the receiving end where there is a similar type of scanning device. This is used in conjunction with a lamp whose light is interrupted or flashed at the same speed as the transmitting end, while the final modulated light signals are projected on to a remote screen through a special rotating shutter. The scheme seems to be somewhat complicated, but has the advantage of being quite original, and only time will prove whether it is of commercial value.

In the Villages

THERE is one aspect of television's development which at the moment does not seem to have received the attention it deserves, and that is the possible demand for television reception in country villages. In those places remote from the bustle and activity of town life the advent of ordinary broadcast radio brought an entirely new outlook to those who spend their working hours on the land. Even without any form of electricity available, listening could still be undertaken with battery sets. The promise of television, however, will bring the whole countryside into intimate contact with actualities in a way that was only a dream a few years ago. Combined vision and

in its ultimate development, bids fair to bring about still further changes because of its wider domestic appeal.

Multiplier Improvements

MORE and more attention is being devoted to the electron multiplier because of its multiplicity of applications in connection with television. Many improvements have been effected, especially when this device is employed for generating ultra-high frequency oscillations. One drawback in this class of work is the internal capacity of the target electrodes which form the source of the secondary emitted electrons. Another point to be studied in the same connection is the actual time taken by the electrons to pass to and fro between the target electrodes. To overcome these difficulties one scheme which has been developed makes use of a

magnetron split anode type of valve. The primary electron stream is then made to impinge on the target electrodes at an acute angle. The electrons from the valve cathode travel in a spiral path due to the influence of an external magnetic field produced by a solenoidal coil. By correctly positioning the target electrodes it is arranged that the electrons moving in the spiral path strike the electrodes tangentially, and it is claimed that in this way very high frequency oscillations can be generated without any of the attendant difficulties.



Visits to all parts of the Regent's Park, London, Zoological Gardens, with television cameras and apparatus were made recently to provide daily demonstrations for visitors to the Radio Exhibition at Olympia. Previous television transmissions have been made from a fixed point, but this year the cameras were moved about more freely. Our illustration shows the chimpanzees being televised at their afternoon tea.

sound will give to the villages an entirely new form of pleasure and education which the inhabitants, because of the very nature of their semi-isolation, will be quick to appreciate. Since television receivers can only be worked from the electrical mains and not batteries, there will be a demand for electrical services in those districts not at present covered. In other words, rural electrification schemes should develop very rapidly when the high-definition television service is extending to cover most of the country by erecting new transmitting stations. It will mean a lighting and power load of substantial size, for obviously the houses will have to be wired throughout, and old forms of illumination become a thing of the past. The films and wireless have already left their stamp on the habits of both town and country, but television,

of view of contrast, it was generally conceded that the experiment was successful. As a direct sequel to this it is understood that the B.B.C. will shortly make a fresh approach to the Kinematograph Renters' Society for permission to use reissues of past film successes in its regular television programmes. So far, the K.R.S., in conjunction with the Cinematograph Exhibitors' Association, has opposed the indiscriminate releasing of films for television broadcast purposes on the grounds that this was unfair competition with the cinemas. On the other hand, the B.B.C. will not allow the cinema industry to show on big screen television installations any of its outside broadcasts, except to private audiences. It is possible that one way out of this apparent double deadlock will be for both parties to give way.

The B.B.C. and Films

DURING the course of Radiolympia two Gaumont-British films, "Jack Ahoy" and "Aunt Sally", were televised on alternate days. Although the picture quality varied, especially from the point

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

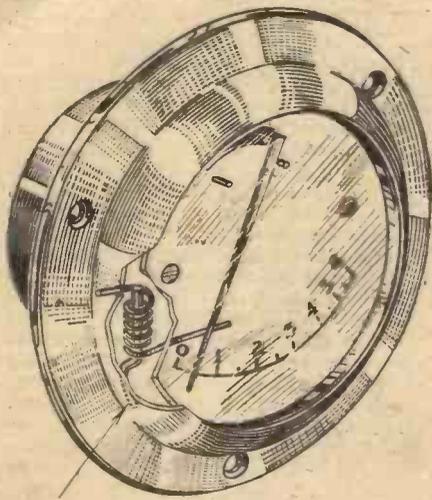
READERS WRINKLES

THE HALF-GUINEA PAGE

Avoiding Damage to a Test Meter

HAVING a sensitive multi-range testing meter, I noticed that when the instrument was carried or taken on a bus, the pointer rocked and jolted violently against its top. To avoid this, or any possible damage to the moving coil, the remedy described below proved successful.

Carefully remove the meter from its case. Drill a small hole in the side of the rim which holds the glass, in a position



SPRING ON SUPPORTING WIRE SOLDERED TO UNDERSIDE OF RIM

A simple method of avoiding damage to a test meter pointer.

nearest to the zero setting of the pointer, and just below the glass. With a piece of thin spring wire make a four or five-turn spring, as illustrated. Next, solder a small piece of copper wire, shaped as shown and which will fit the coil of the spring fairly tightly, to the inside of the rim over the hole. Slip the spring on this wire with one end projecting through the hole about 1/4 in. The other end of the spring should be cut to such a length, and adjusted so that when the meter is refixed into the case, the end is just under the pointer. When the meter is not in use, or when it is taken on a journey, the projecting tip of the wire should be pressed down. This will cause the pointer to be slightly lifted by the other end of the wire and prevented from moving. Before using the meter the projecting tip of wire can be lifted with the finger-nail, thus releasing the pointer. —ALEC DAVIE (Edmonton).

Making Distilled Water

HOW often has the amateur who charges his own accumulator remembered the rule, "Always top up your accumulators with distilled water," but finds himself quite out of the necessary liquid at a week-end? He will either be tempted to top up with water from the tap, or not

THAT DODGE OF YOURS!

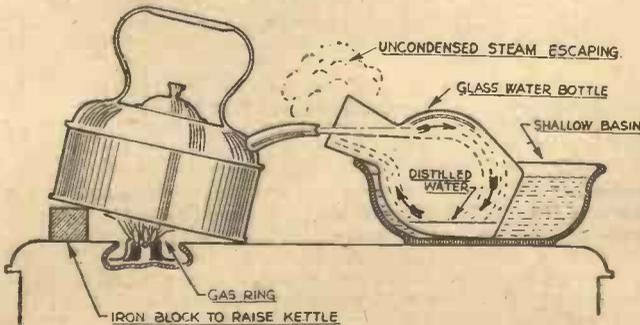
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account 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.

bother at all, either of which alternatives will not tend to extend the life of the accumulator concerned.

However, it is quite a simple matter to make distilled water at home, and the sketch illustrates how easily it can be accomplished. In brief: Steam from a kettle of boiling water is allowed to project into an ordinary glass water-bottle, the bottle resting in a basin of cold water. The steam circles the interior of the bottle, and part of it is condensed by the action of the cold water in the basin, the remainder escaping out of the neck of the bottle. The arrows in the sketch show the path of the steam. After about fifteen minutes a small quantity of distilled water will be found in the bottle, which after allowing to cool, will usually be found sufficient for the purpose required. The spout of the kettle need not be very close to the bottle, as long as the jet of steam enters the neck. Whilst the resulting distilled water will not be as cheap or quite as pure as the commercial product, the "wrinkle" may be of interest as a stand-by, should the necessity arise.—R. L. GRAPER (Chelmsford).

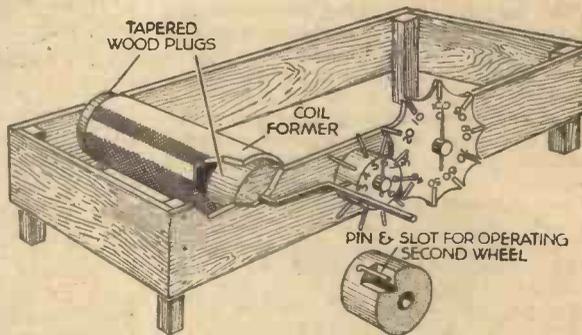


A handy dodge for making distilled water.

A Self-counting Coil Winder

IN order to prevent any interruption during the winding of a coil, I devised the contrivance shown in the sketch. It ensures the correct number of turns being wound, no matter how often you may be interrupted, or forget how many turns have already been wound on a coil. The necessary materials are: 2 pieces of plywood, 12in. x 2in. x 3/4in.; 1 piece of plywood approx. 3in. x 3in. x 3-16in.; 2 pieces of board, 5in. x 3in. x 3/4in.; 2 empty cotton reel; some stout wire for the winding handle and spindle; a few wire nails 1in. long with heads cut off; suitable wood for the tapered end plugs to hold coil former, and wooden pins as spindles for the revolution counter.

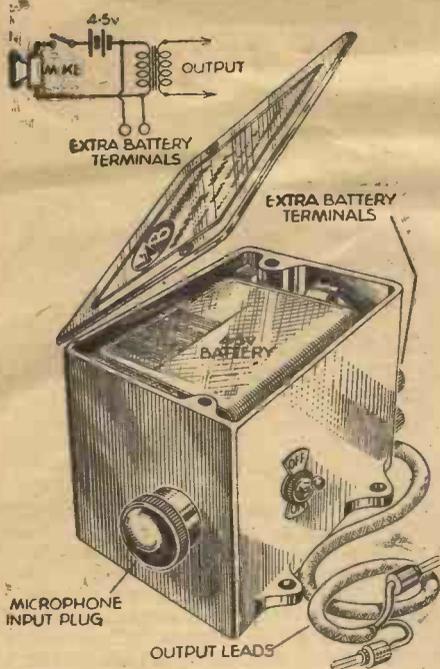
The wheel for recording units, is a cotton reel 1 3-16in. dia., with ends cut off, and recessed as shown in the inset. A bent wire is fixed to rotate the second wheel recording "tens." Ten equally spaced thin wire nails are fixed round the periphery of the reel and engage, in rotation, the winding crank as each turn is wound.



General arrangement of a self-counting coil winder.

To construct the second wheel: on a piece of 3-16in. plywood, describe a circle 2 3/4in. dia. and divide the circle into 10 equal parts. At each point cut a slot 1/4in. deep, just wide enough to accommodate easily the bent wire on the reel. Between the slots mark off the circular indentations using the reel as a guide. Two wooden pins, wedged or glued into the side of the frame form the spindles on which the recording wheels rotate. The pins retaining the wheels in position also act as pointers.

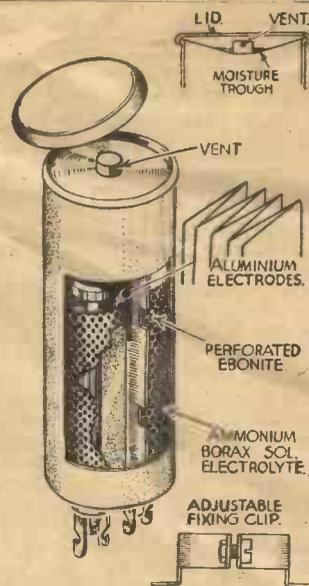
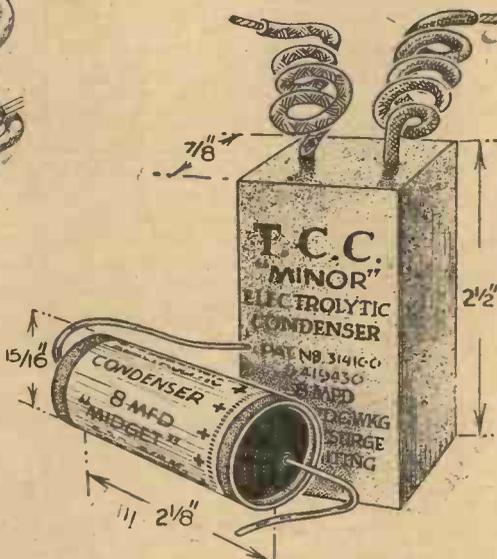
The construction of the frame and winder is simple, and may be varied to suit special requirements. Provision must, of course, be made for allowing the coil former to be disengaged from the tapered end plugs after winding.—R. F. CAMPBELL (Aberdeen).



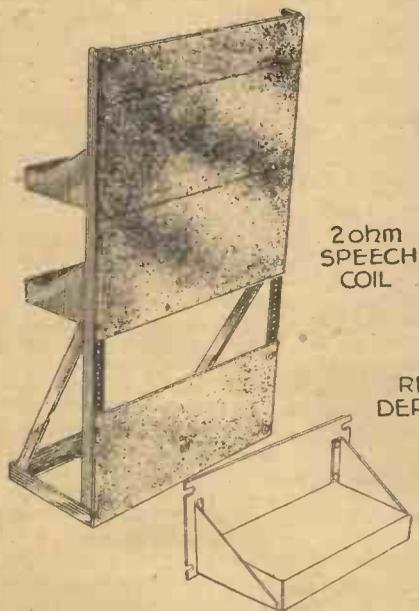
THE illustration shows the W.B. Microphone Adaptor Unit, by means of which any good standard microphone may be connected to the pick-up terminals of a standard receiver. The standard microphone requires an energising battery and a transformer, and these are both included in the neat case shown. Flexible output leads with plugs for use in the pick-up sockets facilitate connection of the unit to the receiver, and the microphone is connected to the input plug shown so that it may be added when required. Terminals are provided for an additional battery when this is needed, and a switch ensures that the battery will not be in circuit unless required, thus economising in current.

Our Artist at Radiolympia

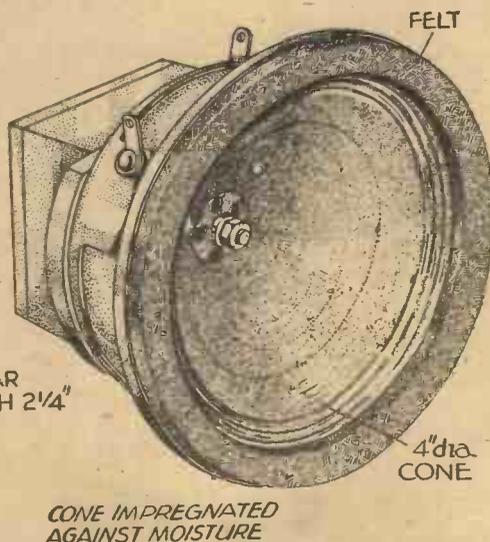
THE modern receiver calls for modern components, and these in most cases have to be of very small dimensions. In the T.C.C. range some interesting new Midgets have been produced, and below may be seen a pair of electrolytics of the 600 volt Surge Limiting Type. These are intended for 500 volt D.C. working and may be obtained in the cylindrical or rectangular cases.



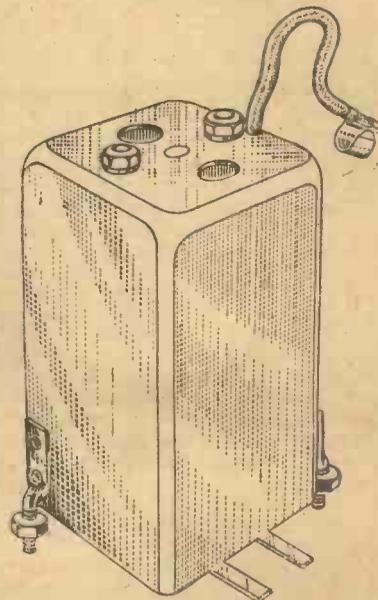
MOST modern receivers incorporate electrolytic condensers for smoothing the mains side, and usually two 8 mfd. units are employed in conjunction with the smoothing choke. Space is economised when a dual condenser unit is employed, and the illustration above shows one of the T.C.C. dual units, available as an 8 plus 8 or an 8 plus 16 mfd. assembly. As the usual single bush has to be omitted to permit two positive output terminals to be fitted the usual method of fitting to a chassis cannot be employed, and, therefore, an adjustable fixing clip is provided. This is bolted to the chassis, and if a large clearance hole is cut the condenser may be mounted at any desired height, or two small holes may be drilled for the connecting leads.



FOR transmitters and for experimental equipment, the rack method of assembly has many points to recommend it. Each section may be assembled separately, taken down for testing without disturbing all the units, and changes may rapidly and easily be made. The unit above is from the Eddystone range.



A MOVING-COIL microphone has many points in its favour, and above is the W.B. mike-speaker. This has a 2-ohm speech coil and thus requires a transformer for matching to most valve input circuits. This mike may be used for home broadcasting, in the construction of room-to-room communicators, or for transmitters, and has a very high degree of sensitivity. The price, less transformer, is £1 1s., and special transformers are obtainable as desired.



A BEAT-FREQUENCY oscillator requires to be very efficiently screened so that the oscillations in the stage are restricted to the second detector, and only fed where required. It is possible to make up a unit with separate components, but Eddystone can supply a ready-made unit of this type, made up on the lines of a standard I.F. transformer. It is shown above, and costs 8s. 6d.

THE SIGNET TWO-VALVER

Main Constructional Details of a Simple Beginner's Broadcast Two-valver, Described on Blueprint No. P.W.76

IN 1936 we described a simple two-valver which has proved a tremendous success, and the demand for Blueprints and back numbers of the issue in question has been so great that all the available issues have been sold out. Blueprints are still available, however, and in view of the fact that many readers are still requiring a receiver of this type we are reprinting the main details, together with the list of components. In the original specification a special Trans-coupler was specified, but this is no longer on the market. Fortunately, however, a similar item is still listed in the Bulgin range, and is known as type L.F.10. This is similar in electrical and physical characteristics and may easily be used in the receiver. The only difference is in the marking of the terminals, and in place of the letters P, H.T.1, and H.T.2 on the original component, the Bulgin item is marked Anode, Low and High. These correspond respectively to the original markings, and thus in this receiver the anode terminal is connected to the point P on the Blueprint and the H.T. lead is taken to terminal marked High.

Circuit Details

The circuit is the well-tried detector-L.F. arrangement, a triode valve being used in the detector stage and an economy pentode in the output stage. A triode could be substituted for the pentode, but this would result in loss of volume and, therefore, the specified valve should be adhered to. The coil is an efficient dual-range type, wave-changing being effected by means of an external three-point switch. It is of the

transformer type so that a high degree of selectivity can be obtained if the reaction condenser is judiciously operated. This coil works best with an outside aerial of approximately 40ft. If a longer aerial is used it will be advisable to connect a fixed condenser of approximately .0002 mfd. between the aerial lead and the aerial socket of the set. Reaction is provided by means of a differential reaction condenser, thereby ensuring an effective path to earth for the H.F. component at the anode of the detector valve.

Range

This simple little set can be relied upon to pick up medium-wave stations at a

distance of approximately 100 mils when a reasonably efficient aerial is employed, and reception of Droitwich on the long waveband may be obtained in most parts of the country. This does not mean that foreign station reception is impossible; with an efficient aerial several Continental stations will be picked up after dark.

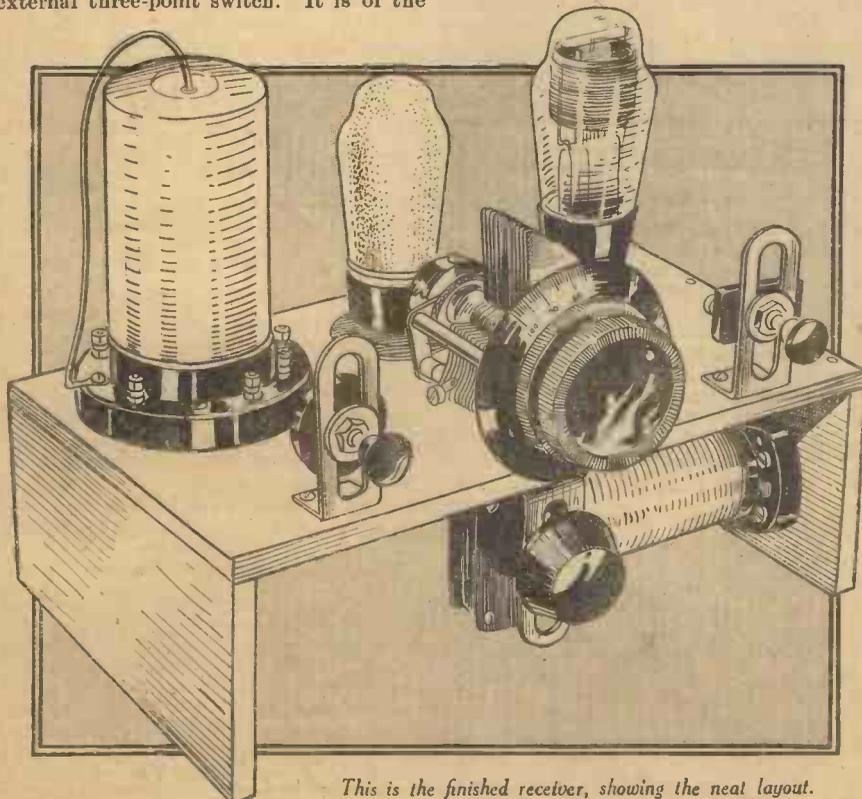
Construction

It will be noted that the receiver is ideal for the constructor who is attacking his first piece of constructional apparatus, and the layout has been arranged so that no possible difficulty can arise. The wiring diagram shows how the very few wires are placed in position, and provided that all connections are firmly made (either by making a neat loop for inclusion beneath the terminal head, or by soldering to connecting lugs) the receiver may be relied upon to offer many months of efficient service without risk of breakdown. When wiring the receiver cross out each wire on the wiring diagram as its counterpart is placed in the receiver, and thereby avoid the risk of omitting one wire and dispose of all doubt as to whether any mistakes have been made.

The illustrations may be used as a guide in wiring, and every component required is clearly set out in the list of components on this page. Do not be tempted to use a substitute if you cannot at once obtain the parts named. Not only will the layout probably have to be modified to accommodate the alternative part, but the performance may be impaired due to differences in characteristics.

LIST OF COMPONENTS

One coil (C20) (Bulgin).
 One .0005 mfd. condenser (1,046) (C1) (J.B.).
 One .00025 mfd. reaction condenser (1,081) (C2) (J.B.).
 One L.F. coupler Type L.F.10 (Bulgin).
 One resistance: 1 meg., R1 (Eric).
 One .0001 mfd. condenser (665) (C3) (Dubilier).
 One switch (S36) (Bulgin).
 One switch (S22) (Bulgin).
 Two terminal strips, A.E. and L.S. (B. Lee).
 Two valveholders (one 4-pin, one 5-pin) (Clix).
 Two valves: D210, Y220 (Hivac).
 Five plugs: H.T.—, H.T.1, H.T.2, G.B.+ , G.B.— (Belling-Lee).
 Two spades: L.T.—, L.T.+ (B. Lee).
 Four component brackets (P. Scott).
 Metaplex chassis, 10" by 6" by 3" (P. Scott).
 One 100 m/A microfuse and holder (Microfuse).
 One speaker, Junior W.B.



This is the finished receiver, showing the neat layout.

The Chassis

If desired, a chassis may be obtained already drilled from Messrs. Peto-Scott, from whom also a complete kit of parts for this receiver may be obtained. If such a chassis is obtained the actual constructional work may be carried out with the aid of only a screwdriver and a pair of pliers. If a complete chassis is obtained holes will have to be drilled in order to accommodate the valveholders, the terminal socket strips and for the various connecting wires to pass through. There are nine of these, and a gimlet may be used for the purpose. Alternatively, a hole $\frac{1}{16}$ in. in diameter may be drilled, but for the valveholders a hole $\frac{1}{16}$ in. in diameter must be drilled, and as a precautionary measure the metallised surface round the hole should be scraped away by means of a penknife in order to avoid risk of short-circuits when the valveholders are screwed into position. For the socket strips you can drill either a separate $\frac{1}{16}$ in. hole for each projecting socket, or may cut a slot into which both sockets on each strip will pass. This is done by drilling two $\frac{1}{16}$ in. holes separated by a space of $\frac{1}{16}$ in. and sawing away the intervening wood.

Before mounting the components one important factor must be stressed. The on-off switch is included in the L.T. positive lead and, consequently, it must be insulated from the metallised chassis which is connected to the L.T. negative lead. The

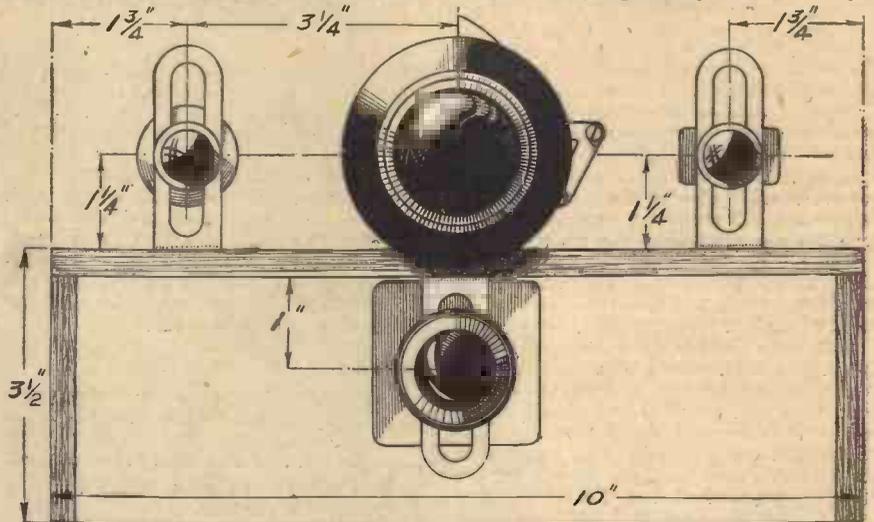
metal mounting bracket which is employed is screwed to the chassis, and the plunger of the switch is in direct contact with the mounting bracket. Therefore, before screwing the bracket into position the metallised surface must be scraped away for a sufficiently large area to ensure that the foot of the bracket will be effectively insulated. Again, a penknife will enable this operation to be carried out quickly and efficiently.

Operating Instructions

Connect the aerial and earth leads to the two sockets marked A and E, and plug the leads from the loudspeaker into the loudspeaker sockets. The two L.T. leads should be joined to the positive (+) and negative (-) terminals on a 2-volt accumulator, and the H.T. lead should be inserted in the negative socket on a 120-volt H.T. battery. The lead marked G.B.+ should be inserted into the positive socket of a 9-volt G.B. battery, and the lead marked G.B.- should be inserted into the 4.5-volt socket on this battery. Lead H.T.+2 should be inserted into the 120-volt socket on the H.T. battery and H.T.+1 should be plugged into the socket marked 99 volts, or somewhere near that value. Pull out both switches, and the receiver will then be in action on the medium waves, and before attempting to tune in a station rotate the reaction condenser in a clockwise direction with the main tuning condenser set at minimum (with the vanes "all out"). If the set goes into oscillation smoothly, as indicated by rushing sound in the speaker turning to a plop, turn the main tuning condenser with vanes all in, and again try the reaction condenser. The same thing should happen. Try this also on the long waves, that is, with the left-hand switch pushed in, and you

should find that the reaction operates smoothly over the entire band. A modification of the voltage at H.T.+1 will vary the sensitivity and the smoothness of the reaction control, and a value should be used where a smooth build up is obtained on a station without a sudden plop, which indicates oscillation. If the H.T. voltage here is too low no reaction will be obtained.

high above an earthed object as possible. Remember that a five-foot pole over a roof will only give an effective height of 5ft., and thus the aerial should, wherever possible, be placed so that it passes over clear ground, and as high as convenient. The earth also should be very efficient, and a buried metal plate, with the earth lead soldered to it, is generally the best. If you



Panel layout diagram.

Stations are located by turning the main tuning condenser, and the strength is increased by the reaction condenser, but this should be used judiciously.

Aerial and Earth

With a simple receiver the best possible aerial should be employed, and this will be obtained when the aerial wire is erected as

cannot get such an earth, or to do so means that a very long earth lead has to be adopted, then a main water pipe should be utilised, with the wire attached by means of a proper type of earthing clip. Do not attempt to solder a wire to a lead pipe, and, if possible, avoid connection to the brass water tap, making the wire provide a sound contact on the main part of the pipe.

IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, September 21st.—Promenade Concert: Bach, from Queen's Hall, London.

Thursday, September 22nd.—Rhythm Express: Dance-band programme.

Friday, September 23rd.—Promenade Concert: Beethoven, from Queen's Hall, London.

Saturday, September 24th.—Parachute-jumping.

REGIONAL (342.1 m.)

Wednesday, September 21st.—Cold Coal: A play by E. Eynon Evans, from Welsh.

Thursday, September 22nd.—Nights Out: A Night in Town; A Night in the Country—two sketches.

Friday, September 23rd.—White Ladies, by Francis Brett Young, from Midland.

Saturday, September 24th.—Music Hall.

MIDLAND (297.2 m.)

Wednesday, September 21st.—Water Polo: A running commentary on the Warwickshire County Finals.

Thursday, September 22nd.—The Belle of Boopadoo: A radio burlesque.

Friday, September 23rd.—White Ladies, by Francis Brett Young.

Saturday, September 24th.—Mendelssohn in Birmingham: A musical programme.

WEST OF ENGLAND (285.7 m.)

Wednesday, September 21st.—Dance Cabaret from the Royal Bath Hotel Ballroom, Bournemouth.

Thursday, September 22nd.—Squire's Party: Variety programme.

Friday, September 23rd.—Band programme.

Saturday, September 24th.—Farewell to Summer: Feature programme.

WELSH (373.1 m.)

Wednesday, September 21st.—Cold Coal: A play by E. Eynon Evans.

Thursday, September 22nd.—Up the Haven: Feature programme.

Friday, September 23rd.—New Songs by Welsh composers: Song recital.

Saturday, September 24th.—Autumn Sport, a Review of Saturday's sport in Wales.

NORTHERN (449.1 m.)

Wednesday, September 21st.—Manx Fairy Stories, by Dora Broome.

Thursday, September 22nd.—Orchestral programme.

Friday, September 23rd.—Sounding Brass: A comedy by Phyllis Bentley.

Saturday, September 24th.—Music and Memories: Musical programme.

SCOTTISH (391.1 m.)

Wednesday, September 21st.—Radio Outlook No. 1: Feature programme.

Thursday, September 22nd.—Sun and Air: A burlesque revue.

Friday, September 23rd.—Orchestral programme.

Saturday, September 24th.—The Mod in Glasgow: A programme of songs and readings.

NORTHERN IRELAND (307.1 m.)

Wednesday, September 21st.—Cupboard Love: A short story by Lynn Doyle.

Thursday, September 22nd.—Programme of chamber music.

Friday, September 23rd.—Band programme.

Saturday, September 24th.—The Family Portrait: A play by John W. Coulter.

TELEVISION FEATURES

First Television Ball

WHILE the B.B.C. mobile television unit is at the Pinewood Film Studios on September 23rd and 24th to show the filming of "The Mikado," a ball will be held in the adjacent Pinewood Club. Emitron cameras will be taken into the ballroom and viewers will see stage and screen stars enjoying themselves in real life, not just "according to script." During this first Television Ball it is hoped to interview some of the celebrities.

Visit to R.A.F. Aerodrome

THE training of R.A.F. pilots will be televised, by courtesy of the Air Ministry, about the middle of October, when one of the B.B.C. mobile units will spend a day at an aerodrome near London. Viewers will then be able to watch fighter planes at close quarters and see pilots under instruction operating the controls.

NEW RADIO FACTORY

A NEW factory has recently been opened on the Cambridge Arterial Road for the production of the well-known Ferguson receivers. The new building has a floor area of over 30,000 square feet, and is capable of turning out 1,000 sets a day—exclusive of production during overtime. The accompanying illustrations show a general exterior view of the factory and a section of the chassis assembly lines.

elaborate cathode-ray apparatus permits the frequency response as well as the general performance of the receiver to be properly tested.

New Models

Several new models are being produced in this new factory, and an important feature is the very high standard of performance on the short waves. A combination of automatic press button station selection



A section of the chassis assembly lines.

displayed how many receivers each operator deals with. Under modern conditions a receiver is assembled stage-by-stage, each operator dealing with a specific part of the set. He thus becomes an expert in that particular job and by limiting the general work to one section risks of faults and mistakes are reduced. Work in general is also speeded up. Stage-by-stage tests ensure

and press button wave range control results in the exclusive feature of instantaneous station selection by single operation. Any station, automatic or manual, can be selected by merely pressing one button. All models give a choice of two long-wave and five medium-wave stations which are pre-set but easily adjustable to suit local requirements.



View of the exterior of the Ferguson factory.

that work is proceeding correctly, and when a chassis is completed it is subjected to various tests after it has been properly lined up. Small booths—not unlike a modern polling station, enable each test operator to examine the receiver properly under normal reception conditions, and

WIRELESS CONSTRUCTOR'S ENCYCLOPEDIA

5/- or 5/6 by post from
George Neaves, Ltd., Tower House, Southampton St.,
Strand, London, W.C.2.

I can't enjoy the short waves on the family set!

Says J. E. MILES,
ENFIELD,
MIDDX.

★AND A SPECIAL SET COSTS SO LITTLE

J. E. M. was just an ordinary listener until his Short-Wave appetite was whetted. . . . He soon found, also, that a thrilling and enjoyable pastime was worth a special set. . . . He invested in an easy-to-purchase "TROPHY" . . . So will you for better short-wave listening.

TROPHY 3 SHORT-WAVE RECEIVER

FOR A.C. MAINS OR BATTERY USE.



WAVE RANGE 0-550 METRES.

Both models employ circuits evolved from a record-breaking receiver and provide amazingly efficient results on 6-550 metres. Self-contained speaker with jack for alternate 'phone use. Metre calibrated scale. Slow-motion tuning. Pleasing black crackle finish cabinet. Guaranteed and fully tested. Supplied with p.T.B. self-locating coils for 12-52 metres.

A.C. MODEL for A.C. 200/250v. supplies only. Cash or C.O.D., 6 gns. or 7 6 down and 16 monthly payments of 7 8.

BATTERY MODEL (Lees batteries). Cash or C.O.D.,

7/-
DOWN

£5/15/-, or yours for 7/- down and 16 monthly payments of 7/-.

If required with extra B.T.S. tuners for complete coverage 6 (television) to 550 metres, add 1/- to deposit and to each monthly payment.

EVERYTHING RADIO CASH, C.O.D. or EASYWAY

F. J. CAMM'S PUSH-BUTTON 3 KIT. Complete Pilot Author Kit "A" comprising all components with ready-drilled chassis and panel but less valves. Cash or C.O.D. £4/14/3 or 11/- down and 11 monthly payments of 11/-. Specified valves 33/-. or add 3/3 to deposit and to each monthly payment.

PRACTICAL WIRELESS JUNIOR CRYSTAL SET. Complete kit including panel and baseboard as described in August 27th issue. Cash or C.O.D., 28/9 or 2/6 down and 11 monthly payments of 2/9.

ALL-WAVE AERIAL. Absolutely essential for present-day good listening. Complete outfit for instant erection with all aerial and lead-in wire, transformer insulators, and instructions. List price 37/6. Special Price, 17/6 cash or 2/6 down and 7 monthly payments of 2/6.

1 Valve All-Wave Kit. 18-2,000 metres. Employing efficient All-Wave Tuner, requiring 6 connections only. Provides world-wide headphone reception. Complete kit with valve and drawings. Special Price 29/6 or 2/6 down and 11 monthly payments of 3/-.

TROPHY 5. A powerful A.C. communication receiver covering 10-550 metres. No coil changing. Mechanical hand-operated tuning. Built-in speaker. 'Phone jack. Cash or C.O.D. £9 or 10/9 down and 18 monthly payments of 10/9.

9-VALVE A.C. ALL-WAVE SUPERHIT Chassis. Amazingly efficient, new circuit arrangement, 10-2,000 metres, new Epicycle Tuning. Plate glass station-name Dial. Automatic Volume-Control. Provision for Pick-up. World-wide reception guaranteed. 7 watts output. Complete with all valves, less speaker. Fully guaranteed. £11/19/6 each or 17/- down and 15 monthly payments of 17/-.

W.B. 1939 SPEAKERS. Stentorian Senior type 38S, a really high quality speaker at a very reasonable price. Cash or C.O.D. 42/- or 2/6 down and 11 monthly payments of 4/-. W.B. 1939 Stentorian Junior Model, a popular speaker with Bin-cone for replacement or extension purposes. Cash or C.O.D. 32/6, or 2/6 down and 11 monthly payments of 3/-.

TEST METERS. Famous Avo-Minor D.C. model, 10 ranges for milliamperes, volts and ohms, 45/-, or 2/6 down and 12 monthly payments of 4/-. Universal A.C./D.C. Avo-Minor model, 22 ranges, £5/10/-, or 10/- down and 11 monthly payments of 10/-.

WE ARE AGENTS FOR

Bush, B.T.S., Corsor, Ekco, and Pye Press-Button and manual control A.C. and Battery All Wave receivers all available on easiest of easy terms from 5/- down. SEND NOW for complete receiver, short-wave and kit lists. No third party collections.

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ELECTRADIX

BARGAINS IN METERS.



We have just made a stupendous purchase of Laboratory Apparatus and a liquidated stock of brand new panel Meters by Weston, Turner, Elliott and Ferranti. Milliameters and Ammeters of practically every range. R.F. Thermo Ammeters for small transmitter aerials, etc. Transmitting and S/W Condensers, variable, by Cydon, Eddystone, J.B., etc. Enclosed Keys, Rotary and Isenthal Automatic Switches, Cambridge distant Thermometers. Lists are in preparation. Meanwhile, as prices are bargains, please state your wants.

DIX-MIPANTA VEST POCKET TESTER. A wonderfully versatile moving-iron multi-range meter for service on A.C. or D.C. jobs. No projecting terminals. **THREE** ranges of volts: 0-7.5, 0-150, 0-300. Used for MILLIAMPS, reads 125 m.a. and 75 m.a. In black bakelite case. Measures only 2 1/2 in. by 2 1/2 in., with pair of test leads and plugs. Leaflet "N" gives full information. 19/6



MILLIAMMETERS, 3/9. New 8 m.a. D.C. back of panel illuminated milliammeters, as illustrated. Plain scale and 1/2 in. needle with mica panel, back lamp and bracket. Neat and compact. Can be used as voltmeter with extra resistance. Great bargain at 3/9 post free. **H.T. TRANSFORMERS,** 230 v. 50 cycle mains to 8,000 v., 35/-; or 10,000 v., 37/6. 14,000 volts 42/-, 300 to 450 volts.



TRANSMITTING VALVES, AT40 Triodes, 4/-. Def. 1, S/W new 5-watt 5-guinea triodes for 15/-. Large stock of replacement valves for your receiver.

TWO CLEAR SCALES WITH MIRROR ARE ON THE DIX-ONEMETER. The Dix-Onemeter with only 6 Terminals, but 50 Ranges, is a valuable instrument for laboratory work. It is of portable size to go in the pocket, but big enough to cover the whole range of D.C. electrical measurements, 50 microamps. to 20 amps. and 20 millivolts to 2,000 volts. 55/- Only. Multipliers from 0/6 each.

Reduced Price: **UNIVERSAL SUPREME PORTABLE A.C.-D.C. ANALYSER,** has M.C. meter with rectifier for A.C. All ranges. Adaptor on cable, a 210 set for 24/10/-.



LOW COST SOUND RECORDING. Blanks now 3/3 per dozen. Electric PEIGH set has ball-bearing centre gear box and geared traverse rod. Set with Tracking Gear, Pick-up and Tone-arm fitted diamond, 37/6. Tracker gear only, less Pick-up and Tone-arm, is 21/6. Diamond Cutter Needles fit all pick-ups, 7/6. 6 in. Blank Discs, 3/3 dozen. Complete No. 2, 10/6; Junior Type, 5/6 each, complete.

TELEPHONES.—For all purposes. Table or wall, house or office phones, from 10/-. Portable Emergency Telephones and Cable Headphones. Pocket type W.D. leather Headbands, 2/6 pr. Sullivan Radio Aluminium Headbands, 9 pr. 4,000 ohm S/W lightweight Headphones, 4/6 pr. Aldis and Lucas Signal Lamps. **CRYSTAL SETS.**—Buy one, they cost nothing to run. No battery or valves wanted. Quiet and efficient reception. Shop-sold sets cheap. Enclosed type, 5/6 and 7/6 each.

Over 7,000 other bargains in our enlarged Illustrated 1938 List "N." Have you got our new **SALE LIST? FREE** for stamped addressed envelope.

ELECTRADIX RADIOS

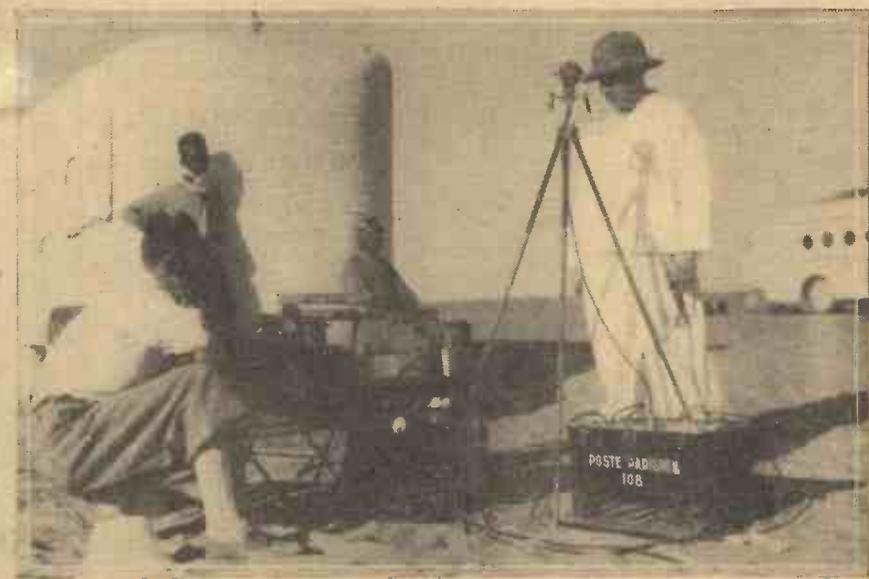
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ROTHERMEL SOUND RECORDER IN THE SAHARA

THE once inhospitable tract of the Sahara Desert has for long been the birthplace of wonders and romance. Thousands of novels have been written about it, but it is not until now that the true atmosphere of the desert has been captured and put within reach of all who possess a gramophone turntable.

essential that the apparatus used should be as simple and efficient as possible, so that a spontaneous and unaffected "first recording" could be obtained. The apparatus used by the Expedition was the Presto Sound Recorder. By this means the actual words of the local chiefs have been recorded so naturally and with fidelity



The Presto Sound Recorder being operated in the Sahara.

An expedition recently sent out to the Sahara by the Compagnie Generale D'Energie Radio Electrique Poste-Parisien and directed by Messrs. Paul Edmond Decharme, and Robert Biart, has returned with a library of valuable recordings of local native chiefs interviewed when the expedition crossed the desert. The nature of these recordings made it

that the records have proved invaluable adjuncts at lectures given in connection with the Expedition's activities. The Compagnie Poste-Parisien are so satisfied with the results obtained from the recorder that another expedition sent out by them to Alaska via Canada has been equipped with Presto recording apparatus.

QUALIFY FOR THE CIVILIAN RADIO RESERVE

with this wonderful new book
WIRELESS TRANSMISSION FOR AMATEURS
By F. J. CAMM

The importance of amateur transmitting has been recognised by the Government, as well as by radio manufacturers. This recognition has been implemented by the formation by Sir Kingsley Wood of the Civil Wireless Reserve, which invites all amateur transmitters to join. This is work of first National importance, and there is a big demand amongst experimenters for a book which will explain, not only how to build amateur transmitting sets, but also how to learn the morse code and obtain the licence. **WIRELESS TRANSMISSION FOR AMATEURS** deals with the subject in a simple yet fascinating way, and the text is rendered even more lucid by the use of many practical and easily understood diagrams.

From all booksellers 2/6 net, or by post 2/9 from

GEORGE NEWNES, LTD. (Book Dept.), Tower House, Southampton Street, London, W.C.2.

PERSONAL PARAGRAPHS

WE are advised that Mr. Guy Campbell, Jnr., Mr. H. L. Smith, and Mr. L. R. Kavanagh have been appointed directors of The Benjamin Electric, Ltd.

MR. E. M. SKIPPER announces that he is resigning his position as publicity manager for Ultra Electric, Ltd., at the end of this week.

THE private address of Mr. W. S. Verrells, chairman of E. K. Cole, Ltd., is now Meadow Wood, Penshurst, Kent.

University of London: Goldsmiths' College

THE Radio Class started its meetings on September 14th.

The programme includes a series of simple talks and demonstrations of Radio principles, and on the practical side the short-wave receiver and transmitter will be used for experimental work, and will again be on the air under the callsign of G6OW, on 5, 10, 20 and 40 metres. A Morse class will be instituted if required.

Meetings are on Wednesdays, and the fee 10s. for the session, September to Easter.

Further information may be obtained from the office at the College, New Cross, S.E.14 (any evening), or of the Lecturer, Mr. A. L. Beedle, on Wednesdays at 7.45.

A COMPLETE LIBRARY OF STANDARD WORKS.

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- WIRELESS CONSTRUCTOR'S ENCYCLOPÆDIA 5/-, by post 5/6.
- EVERYMAN'S WIRELESS BOOK 3/6, by post 3/10.
- TELEVISION and SHORT-WAVE HANDBOOK 3/6, by post 4/-.
- SIXTY TESTED WIRELESS CIRCUITS 2/6, by post 2/10.
- WIRELESS COILS, CHOKES and TRANSFORMERS and HOW TO MAKE THEM 2/6, by post 2/10.

All obtainable from or through Newsagents, or from Geo. Newnes, Ltd., Tower House, Southampton St., Strand, W.C.2

RADIO CLUBS & SOCIETIES

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

DOLLIS HILL RADIO COMMUNICATION SOCIETY

At the meeting held on September 6th, the president (G6SK) delivered a very interesting lecture entitled "Aerials and Aerial Design." Several points, not generally well understood, were gone into and explained in detail.

The following programme has been arranged: October 4th, Lecture by Mr. A. Turner, M.I.R.E. (G2XO); October 18th, Mr. J. H. Walters, of Belling and Lee. Lecture and demonstration on causes of interference, suppression of the source and receiver end, and proposed legislation.

Meetings are held fortnightly on Tuesdays, at 8.15 p.m., at Braintcroft Schools, Warren Road, N.W.2, and visitors are welcome at any of the meetings. Hon. Sec., Mr. E. Eldridge, 79, Oxgate Gdns., Cricklewood, N.W.2.

SLOUGH AND DISTRICT SHORT-WAVE CLUB

At the meeting held at 2B.M.I. Uxbridge, the attendance was somewhat higher, despite the summer holiday season. Unusual DX catches were recounted, and this provoked a lengthy discussion on "R" strengths, and their correct values, followed by a similar discussion on the "T" code. This was concluded in a most interesting manner when all members present listened to the same signal in turn and estimated its strength. Surprisingly little divergence was found. The QRA of the next meeting was fixed at 2DAJ, when an exhibition of valves will be held. Everybody is welcome at our meetings, and a programme of the meetings for the next few months and any further information may be obtained from the secretary, J. H. White (2DAJ), 20, Chalvey Road East, Slough, Bucks.

THE MAIDSTONE AMATEUR RADIO SOCIETY

The summer months now being over, the above society is settling down to the winter season of 1938-39. The meetings will be held as before at 7.45 p.m. on Tuesdays in the clubroom, 244, Upper Fair Road. Important lectures have been arranged for alternate Tuesdays throughout the season, the other meetings being filled with short lectures and demonstrations dealing with amateur subjects and Morse practice. The society has now applied for a transmitting licence, and should its application be granted, transmitting lectures will be included on the alternate weeks.

The following lectures were arranged: Oct. 4th, 1938—A demonstration by the President, Mr. Goldsmith, of several modern All-wave Receivers. Oct. 18th, 1938—A lecture by Dr. F. C. Stephan, Research Manager, the Telegraph Condenser Co., Ltd., on Condensers for the Amateur, receiving and transmitting.

Anyone interested, whether a member or not, is invited to attend these lectures, which all commence at 8 p.m.

The society will be very pleased to enrol new members, and all interested are requested either to come to the meetings, or to get in touch with the honorary secretary, P. M. S. Hedgelund (2DBA) "Hill View," 8, Hayle Road, Maidstone, Kent.

TAMWORTH RADIO EXPERIMENTAL SOCIETY

A PARTY of members of the above society spent an enjoyable afternoon in connection with a visit to the G.P.O. Radio Station at Hillmorton, Rugby, on September 7th last. It was very instructive and interesting to all who made the trip. The society, which is affiliated with the R.S.G.B., has amongst its members four fully licensed stations, and two with A.A. licences. Another feature of the society is a Morse code instruction class, and the society invite interested short-wave radio enthusiasts to attend their meetings, which are held at their headquarters, the Town Hall Vaults, Market St., Tamworth, every alternate Thursday evening at eight o'clock. Further particulars may be obtained upon application to the hon. secretary, P. H. Lawrence (G3PN), 38, Market St., Tamworth, Staffs.

EXETER AND DISTRICT WIRELESS SOCIETY

The programme of this society's activities to the end of next month is given below: All meetings are held at the Y.W.C.A., Dix's Field, Southernhay, and commence at 8 p.m.

September 26th, High Spots of Amateur Radio 1928-1938, by H. A. Bartlett (G5QA); October 3rd, Short-wave night. Members are invited to bring their sets; October 10th, Test of the Society's amplifier. A set of test records will be available: October 17th, Visit to the Showrooms at Electricity House, Fore Street, Exeter; October 24th; Demonstration of the season's sets, by F. J. Thorn; October 31st, Pioneers of Radio, by V. Searle, M.Sc., Physics Dept., University College, Exeter. Hon. Sec., W. J. Ching, 9, Sivel Place, Heavitree, Exeter.

RADIO AT THE RIGHT PRICE

Whatever you might need, a modern replacement chassis—A.C., D.C. or Battery, components, a kit to meet your hobby for short-wave or all-wave listening, valves for experimenting, gramophone apparatus, a brand new guaranteed all-wave set, if you need any of these personally, for presenting as an acceptable gift or for selling at a profit . . .

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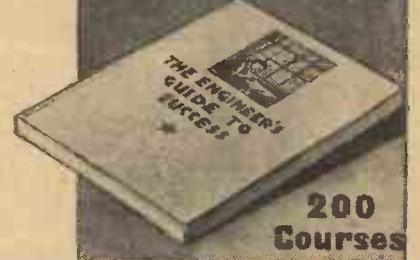
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SHORT-WAVE SECTION

SIMPLIFIED CONTROL

Details of Short-wave Tuning and a Suggestion for a Home-made Drive. By W. J. DELANEY.

THE majority of amateurs when first trying out short-wave apparatus complain that there is very little to be heard on some wavebands. When the case is investigated, however, it is found that the trouble is invariably due to the fact that the very sharp tuning has resulted in most of the stations being passed without realising the fact. A glance at a modern all-wave receiver will show that on the short-wave ranges there are often ten or a dozen stations crowded into a space less than half an inch in length, and although very elaborate slow-motion drives may be fitted, the action of tuning has to be carried out very carefully. In a short-wave receiver the same number of stations may be spread out over 180 or more degrees by using a smaller tuning condenser, but even so it is possible to pass a weak station if the control knob is turned too quickly. Band-spread tuning assists in overcoming this trouble, but even so, tuning is still very critical.

It is necessary, therefore, to fit the short-wave receiver with a reliable slow-motion drive and to make certain that no back-lash is present. For the benefit of new readers back-lash may need explanation. With some types of drive it will be found that as the drive is turned in one direction rather quickly a station may suddenly be noticed. The rotation of the control is stopped and it is turned the opposite way to come back to the signal, but it will be found that the movement has to be continued for quite a long way before the station is found. There are various reasons

Reduction Drives

It is possible for the keen amateur to improve on the ordinary type of drive by making a very much higher gear ratio, and the simplest way of carrying this out is to use pulley drives with reliable cord, choosing the various sizes of pulley through the chain so that the desired reduction is obtained. This may even be employed when band-spreading is in use, although this gives an equivalent effect of a reduction drive. The whole art of short-wave tuning should be reduced to simplicity, and therefore it is worth while using the best reduction drive on a band-spread condenser, even though this may mean more work. As already mentioned, a high gear will give very fine tuning, spreading out short-wave stations even on the 10-metre band over many degrees of movement, but the drawback is that it takes a considerable time to move from one end of the condenser to the other. This may be overcome by using a fly-wheel tuning device, and the constructor can make up one of these in a very short time. A device of this type was recently made up for experimental use by using a large size blacking-tin lid, with a set of pulleys obtained from the well-known constructional toy. As other readers may be desirous of making a similar scheme the main details are given.

Home-made Fly-wheel

A quantity of old lead was obtained and melted down in an old saucepan, and the large tin lid was heated to burn off the enamelled label. It was then thoroughly cleaned and the centre drilled to clear a $\frac{1}{4}$ in. spindle. A length of $\frac{1}{4}$ in. diameter brass rod was then turned down in the lathe until it fitted the hole in a $\frac{1}{4}$ in. pulley, and the latter was slipped up to the shoulder which had been left and there locked into position. A $\frac{1}{4}$ in. hole was then drilled in a large block of wood and the rod placed through the tin lid and down into the hole, and when perfectly level the molten lead was poured into the tin lid. This was then left to cool whilst a square framework was rigged up to fit behind the panel, and a series of pulleys were fitted round to give the required drive. These may be arranged as desired by the constructor so that eventually the main tuning condenser is operated from the fly-wheel. Finally, a large pulley is made up by soldering back

to back two press-on lids from 1lb. paint tins, and these also are drilled and fitted with a boss with set-screw for locking on the condenser spindle.

The drive was made up from a good-quality undressed fish-line, which was drawn several times through a folded rag in which was placed some powdered resin. To avoid the trouble caused by a knot jumping the pulleys the ends of the cord were laid side by side for a distance of about $\frac{1}{2}$ in. and carefully bound with thin thread. This was varnished and also treated with the resin. No trouble has been experienced from slip, the fly-wheel may be spun without any difficulty, and the condenser is turned with two twists of the wheel from minimum to maximum. The actual reduction is over 100 to 1. This method of driving was found preferable to a geared drive built up with toothed gear wheels as the friction of the metal gave electrical interference on the shorter waves, as well as proving noisy from an acoustic point of view. Furthermore, it was found much more difficult to arrange

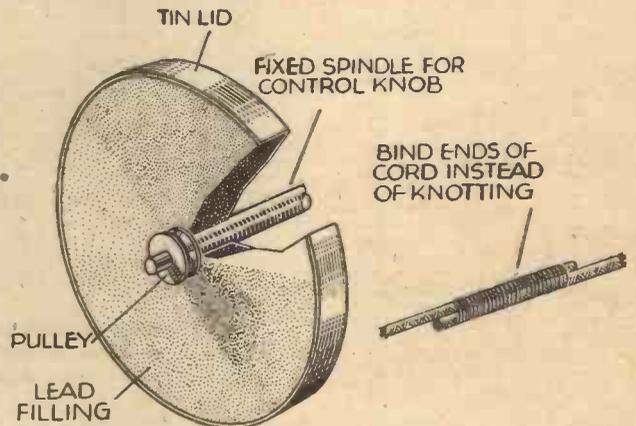


Fig. 2.—A fly-wheel made from a tin lid filled with lead, and the best method of joining driving cords.

the various wheels to obtain a suitable train of gears to drive a condenser without placing the control knob too close to facilitate mounting.

If desired, a much larger fly-wheel may be cast, adopting a similar process and using the same idea for driving the condenser. With a suitable arrangement of gears, the fly-wheel could be mounted "end-on," and the edge knurled to facilitate housing accommodation and operation.

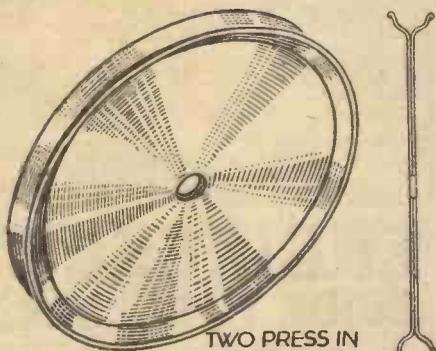


Fig. 1.—For a large pulley, two tin lids sweated together are ideal.

for this—either too much oil or grease on the drive, or an inefficient design of drive are the most frequent. If a pointer or indicator is fitted to the drive this should be carefully watched whilst the knob is turned fast in both directions, and then when it is moved slowly. The pointer should answer to each movement of the control knob, and when the condenser is properly locked into position, the moving vanes should also be seen to follow every slight movement.

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Leaves from a Short-wave Log

The All-India Radio Short-wave Broadcasts

THE programme of transmissions from the All-India Radio 10-kilowatt short-wave transmitters is now readjusted as under, until further notice: VUC2, Calcutta, on 31.48 m. (9.53 mc/s), daily from G.M.T. 06.06-09.06 and on 61.48 m. (4.88 mc/s), from G.M.T. 10.36-16.06. VUM2, Madras, works on 60.6 m. (4.95 mc/s) from G.M.T. 11.00-16.00 daily. VUD3, Delhi, provides two broadcasts on Sundays, Tuesdays, Thursdays and Saturdays on 19.8 m. (15.15 mc/s) between G.M.T. 12.30-14.30, and from 17.30-19.30; through VUD2, daily, on 31.28 m. (9.59 mc/s) from G.M.T. 11.30-16.30 with an S.B. on 60.06 m. (4.995 mc/s). Through VUD2, a transmission is also made between G.M.T. 12.30-14.30, and from 17.30-19.30. From Bombay, VUB2, on 31.41 m. (9.55 mc/s), a broadcast is carried out daily from G.M.T. 01.30-02.30, and again from 05.00-07.30, with a third transmission between G.M.T. 11.00-16.30 on 61.16 m. (4.905 mc/s).

Ankara Calling

BOTH early morning, and towards G.M.T. 20.00, one may now hear test transmissions from the new 20-kilowatt Turkish short-wave station (TAQ) at Ankara. The wavelength is 19.74 m. (15.195 mc/s). TAP, on 31.7 m. (9.465 mc/s), will also be tried out shortly. All announcements and call are given in the English language.

Broadcasts from Curaçao

PJCI, a 150-watt transmitter operated by the Curaçoesche Radio Vereeniging at Willemstad, Curaçao, Netherlands East Indies, on 31.67 m. (94.73 mc/s), is reported to be working daily from G.M.T. 23.36-01.36. The transmitter is also entitled to use 50.6 m. (5.929 mc/s). The distance from London is approximately 4,400 miles, and standard time is equivalent to G.M.T. less 4 hours 24 minutes.

Finland's Altered Schedule

OFE and OFD, Lahti (Finland), on 25.47 m. (11.78 mc/s), and 31.58 m. (9.6 mc/s) respectively, have slightly altered the timing of their radio programmes. The former station is now on the air daily from G.M.T. 06.05-06.45, 10.00-12.00, and 15.00-17.00; the latter from G.M.T. 17.15 every evening. On Sundays, OFE would

appear to be the sole short-wave outlet of the Lahti-Helsinki radio entertainments.

U.S.A. New Guinea Expedition

PK6XX is the call-sign of a 300-watt transmitter installed at a base camp in New Guinea (Netherlands East Indies) by the U.S.A. Natural History Expedition. Transmissions are made at frequent intervals on 21.13 m. (14.2 mc/s).

Is This an Amateur?

LISTENERS report reception of broadcasts from a Romanian station giving the call-sign YR5AA, and Bucharest as its location; the wavelength used is 20.81 m. (14.15 mc/s). According to the "Call Book" the transmitter is operated by Engineer Popescu-Malaesti, of Carve Davila, 143, Bucharest, but all reception reports should be sent in a sealed envelope to the Radio Club, C.A. Rosetti, 6, Craiova, Romania.

Tune in to British Guiana

VP3BG, Georgetown, a 200-watt transmitter on 48.94 m. (6.13 mc/s) has been heard well during the past week or so. The station broadcasts twice daily, namely from G.M.T. 15.30-16.30 and from 21.00-01.00. It closes down with the melody: *Good Night, pretty Maiden, Good night.* The address is: The Crystal Broadcasting Company, Philharmonic Bldgs., Georgetown (British Guiana).

A Good Canadian Programme

CFRX, the short-wave outlet of CFRB, Toronto, now on 49.42 m. (6.07 mc/s), provides a strong signal between G.M.T. 23.00-02.00. An excellent radio programme—a portion of which is sometimes supplied by one of the U.S.A. studios, as CFRB is linked with the Columbia Broadcasting network—is given daily between G.M.T. 12.30 until 04.00, on weekdays. The Sunday transmission is made between G.M.T. 15.30-05.00. Address: Rogers Majestic Radio Corporation, 37, Bloor St. West, Toronto (Ontario), Canada.

Altered Programme Times

ZIK2, the 100-watt station at Belize (British Honduras), working on 28.3 m. (10.6 mc/s) now transmits every Wednesday, Friday and Sunday from G.M.T. 01.30.

cast excerpts from its shows. "The Bouquets" artists include Gladly Sewell, Sylvia Nichols and Murray Ashford—and the Exhibition will also be engaging well-known radio and variety artists. This Radio Show, an annual event, opens on September 27th.

PROGRAMME NOTES

Variety from Manchester Radio Exhibition

VARIETY will be broadcast on September 30th from the Manchester Evening Chronicle Radio Exhibition at the City Hall. The entertainment will be by "The Bouquets," presented by Murray Ashford, a concert party company which has been at Scarborough during the summer and which is well known to Northern listeners through Outside Broad-

Concert from Cheltenham

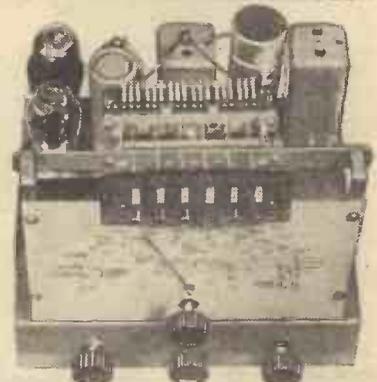
THE CITY OF BIRMINGHAM ORCHESTRA goes to Cheltenham on September 25th to give a concert of popular symphonic movement, part of which will be broadcast. There is a local conductor, Eric Woodward, for this concert. Mr. Woodward is himself a 'cellist. The well-known violinist, Marie Hall, who lives at Cheltenham, will play Mendelssohn's E minor concerto, with the Orchestra.

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Model AW3PB, 7-stage ALL-WAVE Chassis. Manual and Instantaneous Press-Button Tuning. Short waves from 15.9 to 50 m. Complete with 8-in. Matched M.C. Speaker. CASH PRICE £7.18.6, or 12/6 payments of 18/4.

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Model AW93PP, having Radio frequency Pre-Amplifier and 8-Watts resistance capacity coupled Triode push-pull output. CASH PRICE £10.10.0, or 18/- with order and 12 monthly payments of 17/3.

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PARIS RADIO SHOW

AMONG the many interesting items seen at the Paris Radio Show were models of the various broadcast stations and television equipment. Marconi apparatus was prominent among the latter and resembled the English counterparts. As with the English exhibition, automatic tuning in various forms was featured. Some very novel cabinet designs were featured and in general there was very

little difference on the technical side from current practice in this country. The Yardeny system was noted on several receivers, and this has been adopted by at least one manufacturer in this country. Another French idea which is being featured at the moment is a low-frequency resonator in the form of a tapped inductance included in a form of negative feed-back circuit.



The central distributing amplifier and equipment at the Paris Radio Salon.

R.C. COUPLED AMPLIFIERS

READERS often ask what values of resistance and condenser to use in a straightforward R.C. amplifier, and it should be remembered in this connection that the value of the resistance in the anode circuit depends to a very large extent upon the high-tension voltage which is available. With regard to the condenser, various values are from time to time specified, and *Radio To-day* quotes the following extract from the National Union's Radio Tube Manual which will no doubt prove interesting to readers:

"It might be mentioned that a mistake commonly made in resistance-coupled amplifiers is the use of an unnecessarily large coupling condenser. If the possibility of motor boating is to be minimised, the coupling condenser should be no larger than is absolutely necessary to obtain satisfactory transmission at the lowest useful frequency. For instance, in certain receivers where, due to limitations imposed by the speaker and the effective baffle size, the lowest useful frequency for the amplifier to transmit might well be as high as 100 or 150 cycles. In such an instance, assuming a grid leak of 0.5 megohms, the coupling condenser should not be more than 0.003 microfarad.

"Incidentally, another benefit accruing from the use of a coupling condenser no larger than is absolutely necessary is that the effective power output is increased.

This is true because transmission of frequencies to the grid of the power output tube, lower than that which may be acoustically reproduced, simply uses up an appreciable part of the tube's power capability. Using a coupling condenser as large as 0.1 microfarad invites trouble."

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MODERN LOUDSPEAKERS

(Continued from page 30)

signal is naturally a subject for fierce discussion. There are probably many readers who will remember "Honolulu Moon," a sturdy favourite in the old days with "His Master's Voice." In general, the test input should be varied in character, and special records are made covering most features of the orchestra, with passages of speech. It has been suggested that the sole redeeming feature of certain "swing" numbers is their suitability for test, but this probably represents a biased viewpoint.

In the opinion of the writer, an excellent test is a stringed instrument, particularly the guitar, for its overtones run up to the 8,000 cycles per second mark, while the strong "plucked" strings and characteristic "fingering" form an excellent test for over-all response.

Unfortunately, time cannot be spared for more than a few minutes' listening, so the test is usually conducted from the point of view of the average listener, rather than that of a skilled musician.

The test speaker is again compared with the standard for general performance, and is then stamped, "dust-bagged" and returned to stores or the conveyor belt for immediate inclusion in the receiver.

It must be clearly understood that the foregoing description applies to the cheaper type of component rather than the quality instrument intended for high-class receivers. The same test procedure is followed, but the specifications are much more stringent in the case of the more expensive unit.

Yet in spite of the high production rate, and the shortness of test time, the expert operator can detect a fault with remarkable precision, and it is safe to say that the speaker fitted in the model you purchase will be the best that can be provided at the price.



Charlton Higgs (Radio), Ltd.

THE accompanying illustration shows a fair listener operating the Charlton Higgs receiver Model A.W.69.P.B. This was shown in our September 3rd issue, and the wrong caption was inadvertently attached to the illustration. The receiver illustrated is a 4-valve A.C. 3-band superhet, with cathode-ray tuning indicator and push-button tuning. A prominent feature is the large full-vision tuning dial, and this model costs £13 15s.

LETTERS FROM READERS

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).

An Overseas Five-valver

SIR,—I wrote some time ago asking your advice about building a S.W. receiver, and you suggested that I made your "Perfect 3." While this set worked quite well it didn't give the entertainment that I required, and with some experimenting I have now made a set—circuit attached—that gives grand results on the loudspeaker from all over the world.

In your issue of July 16th, 1938, you ask for details of sets from Empire readers, and this one, I think, would suit many.

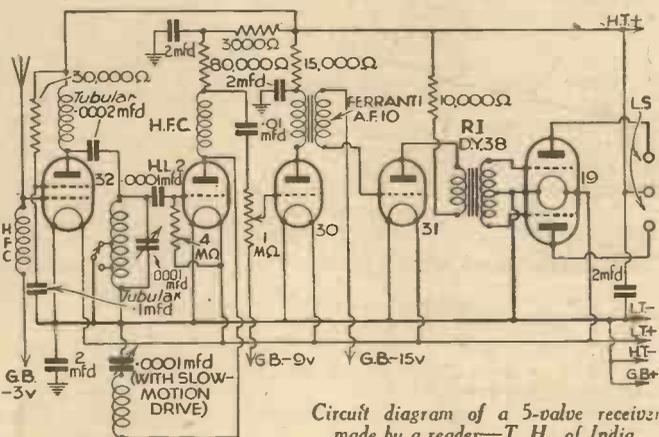
Personally, I required only the B.B.C. Empire programmes (13.49 m.) and the Indian broadcasts on 60 m., and I used a Lissen 3-range S.W. coil with switch. Plug-in coils might be better, and would allow the higher wavelengths to be received. The valves I used are all American (I can get them so much more cheaply than British) except the detector. The S.G. is a 32, the 1st L.F. a 30, 2nd L.F. 31, and Class "B" a 19. I tried a 32 for the det., but results were not good. With the screen and anode strapped it worked fairly well as a triode, but I got the best results using an Osram H.L.2. The set is made on an unscreened wooden chassis—I tried screening with sheet tin, and then with aluminium foil, but I think it best without any screening. The H.F. chokes are of the S.W. screened type but the screening is not earthed at all. The chassis is 15in. x 9in. x 3½in. Nothing is crowded, and the Class "B" transformer is mounted on top. With a really good slow-motion dial and the .0001 condenser tuning is not difficult (I use an Eddystone dual-ratio dial, type 973, about 24.1 and 160.1). My aerial is an inverted-L, about 20ft. long and 30ft. high, pointing more or less towards England. Results are good on all wavelengths—16, 19, 25 and 31 particularly so. My loudspeaker is a Blue Spot Star Junior, but I really need one capable of handling a much larger output when tuned to the locals. By locals I mean Delhi (31, 60 m.), Bombay (60 m.), Calcutta (60 m.) and Madras (60 m.) which are approximately 600, 1,000, 1,200, and 1,600 miles away. I'm situated at the bottom of a narrow valley with hills of 7,000ft. all round. With 150 volts the H.T. consumption is about 20 mA, but the set works alright down to 80 volts, when consumption is 7.5 mA.

I might add that about a year ago I

knew nothing about wireless, but I was very lucky in having a subscription to your grand book paid for me, and from it I have learned more than a little about radio, for which I send you my salaams.—T. H. (Drosh, Chitral State, India).

Logged at Sidcup

SIR,—I have seen many short-wave DX logs in PRACTICAL AND AMATEUR WIRELESS recently, so here is mine, hoping it will be of some use to fellow S.W.L's. All stations received on a battery 0-v-1



Circuit diagram of a 5-valve receiver made by a reader—T. H., of India.

using a Mullard PM1HL and a PM2A. H.T. is obtained from a home-made power pack. The aerial is a 20-metre half-wave doublet (N.S.) 30ft. high. All stations received between 06.30-09.30, and 22.00-24.00 B.S.T., on 'phones, during the last two months.

20-metre C.W. :—
VK2DE, LA, KU, KZ, VK3CK, ED, OR, RN, WR, KP, RM, YK, VK5ML, WK, JS, FL, ZL4FK, TO, AQ, FV. LU8EN, PY1AZ, PY9AG, ZB1S, K5AA, K5AM. NY2AD, LY1J.

20-metre 'phone :—
N. America.—136 "W" 1-9, including W599X (New Mex.), W6FUO (Nevada), W10XDA (Expedition to Greenland): VE1, DE, BF, JP, DQ. VE2GA, B9. VE5OT, VO1D, VO1J.

S. America.—YV1AP, PY1FR, LM, FN, GU, GR, DG, BJ. PY2LM, PY3QC, PY4CT, PY5BJ, EI, OA4AI. LU7AG, LU8AB, NY2AM, 2AE. HK3LR, LA, HK4RT, FM, XE1GK, VP3AA.

West Indies.—VP9G, VP9G, VP51S.

Oceania.—K6OQE, KA7EF, K60NW.

Africa.—SU1KG, SU1GG, SU2TW, CN8AR.

Australia.—VK3BM, WA, HG, PE, WO, KX, HK.

Europe.—SV1KE, and many others. — P. KING, Jnr. (Sidcup, Kent).

Proposed Club for Leicester: Correspondents Wanted

SIR,—I have been a consistent reader of your highly praised radio paper for nearly two years, and it has helped me times out of number with radio technicalities, my interests being particularly with short-wave reception and transmission. It was the section under the heading Transmitting Topics that led me to apply for an A.A. licence, for which I am waiting. I have two reasons for writing to you, firstly to thank you for the sound knowledge I have gleaned from the pages of PRACTICAL AND AMATEUR WIRELESS, and secondly to call the attention of those interested in short-wave radio work that live in and around my locality. I have not heard of any radio club in Leicester, and I am fully prepared to help and assist in forming one for the coming winter. Will all those interested please get in touch with me by letter, or personally?—A. LESLIE MILNTHORPE (3, Winstor Drive, Thurmaston, Leicester).

A DX Log from Hampstead

SIR,—I enclose a list of some of the DX stations that I have heard during the past two weeks on the 14 mc. band. The receiver used was a 6-valve superhet, and the antenna a half-wave cut for 20 metres running N.W.-S.E. All the stations were heard on the loudspeaker.—J. L. HARVEY (Hampstead, London, N.W.3).

Date	G.M.T.	Station	R.	S.
August 23	22.35	CE3BH	8	5
" 24	06.16	K4FAY	8	5
" 25	21.18	CX2AU	6	5
" 26	22.06	TI5X	8	5
" 26	22.55	TI8Q	7	5
" 27	07.33	VE5NY	6	5
" 27	21.41	VP6FO	7	5
" 28	08.18	NY2AE	8	5
" 28	23.08	VP51S	6	5
" 30	19.30	XU81G	8	5
" 30	20.43	VP3AA	6	5
" 30	21.41	CX2CO	6	4
" 31	06.40	HC1FC	8	5
September 2	06.20	HC1PZ	7	5
" 3	06.38	VK5FL	6	5
" 3	21.38	VP6FY	7	5
" 5	19.00	ZS1BL	6	5

CUT THIS OUT EACH WEEK.

Do you know

- THAT push-button tuning may be added to any type of receiver with very little difficulty.
- THAT special add-on push-button units, giving improved results over those now obtainable with ordinary sets will shortly become available.
- THAT twin loudspeakers, properly balanced and fed with the correct frequencies, will give ideal reproduction.
- THAT for best results it is imperative that each speaker in the above arrangement be fed from a tuned circuit so that only certain frequencies are dealt with by each unit.
- THAT ready-made needle scratch filters are now obtainable for any type of pick-up where the amplifier and speaker provide really good high-note response.
- THAT vertical aerials are non-directional.

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 Newman, 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.

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NOTES FROM THE TRADE

Change of Address

OWING to road-widening activities at Stratford, Wireless Supplies Unlimited have removed to new premises on the opposite side of the High Street. The new address is Essex House, High Street, Stratford, where better display and demonstration facilities are provided, and a complete range of modern radio and television receivers may be seen.

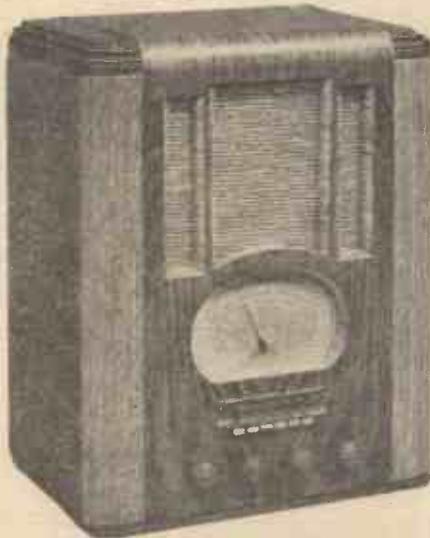
The National Radio and Television Service Co. have also removed to new premises, the new address being 126, Elthorne Road, Holloway, N.19 ('phone: Archway 1319). Here they are continuing the manufacture of high-quality amplifiers, P.A. equipment and trade and service work.

Pilot Model BT.530

THE illustration given below shows the new 5-valve all-wave A.C. push-button Pilot receiver. This is a superhet with Pilotune control and utilises octal valves. The most interesting feature is the new Eaziread station scale, calibrated in station names and wavelengths. Six buttons are provided, with the usual manual control, and the output is rated at 4 watts. The price of this model is 12 guineas, or 12½ guineas if required for A.C./D.C. use.

Philips' Big Screen

THE big-screen Philips television receiver which was seen at Olympia provides a picture 18ins. by 14½ins., and some idea of the efficiency of the projection system and the illumination may be gained from the accompanying unretouched



Pilot's new push-button receiver, Model BT.530.

illustration which was taken during an actual broadcast. It shows Fred Duprez, and the picture was taken with a Contax III at F1.5, using an ultra-rapid panchromatic film and an exposure of one-fiftieth of a second. The brilliancy is such that the picture may be seen clearly in a room under normal lighting conditions, and no difficulty is experienced from the focusing point of view. It is also interesting to note that the quality of sound reproduction has also been given careful attention in these receivers and twin 10in. super-

sensitive moving-coil speakers are fitted, and these, in conjunction with the efficient radio circuit in which the new Silentron valve is incorporated, provide a really startling quality of reproduction.

Invicta Small Screen

AS a contrast we also illustrate the smallest television screen so far produced as a commercial product in this country. This is the new Invicta receiver in which the screen size is only 4ins. by 3½ins. In spite of this, however, the picture is remarkably useful for normal domestic purposes, and the low price of this receiver (which is in the form of an add-on unit) brings it within the reach of all. It provides vision only, and has to be connected to a normal broadcast receiver in order to obtain the sound component of the television programme. The price is £22 11s. 6d.

Westinghouse Rectifiers

WE repeatedly receive inquiries from readers regarding the ratings of metal rectifiers which are obtained without cases and thus with no reference or type number. We are asked by Messrs. Westinghouse to point out that many of these "stripped" rectifiers are probably special models made to some specific manufacturer's requirements, and thus it is unsafe to give any indication as to the ratings. They must, of course, only be used under the conditions for which they were designed.

New Battery Design

A NEW type of battery has been perfected and will shortly appear on the market. In place of the usual cylindrical zinc cases containing the various elements, the new battery has the elements arranged in flat or "pack" form, and it is claimed that not only does this result in a more compact battery, but a greater output is produced owing to the active area which is provided.

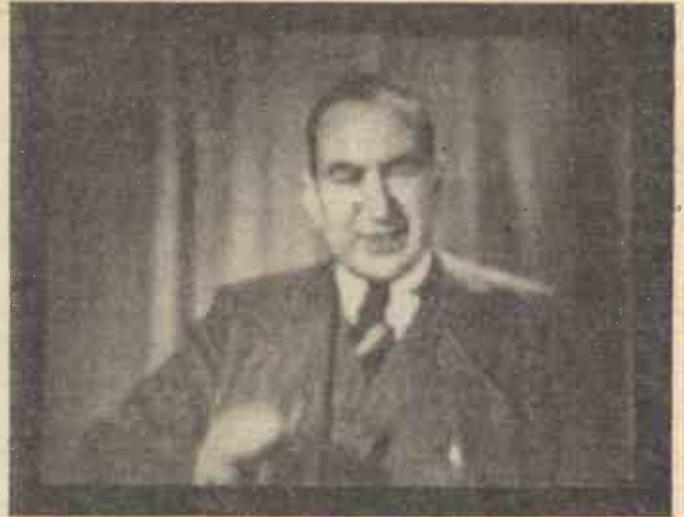
Murphy Oscillator

A USEFUL oscillator has been produced by Murphy Radio and should appeal to service-men and dealers who require a really reliable test unit of this type. It is an all-wave unit, well screened and

designed for mains operation. The total range is from 10 to 3,000 metres in five ranges, and by utilising harmonics it may be used down to 5 metres. Hand-calibrated curves are provided with it, and the price is £12.

New Mullard Valves

THE principle of utilising the secondary emission has before been applied to photo-electric cells and similar apparatus, but it has now been applied to valves



This is a print from an unretouched photograph taken on a Philips big-screen television receiver during a broadcast.

intended for normal domestic receivers. Messrs. Mullard are now releasing two new valves, to be known as types EE50 and TSE4, the former being a pinchless all-glass type with a bottom plate of glass and the leading out wires acting as connecting points. The latter has a standard type of base. The main use for this type of valve will be in television or short-wave apparatus and the heater is of the 6.3 volt .3 amp. type, with anode rating of 250 volts maximum. The mutual conductance is 14 mA/V, and the gain is so high that the number of



This is the small Invicta television receiver, which is of the unit, or "add-on," type.

stages needed in a receiver may be considerably reduced, whilst background noises are also kept down. This particular type of valve may find ready application to push-pull amplifiers.



QUERIES and ENQUIRIES

Volume Controls

"Is there any rule which I can follow with regard to the choice of volume controls? I have been told that ordinary potentiometers are noisy; that L.F. controls are the only satisfactory ones, and that an H.F. control must be used in any set worthy of the name. So that I can sort out all this contradictory information, I should like to have your comments and recommendations."—J. E. (Harringay).

PROBABLY all of the remarks are correct—but relate only to specific receivers. You do not state what type of set you are interested in, and thus no definite recommendations can be made. Ordinary potentiometers are quite satisfactory as volume controls, provided they are properly used. A heavy current should not be passed through them unless they are rated to take a heavy current. If current can be excluded, they will be noiseless in action. If an H.F. stage is employed at your address you should certainly use an H.F. volume control to avoid overloading the detector stage. This may take the form of a differential reaction condenser connected across the aerial coil. An L.F. control will enable the volume to be regulated to avoid overloading the output stage.

Mains Operation

"Is there any objection to converting the Push-button 3 to mains? I have a mains transformer and I contemplated making a separate mains unit with leads running to plug sockets on the set. Could you send me a suitable circuit diagram for such a unit?"—V. L. C. (Wimborne).

IT would be possible to operate this receiver from a standard H.T. unit (battery eliminator) but when mains facilities are available, and a new set is to be built, it is worth while making a proper mains set rather than to use a battery set. Firstly, the latter utilises valves which are not so efficient as the mains types, and, secondly, the battery set needs an accumulator, with the resultant necessity for recharging. When all-mains working is adopted efficiency is higher and the set is much less trouble to maintain. You do not state whether your transformer would be suitable for mains valves, but we shall shortly be describing a mains version of this set and advise you to wait for this.

S.W. Converter

"I should be glad to know if a short-wave converter would work satisfactorily with a four-valve superhet."—G. D. (New Malden).

THEORETICALLY a superhet is no different from a normal T.R.F. receiver so far as concerns its suitability for use with a converter. In each case all that is necessary is to tune the set to the long waves and tune on the converter. Unfortunately, however, there are often snags when a superhet is used, one of the most common of which is met with in a commer-

cial superhet. Some of these have special aerial input devices, designed either to improve input selectivity or to prevent second-channel or whistle interference. These devices often prevent a converter from giving satisfactory results. Secondly, the fact that frequency changing is employed in both unit and superhet, often gives rise to a peculiar form of whistle interference due to the double frequency changing. If, therefore, yours is a commercial set it would be advisable to ascertain from the makers whether or not the set is suitable. If home-made, then you could make any modifications which are necessary to enable maximum results to be obtained.

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.

Experimenters' Short-wave Three

"In your Experimenters' S.W. Three of July 30th certain components are recommended. I have obtained separate components for the coupler, and should be glad to know how these are connected."—A. C. (Shoreditch).

IN place of the coupler which is no longer on sale, the Bulgín component type L.F.10 may be employed as a substitute. If separate components are employed the high value of resistance (from 30,000 to 50,000 ohms) should be joined to the anode of the valve and also to one side of a fixed condenser (.01 to .1 mfd). The other side of the condenser should be joined to one side of the primary winding of the transformer, the other side of which is joined to earth. The secondary is joined in the usual way. Between H.T. positive and the other side of the resistance a second resistance should be joined, having a value of 10,000 ohms, and from the junction of the two resistances to earth a 2 mfd. fixed condenser should be connected.

Auto-tuning

"I am interested in the modern system of button tuning, and should like to build a set of this type for my own use. I do wish, however, to dispense with all other panel controls, using only buttons, and thus should like to get rid of a wave-change switch as well as volume controls. Is there any way in which I can carry out this idea

without making things too complicated?"—A. A. L. (Bedford).

A SEPARATE add-on tuning unit may be added to your set, or a complete converter of the superhet type with push-button tuning. The latter would improve the performance of the receiver, but could only be used if the set employed an H.F. stage. We hope to describe such a unit during this season.

Transmitter Circuit

"With regard to the circuit for a one-valve transmitter, published in June 25th, 1938, issue, I should be very interested to know if this TX could be run off batteries using two battery triodes in place of the 6A6 valve. If this cannot be carried out perhaps you could suggest an alternative, but the mains installed here are D.C."—H. L. B. (Birmingham 18).

IT would be quite in order to use battery triodes, or, alternatively, you could use a battery Class B valve. We published a design round the latter valve, but any good pair of triodes could be used by adopting the same circuit as is employed with the double valve, the two sections being separate, of course.

American Valve Characteristics

"Could you supply the main characteristics of the American 25A6 valve. I am uncertain whether this is a 2.5 volt valve or whether it is a mains component."—G. I. (Newcastle).

THE valve is a power pentode with a 25 volt 3 amp heater. It is rated at a maximum anode voltage of 180 with 135 volts for the screen. The bias is 20 volts and the load 500 ohms at these ratings. The rated power output is 2.75 watts.

Speaker and Hum

"I have an old moving-coil speaker and have been experiencing hum when this is switched on. After some period of tests I am convinced that the hum is because the field is used for smoothing. I propose to add a humbucking coil and should be glad if you could tell me what this is and how to fit it."—R. Q. E. (Perivale).

THE hum bucking coil is a small winding in series with the field winding and wound over the latter. It should be so wound that it is in opposition to the speech coil. A resistance of about 2 or 3 ohms may be found suitable, although it may be necessary to carry out one or two tests to find the best winding. The wire should be heavy enough to carry the field current, and it may be found worth while to fit a resistance across the humbucking coil to assist in the process.

Combined Controls

"I am building a new mains set for myself and wish to dispense with the on/off switch. This may be obtained ganged on to a control and I am uncertain whether it is important which control it is joined to. I can have it on the manual volume control or the tone control. Which is preferable from all points of view?"—T. H. (Edgeley).

IT is immaterial from the general point of view although it is necessary to consider such items as the run of mains leads, hum, etc. The manual control could be left at the best position for the local station if you had the switch ganged with the tone control, and in some respects this is desirable. Otherwise, it is purely a matter of personal preference.

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 7d.
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.C.

PRACTICAL WIRELESS		No. of	D.C. £5 Superhet (Three-valve)	PW42
Date of Issue		Blueprint	Universal £5 Superhet (Three-valve) —	PW44
CRYSTAL SETS.			F. J. Camm's A.C. £4 Superhet 4	PW59
Blueprint, 6d.			F. J. Camm's Universal £4 Superhet 4	PW60
1937 Crystal Receiver	9.1.37	PW71	"Qualitone" Universal Four	PW73
STRAIGHT SETS. Battery Operated.				
One-valve : Blueprints, 1s. each.			SHORT-WAVE SETS.	
All-wave Unipen (Pentode)	—	PW31A	One-valve : Blueprint, 1s.	
Beginner's One-valver	19.2.38	PW85	Simple S.W. One-valver	9.4.38
Two-valve : Blueprints, 1s. each.			Two-valve : Blueprint, 1s.	
Four-range Super Mag Two (D, Pen)	—	PW36B	Midget Short-wave Two (D, Pen)	—
The Signet Two (D & LF)	24.9.38	PW70	Three-valve : Blueprints, 1s. each.	
Three-valve : Blueprints, 1s. each.			Experimenter's Short-wave Three	
The Long-range Express Three			(SG, D, Pow)	30.7.38
(SG, D, Pen)	24.4.37	PW2	The Protect 3 (D, 2 LF (RC and	
Selectone Battery Three (D, 2 LF			Trans)	7.8.37
(Trans)	—	PW10	The Band-Spread S.W. Three	
Sixty Shilling Three (D, 2 LF			(HF Pen, D (Pen), Pen)	—
(RC & Trans)	—	PW34A	PORTABLES.	
Leader Three (SG, D, Pow)	22.5.37	PW35	Three-valve : Blueprints, 1s. each.	
Summit Three (HF Pen, D, Pen)	—	PW37	F. J. Camm's ELF Three-valve	
All Pentode Three (HF Pen, D			Portable (HF Pen, D, Pen)	—
(Pen), Pen)	29.5.37	PW39	Parvo Flyweight Midget Port-	
Hall-Mark Three (SG, D, Pow)	12.6.37	PW41	able (SG, D, Pen)	10.0.37
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48	Four-valve : Blueprints, 1s. each.	
F. J. Camm's Silver Souvenir (HF			Featherweight Portable Four (SG,	
Pen, D (Pen), Pen) (All-wave			D, LF, Cl.B)	15.5.37
Three)	13.4.35	PW49	"Imp" Portable 4 (D, LF, LF,	
Genet Midget (D, 2LF (Trans))	June '35	PW1	Pen)	10.3.38
Cameo Midget Three (D, 2 LF			MISCELLANEOUS.	
(Trans)	8.6.35	PW51	S.W. Converter-Adapter (1 valve)	—
1936 Sonotone Three-Four (HF			CRYSTAL SETS.	
Pen, HF Pen, Westector, Pen)	—	PW53	Blueprints, 6d. each.	
Battery All-Wave Three (D, 2 LF			Four-stratum Crystal Set	23.7.38
(RC))	—	PW55	1934 Crystal Set	—
The Monitor (HF Pen, D, Pen)	21.3.36	PW61	150-mile Crystal Set	—
The Tutor Three (HF Pen, D, Pen)	14.8.37	PW62	STRAIGHT SETS. Battery Operated.	
The Centaur Three (SG, D, P)	—	PW64	One-valve : Blueprints, 1s. each.	
The Gladiator All-Wave Three			B.B.C. Special One-valver	—
(HF Pen, D (Pen), Pen)	29.8.36	PW66	Twenty-station Loudspeaker	
F. J. Camm's Record All-Wave			One-valver (Class B)	—
Three (HF Pen, D, Pen)	31.10.36	PW69	Two-valve : Blueprints, 1s. each.	
The "Colt" All-Wave Three (D,			Melody Ranger Two (D, Trans)	—
2 LF (RC & Trans))	5.12.36	PW72	Full-volume Two (SG det., Pen)	—
The "Rapid" Straight 3 (D,			B.H.C. National Two with Lucerne	
2 LF (RC & Trans))	4.12.37	PW82	Coil (D, Trans)	—
F. J. Camm's Oracle All-Wave			Big-power Melody Two with	
Three (HF, Det, Pen)	28.9.37	PW78	Lucerne Coil (SG, Trans)	—
1938 "Triband" All-Wave Three			Lucerne Minor (D, Pen)	—
(HF Pen, D, Pen)	22.1.39	PW81	A Modern Two-valver	
F. J. Camm's "Sprite" Three			Three-valve : Blueprints, 1s. each.	
(HF Pen, D, Tet)	26.2.38	PW87	Class B Three (D, Trans, Class B)	—
The "Hurricane" All-Wave Three			New Britain's Favourite Three	
(SG, D (Pen), Pen)	30.4.38	PW89	(D, Trans, Class B)	15.7.33
Four-valve : Blueprints, 1s. each.			Home-built Coil Three (SG, D,	
Sonotone Four (SG, D, LF, P)	1.5.37	PW4	Trans)	—
Fury Four (2 SG, D, Pen)	8.5.37	PW11	Fan and Family Three (D, Trans,	
Beta Universal Four (SG, D, LF,			Class B)	25.11.33
Cl. B)	—	PW17	£5 5s. S.G.3 (SG, D, Trans)	2.12.33
Nucleon Class B Four (SG, D			1934 Ether Searcher; Baseboard	
(SG), LF, Cl. B)	6.1.34	PW34B	Model (SG, D, Pen)	—
Fury Four Super (SG, SG, D, Pen)			1934 Ether Searcher; Chassis	
Battery Hall-Mark 4 (HF, Pen,			Model (SG, D, Pen)	—
D, Push-Pull)	—	PW40	Lucerne Ranger (SG, D, Trans)	—
F. J. Camm's "Limit" All-Wave			Coscor Melody Maker with Lucerne	
Four (HF Pen, D, LF, P)	26.9.36	PW67	Coils	—
All-Wave "Corona" 4 (HF Pen,			Mullard Master Three with	
D, LF, Pow)	9.10.37	PW79	Lucerne Coils	—
"Acme" All-Wave 4 (HF Pen, D			£5 5s. Three; De Luxe Version	
(Pen), LF, Cl. B)	12.2.38	PW83	(SG, D, Trans)	10.5.31
Mains Operated.				
Two-valve : Blueprints, 1s. each.			Lucerne Straight Three (D, RC,	
A.C. Twin (D (Pen), Pen)	—	PW18	Trans)	—
A.C.-D.C. Two (SG, Pow)	—	PW31	All-Britain Three (HF Pen, D, Pen)	—
Selectone A.C. Radiogram Two			"Wireless League" Three (HF	
(D, Pow)	—	PW19	Pen, D, Pen)	3.11.34
Three-valve : Blueprints, 1s. each.			Transportable Three (SG, D, Pen)	—
Double-Diode-Triode Three (HF			£6 6s. Radiogram (D, RC, Trans)	—
Pen, DDT, Pen)	—	PW23	Simple-tune Three (SG, D, Pen)	—
D.C. Ace (SG, D, Pen)	—	PW25	Economy-Pentode Three (SG, D,	
A.C. Three (SG, D, Pen)	—	PW29	Pen)	Oct. '33
A.C. Leader (HF, Pen, D, Pow)	—	PW350	"W.M." 1934 Standard Three	
A.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B	(SG, D, Pen)	—
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A	£3 3s. Three (SG, D, Trans)	—
Armada Mains Three (HF Pen, D,			Iron-core Baud-pass Three (SG,	
Pen)	—	PW38	D, QP21)	—
F. J. Camm's A.C. All-Wave Silver			1935 £6 6s. Battery Three (SG, D,	
Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50	Pen)	—
"All-Wave" A.C. Three (D, 2			PTP Three (Pen, D, Pen)	—
LF (RC))	—	PW54	Certainty Three (SG, D, Pen)	—
A.C. 1936 Sonotone (HF Pen, HF			Minutube Three (SG, D, Trans)	—
Pen, Westector, Pen)	—	PW56	All-Wave Winning Three (SG, D,	
Mahs Record All-Wave 3 (HF			Pen)	—
Pen, D, Pen)	5.12.36	PW70	Four-valve : Blueprints, 1s. 6d. each.	
All-World Ace (HF Pen, D, Pen)	29.8.37	PW80	65s. Four (SG, D, RC, Trans)	—
Four-valve : Blueprints, 1s. each.			"A.W." Ideal Four (2 SG, D, Pen)	16.9.33
A.C. Fury Four (SG, SG, D, Pen)	—	PW20	2HF Four (2 SG, D, Pen)	—
A.C. Fury Four Super (SG, SG, D,			Crusader's A.V.C. 4 (2HF, D, QP21)	18.8.34
Pen)	—	PW34D	(Pentode and Class B Outputs for	
A.C. Hall-Mark (HF Pen, D,			above : Blueprints 6d. each)	25.8.35
Push-Pull)	24.7.37	PW45	Self-contained Four (SG, D, LF,	
Universal Hall-Mark (HF Pen, D,			Class B)	Aug. '33
Push-Pull)	9.2.35	PW47	Lucerne Straight Four (SG, D,	
A.C. All-Wave Corona Four	6.11.37	PW81	LF, Trans)	—
SUPERHETS.				
Battery Sets : Blueprints, 1s. each.			£5 5s. Battery Four (HF, D, 2LF)	—
£5 Superhet (Three-valve)	5.6.37	PW40	The H.K. Four (SG, SG, D, Pen)	—
F. J. Camm's 2-valve Superhet	13.7.35	PW52	The Auto Straight Four (HF Pen,	
F. J. Camm's £4 Superhet	—	PW58	HF Pen, DDT, Pen)	Apr. '36
F. J. Camm's "Vitesse" All-			Five-valve : Blueprints, 1s. 6d. each.	
Wave (5-valver)	27.2.37	PW75	Super-quality Five (2HF, D, RC,	
Mains Sets : Blueprints, 1s. each.			Trans)	—
A.C. £5 Superhet (Three-valve)	—	PW43	Class B Quadradyne (2 SG, D, LF,	
Class B)	—	PW344		

New Class B Five (2 SG, D, LF,			Class B)	—	WM240
Mains Operated.					
Two-valve : Blueprints, 1s. each.			Consoelectric Two (D, Pen) A.C.	—	AW403
Economy A.C. Two (D, Trans) A.C.			Unicorn A.C.-D.C. Two (D, Pen)	—	WM86
Three-valve : Blueprints, 1s. each.			House Lover's New All-electric		WM383
Three (SG, D, Trans) A.C.	—	—	S.G. Three (SG, D, Pen) A.C.	—	AW290
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399	A.C. Pentaquester (HF Pen, D,		AW439
Pen)	23.6.34	AW439	Mantovani A.C. Three (HF Pen,		WM374
D, Pen)	—	—	£15 15s. 1936 A.C. Radiogram		WM101
(HF, D, Pen)	Jan. '36	WM101	Four-valve : Blueprints, 1s. 6d. each.		WM326
All Metal Four (2SG, D, Pen)	—	—	Harris' Jubilee Radiogram (HF		WM380
Harris' Jubilee Radiogram (HF			Pen, D, LF, P)	May '35	WM380
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'Varsity Four	—	—	'Request All-Wave	Oct. '35	WM395
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"W.M." Radiogram Super A.C.	—	—	1935 A.C. Stenode	—	WM385
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LF, Class B)	20.5.33	AW399	Holiday Portable (SG, D, LF,		AW303
Holiday Portable (SG, D, LF,			Class B)	—	AW303
Family Portable (HF, D, RC,			Trans)	22.9.34	AW447
Two H.F. Portable (2 SG, D,			Tyers Portable (SG, D, 2 Trans)	—	WM367
QP21)	—	—	SHORT-WAVE SETS—Battery Operated.		
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RC, Trans)	—	—	Experimenter's 5-metre Set (D,		AW438
Trans, Super-regen)	30.6.34	AW438	Experimenter's Short-waver (SG,		AW463
D, Pen)	Jan. 10, '35	AW463	The Carrier Short-waver (SG, D, P)	—	WM390
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Trans)	—	—	Standard Four-valver Short-waver		WM333
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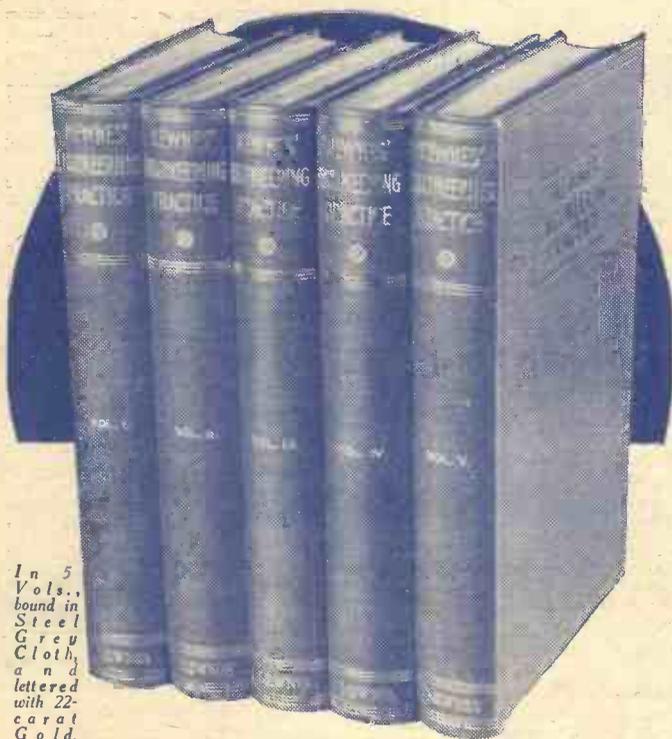
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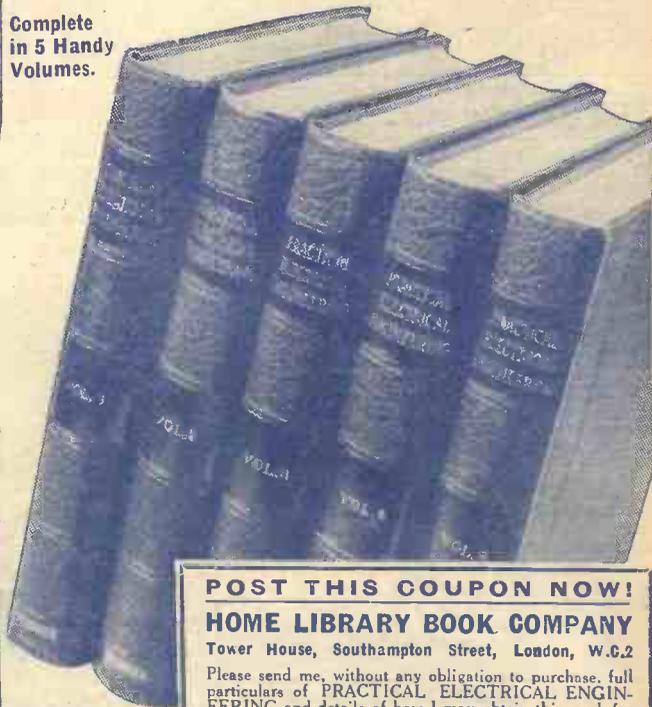
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