COMPLETE SHOW REPORT INSIDE

Practical and Amateur Wireless, September 3rd, 1938.

EVERY WEDNESDAY

Edited by F.J. CAMM

A GEORGE NEWNES Publication

Vol. 22, No. 511.
September 3rd, 1938.

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!

★ GREAT NEW BOOK FOR "PRACTICAL WIRELESS" READERS

SEE INSIDE
Not so simple as it looks!

38 separate parts in a Cossor Valve...

And always in the forefront are Cossor research engineers developing new valves to take advantage of these ever-changing conditions. Whatever your valve requirements — whether it be a replacement valve for a simple Battery Receiver or one for an elaborate Superhet — you will find it in the Cossor range. More than 80 different types available — and every one manufactured to the same exacting standards of accuracy and efficiency.

When re-valving your Set use COSSOR VALVES

Britain's most popular valves
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."

Round the World of Wireless

Notts Radio Exhibition

This year's Nottingham exhibition will be held from September 7th to 14th at the Greys Inn 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 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 in 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.

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 364.5 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.
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. (388 kc/s) as kitherto.

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) and operated by the Municipal authorities of the capital, but the city possesses, in

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 Harold W. Geas, who is the conductor.

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 Merrythorn," 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

Many 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 them into two band-pass tuned sets. The coils were of different makes but both for ordinary medium and long waves, and he therefore obtained a tuning condenser and adjusted the coils in the usual way with capacity coupling. He found, however, that although he succeeded in getting stations at one part of the dial he could not obtain satisfactory results throughout the whole of the 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 5th, 1938.

Solution to Problem No. 310

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

The following three readers successfully solved Problem No. 310 and books accordingly been forwarded to them: J. Craddock, 7, Glendowne, Riddings; Harold F. Petts, who leads the orchestra, has appeared frequently as a soloist.

Torquay Municipal Orchestra

THE Torquay Municipal Orchestra will make their 200th broadcast in the Regional programme on September 6th, from the Pavilion, Torquay, when the solo artist will be Mary Hamlin (soprano). The orchestra was re-started after the War by Harold W. Geas, 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 8th. 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 Camerons"; and the Orchestra of the Royal Marines (Portsmouth Division), conducted by Lieut. F. Vivian Dunn.

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 transmit 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 services include unsatisfactory broadcasts and programmes, in some instances, of a questionable nature.
Testing and Adjusting

The remaining components may now be bolted in position and the wiring completed in accordance with the diagram given in last week's issue, and the receiver is then ready for test. H.T. at H.T.1 should be from 60 to 80 volts. The grid bias at G.B.-F 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 the 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 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 wave-lengths of these should be found so that the condensers which we have selected may be adjusted to give the necessary tuning point, and there 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 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 gauzed condenser, and to facilitate matters it may be found worth while to cut out the aerial socket and adjust the pm-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 wave-lengths of these should be found so that the condensers which we have selected may be adjusted to give the necessary tuning point, and there is not a great deal of latitude in this connection.
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 adjustments of the gang condenser are exact 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 wave-change 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. With any receiver, the aerial and earth systems 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.

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

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>One semi-circular dial</td>
<td>(Polar)</td>
</tr>
<tr>
<td>One B.P.I14 coil</td>
<td>(Varley)</td>
</tr>
<tr>
<td>One tuning condenser, 2-gang, .0005 bat type</td>
<td>(Polar)</td>
</tr>
<tr>
<td>One reaction condenser, .0003 mfd. Compax</td>
<td>(Bulgin)</td>
</tr>
<tr>
<td>One push-button switch, 5.221, with knobs and escutcheon (E10)</td>
<td>(Bulgin)</td>
</tr>
<tr>
<td>Ten pre-set condenser (for values, see Editorial)</td>
<td>(Bulgin)</td>
</tr>
<tr>
<td>One series condenser, type 431, .0001 mfd.</td>
<td>(T.C.C.)</td>
</tr>
<tr>
<td>One grid condenser, type 451, .0002 mfd.</td>
<td>(T.C.C.)</td>
</tr>
<tr>
<td>One bias condenser, type 341, 1 mfd. (T.C.C.)</td>
<td></td>
</tr>
<tr>
<td>One manganese by-pass condenser, type 431, .001 mfd. (T.C.C.)</td>
<td></td>
</tr>
<tr>
<td>Two screen condensers, type 341, .1 mfd.</td>
<td>(T.C.C.)</td>
</tr>
<tr>
<td>One coupling condenser E.F., type 451, .04 mfd.</td>
<td>(T.C.C.)</td>
</tr>
<tr>
<td>One tone condenser, type 451, .04 mfd. (T.C.C.)</td>
<td></td>
</tr>
<tr>
<td>One H.F.C. H.F.9 (Bulgin)</td>
<td></td>
</tr>
<tr>
<td>Three valveholders—two 7-pin, one 5-pin</td>
<td>(Clix)</td>
</tr>
<tr>
<td>Two grid-leaks, 5 meg. 1 watt (Erie)</td>
<td></td>
</tr>
<tr>
<td>Two screen resistances—two 30,000, one 20,000 1 watt (Erie)</td>
<td></td>
</tr>
<tr>
<td>One anode resistance, 10,000 1 watt (Erie)</td>
<td></td>
</tr>
<tr>
<td>One on-off switch, 5.132 (Bulgin)</td>
<td></td>
</tr>
<tr>
<td>Two terminal strips—A., A.1, and E., L.S. (Clix)</td>
<td></td>
</tr>
<tr>
<td>One panel, 1½m. x 9m. ½m. (Peto-Scott)</td>
<td></td>
</tr>
<tr>
<td>One chassis, 1½m. x 21m. x 9m. (Peto-Scott)</td>
<td></td>
</tr>
<tr>
<td>One bias pot, 50,000 without switch (Erie)</td>
<td></td>
</tr>
<tr>
<td>Fuse, 200 mA (Microfuse)</td>
<td></td>
</tr>
<tr>
<td>Fuseholder (Microfuse)</td>
<td></td>
</tr>
<tr>
<td>One valve, 210V/P, 7-pin metallised (Cossor)</td>
<td></td>
</tr>
<tr>
<td>One valve, 210V/P, 7-pin metallised (Cossor)</td>
<td></td>
</tr>
<tr>
<td>One 120-volt H.T. battery and one 2-volt 40 A.H. accumulator (Eside)</td>
<td></td>
</tr>
<tr>
<td>One Stentorian loudspeaker (W.B.)</td>
<td></td>
</tr>
</tbody>
</table>
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 Eico 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. 47), the picture which is seen is approximately 4in. by 4in., 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
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 14in., 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 Road entrance, immediately on entering you turn right for the commencement of the stands in numerical order. The second stand is that of Messrs. Heyherd, 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.

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, 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 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...
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.

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

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 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 Tungsram valves which are distributed by Messrs. Siemens.

MONOMATIC TUNING

On Stand 17, Invicta are showing some push-button 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.

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

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

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 29, 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 foolproof 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), where the wide range of aged and electric motors and automatic record changers. Complete tables for incorporation in an existing receiver, and a new radio gram 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 these models are some novel cabinet designs. 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 2s. 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 tuning dial, is very attractive, and push-button tuning is also incorporated on two of the new models.

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Next comes the Garrard stand (No. 25), where the wide range of aged and electric motors and automatic record changers. Complete tables for incorporation in an existing receiver, and a new radio gram 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 these models are some novel cabinet designs. 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.

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- 0-250
- 0-500

MILLIAMPS
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- 0-25
- 0-100
- 0-500
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- 0-5 volts
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- 0-60,000
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"Practical Wireless"
SPECIFIES
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You don't find experts recommending a thing without good cause, without knowing that their choice is sound and will be justified in use. Tungsrarn Valves, have again been exclusively specified. The reason? Tungsrarn do all that a good valve should do; well-Tungsrarn Valves can be relied upon, trusted to give unmitting and faithful service. Tungsrarn Valves are dependable valves. "Practical Wireless," now specifies Tungsrarn Valves for two 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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FOR ONLY 3/9

The economical way to bring your set up to its highest possible efficiency, is to use HIVAC when replacing all "old" valves.

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1939 EDITION

Includes a special chapter on television rectifiers, as well as up-to-date information on all rectification problems.

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J.B. precision built Condensers and Dials have been specified and used in three sets described in this and last week's issue of "Practical and Amateur Wireless."

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

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JACKSON BROS. (London) LTD.
72, ST. THOMAS STREET, LONDON, S.E.I
A neat push-button remote control—applied by R.C.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 £12, 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 16in. 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. 6d.

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 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 a large table model giving a picture by 4in. 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 feedback and twin auditorium speakers. The Ekco-Symphony optical-

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

mechanical television receivers are also on show here.

Ultra Electric are also showing a television receiver amongst their receivers on Stand No. 90, one of these giving a 7in. by 6in. picture and the other a 10in. by 8in. 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.

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 14in. This costs £125.

BATTERIES AND TEST GEAR

There is a wide range of H.T. batteries...
to be seen on Stand No. 52, and the Brifanica Batteries exhibit is of great interest.

The service man will find the Everett Edgecombe exhibit on Stand No. 58 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 des-fad 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 ideal for 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.

The service man will find 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 Steatite 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 there are many favourites which may be obtained from records.

On the Rothermel Stand, No. 80, there are many 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 combinations. 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)
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 Cylid 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 mabode-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 amplifiers, 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 service-men 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

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![McMichael's model 802 - costing £24 16s. with stand.](image1)

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 associated 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, 66 and 70.

In the direction of construction in a Fanney 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.

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![An unusual design in cabinets shown in a K.B. Model.](image2)

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

![Note the arrangement of the push-buttons in this McMichael receiver, which delivers 5 watts.](image3)

Here is one of the Ekco C.R. tube television receivers.
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 linen diameter pulley was made from wood and forced on the spindle A as indicated in the sketches. A similar pulley was placed loosely on spindle B of the second condenser. A band of narrow tape was then stretched over the pulleys, and a pointer made of brass strip clamped firmly to spindle B. This indicator is very accurate, and is particularly suitable for home-made portable receivers.—G. DALES (Biddenden, Kent).

Taking Advantage of Inter-electrode Capacities

Generally speaking, the inter-electrode capacities of values 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 30mmfd, 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 L2 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. JOHNSON (Belzize Park).

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 were a small linen diameter rheostat dial-calibrated in volts—by another, giving the readings. Shallow grooves, 1/16 in. wide, were then cut in the outer edge of the strip, and spaced 1/16 in. apart. Strips of tinplate were cut, 1 1/4 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 tinplate, 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).
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 flapdoodle, 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; 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. 98. 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 shall be glad of, I shall be glad to publish, and 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 tank.

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

A 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.
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

T HE 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 60ft. by 12ft. by 22ft. high. The main features of the stand consist of three large pylons on which members 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 televizier.

The lay figure, known as "Tilly," used from earliest days as a 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, which is 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-stories which, under the title "What Happened at 8.20?" will be launched in October and will continue throughout the year.

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 these 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 on 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 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 on his story 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.

Soldering Materials

T HE 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 tassel 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 and condensors and resistors.

Screening Problems

T HE 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

W HEN 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.C. 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.
**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 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 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 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 R1 should have a value of 80,000 ohms and feed through values similar to the first stage to the second detector, which is coupled to the output pentode with a 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 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 R1 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, R1 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 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 coupling.

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 noise.

**High-gain L.F. 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 noise. The problem of H.F. amplification is, of course, the tuning.
Leaves from a Short-wave Log

Switzerland Tries Out Short Waves

The Swiss Administration of Posts and Telegraphs at Berne is carrying out experimental broadcasts with a transmitter at Schwarzenburg. The transmissions are made daily (Sundays excepted) between G.M.T. 18.00-19.00 on 31.46 m. (11.865 me/s) and again from 01.00-02.00 on 39.74 m., the wavelength used for the experimental channel used by station FIQA which it is destined to replace. There is a possibility, however, that these frequencies may also be tried out.

Radio Helsinki

The following channels have been allotted to the Lahti 2-kilowatt short-wave transmitter which relays the Helsinki (Finland) radio entertainments: 13.92 m. (21.55 me/s); 16.85 m. (17.8 me/s); 19.75 m. (15.19 me/s); 25.47 m. (11.78 me/s); 31.85 m. (9.5 me/s); and 49.02 m. (6.12 me/s). The power of the station will shortly be increased to 10 kilowatts, but later the transmitter will be placed by one of a power of 50 kilowatts. The station has been slightly changed. It is now as under: Daily: G.M.T. 01.00 simultaneously on 19.76 m. (15.18 me/s) and 31.25 m. (9.6 me/s); at G.M.T. 04.15, through R.W.20 (RNE) on 26 m. (12 me/s). RNE is also used on Sundays at G.M.T. 12.00, 16.00 and 22.00; on Mondays and Fridays at 22.00, and on Wednesdays at G.M.T. 12.30.

Three New Costa Ricans

With the aid of Radiodifusora TIEF, Alma America, broadcasts from a new transmitter at San José (Costa Rica) have been logged on 20.87 m. (10.042 me/s). The station appears to relay its program from the medium-wave TIRM, in that city. The short-wave outlet of a medium-wave station bearing the same call-sign, and styling itself Radio Para Ti has been heard on three occasions during the past few weeks.

Radio Alarobia

ACCORDING to a Paris report a new transmitter giving the above ecall is now testing at Tananarive (Madagascar). The wavelength for the experimental broadcast is 49.96 m. (6.005 me/s), the channel used by station FIQA which it is destined to replace. There is a possibility, however, that other frequencies may also be tried out.

Moscow's English Broadcasts

With the coming into action of the new R.W.99, 100-kilowatt transmitter, the schedule of the English talks from Moscow has been slightly changed. It is now as under: Daily: G.M.T. 01.00 simultaneously on 19.76 m. (15.18 me/s) and 31.25 m. (9.6 me/s); at G.M.T. 04.15, through R.W.20 (RNE) on 26 m. (12 me/s). RNE is also used on Sundays at G.M.T. 12.00, 16.00 and 22.00; on Mondays and Fridays at 22.00, and on Wednesdays at G.M.T. 12.30.

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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 these 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 the two wires run in parallel to each other, but as close together as possible. 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—and 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 occupants. Alternatively, when using an external speaker, the speaker can be tilted so that a line drawn parallel to the axis of the centre magnet nearly in line with the level of the ears of the listener when seated.

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 run it along the picture moulding. The down-lead from 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 inlaid aerial consisting of "Fix" 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 through a window frame. In most cases where the frame is wooden a small hole can be bored in it with a thin 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 through 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 4in. disc of aluminium sheet or metal foil to each side of the frames. With the window half open, if necessary, they make a good fixed condenser. (See Fig. 1.) Thus it is necessary only to solder "Fix" to the condenser to assure 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 silicon 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 hanging 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 covered and appear as a single flat lead. At one
PROBLEMS OF RECEIVER INSTALLATION

(Continued from previous page)

and 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 underfoot. 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 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 night well exceed one amp.; and one ohm resistance at one amp. represents a voltage drop of one, which would render the picture indistinct.

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 lead 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 nearer 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 thin nail. It will easily drive through the plaster, but will stop when the face of a layer is encountered. After a few attempts a joint should be found, when a hole can be knocked through the wall with a wall drill and fixed with mortar.

When taking an extension lead to an upstairs room the plaster can be pierced with any 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 lst.—Promenade Concert from Queen's Hall, London.
Friday, September 2nd.—Vooral Girl Makes Good; musical comedy.
Saturday, September 3rd.—The Tourist Trophy Race, organised by the R.A.C.; a microphonic 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.—Lonely, act 2 of Alfredo Catalani's opera, from The Purin Studios of L.I.A.R.E.
Friday, September 2nd.—Cabaret Cruise: Radiofymnia television.
Saturday, September 3rd.—The Bohemian: 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 Eve Fair: A recorded impression of one of the great annual sheep sales of the Welsh Borders.
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 Ballrooms, Blackpool.
Thursday, September lst.—Scott v. English: one more Border Incident, a discussion on Scotland and England.
Friday, September 2nd.—Southport: Concert party from the New Annesley Plaza Hotel, 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 (857 m.)
Wednesday, August 31st.—The Streets of Bristol, No. 1, King Street.
Thursday, September 1st.—Fife and Gaia.

"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 Maudlin. 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 new ensembles 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. con-ventor.

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 Esteddfod Writers' Programme.
Friday, September 2nd.—Heyrduddiol Hall: Summer Eve, a light music programme.
Saturday, September 3rd.—Breeze of Saturday's export in Wales, including eye-witness account of the Final of the Giron Wall Cup Competition at the Rock Park Green, Llandrindod Wells.

SCOTTISH (191.1 m.)
Wednesday, August 31st.—Travelers: The day's work of the North Sea Fishermen.
Thursday, September 1st.—A Visit to the Empire Exhibition.
Friday, September 2nd.—Scott's Songs: Orchestral concert.
Saturday, September 3rd.—Exhibition on Parade (3rd Edition): A Revue of Flower Show and Fancy Flowering.

NORTHERN IRELAND (107.1 m.)
Wednesday, August 31st.—Choral programme.
Thursday, September 1st.—Dance music from the Ritz Cinema, Belfast.
Friday, September 2nd.—Death at Newtownards: An examination of a famous Ulster crime in the 'sweeney.
Saturday, September 3rd.—Chamber music.
PERCIVAL MACKAY
A BRIEF BIOGRAPHY

Most of our popular dance band leaders seem to have taken 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.

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 don caps from cabinets and seated up seats. Just over a year later he became a solo pianist and accompanist for a concert party. Next year he joined a concert party at Clifton, playing the piano, doing his own small pianist and accompanist for a concert party. The following year he joined a concert party at Clacton, and the year after that he went on tour with the famous "No-No Nanette!" which ran under the conductorship of the new musical comedy, "The Broadway Five.

Talk with Jack Hylton

Back in London in 1919, Mackay assisted arranging and orchestrating the show for Jack Hylton when his band made its first appearance on the music-hall stage at the "Belford 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.

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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.

First of all, the cathode-ray tube itself has increased efficiency due to the fact that the anode volts have been increased to a much brighter picture on the fluorescent screen. Furthermore, the chemical composition of the screen powder used is better, due to the enormously high electron impact efficiency of the remote crystal-type screen used. 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.

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 48 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. have followed 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 have acquired an interest in the DuPont Manufacturing Co. The actual television receiver, in so far as transmission is concerned, is now acquired a complete mobile film unit in America by the Dupont Manufacturing Co. The actual television receiver, in so far as transmission is concerned, is now acquired a complete mobile film unit in America by the DuPont Manufacturing Co.

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, 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 half of the area, 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. Evidence of the resulting picture quality reference can be made to Fig. 2, which is an unretouched photograph of a 12ft. by 10ft. picture 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.

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

Fig. 2.—A 441-line big screen projection picture as shown recently in Berlin.
for television purposes. This comprises a special car equipped with a film camera and sound head, and the associated apparatus for making short lengths of film. The roof of the car is reinforced to allow camera, tripod and operator to work in that position if desired. There is, of course, no intention for making short lengths of film. The roof sound head, and the associated apparatus for television purposes.

This has already been carried out with extending the field of action in a televised radio reception, and it

A Television “Volume” Control

MOST readers are familiar with the principles and results as applied to A.V.C. in so far as it relates to ordinary coding. The number of listeners has occurred to many that it would be a distinct advantage if similar principles could be applied to television to effect certain forms of interference and fading which are sometimes encountered. With ordinary broad-casting the carrier wave is really anchored to a datum line, and the fading is really a reduction in the amplitude of the carrier signal about that line. With television, however, due to the transmission of the D.C. component, as it is called, the mean value of the carrier wave varies so as to allow for the relatively slow changes in the average background illumination.

A scheme has been developed, however, which makes television A.V.C. possible in spite of the complicated nature of the radiated signal. The main idea is to displace the synchronising signals, which occupy a steady 30 per cent. of the carrier amplitude, to a new position so that the minimum amplitude of the received signals corresponds with the minimum position. The main causes of this are used as the foundation for any A.V.C. voltages which have to be developed to offset the effect of interference. Thereby the comparatively small number of sets in restricted service area which now holds sway on the television programme in this country, can be provided with a service of sufficient quality to ensure wide acceptance.

For the short-wave broadcast, the receiver is used with an amplitude modulated carrier wave roughly of the type: 15 per cent. modulating signal, and 85 per cent. carrier. This is said to be the approximate standard in the normal B.B.C. sound service.

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Buy this kit and you will have AM. Watch the highly efficient Short-waves you can build with the filament and bias supply that will answer to your choice.

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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 antenna 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 yielded a 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 30 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 ever set received a signal on an 80-ohm unbalanced feeder cable which gave 20 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 amplification of the signals to the 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 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 condition of programme sound and vision emanating from the glass-walled Olympia studio passed to the B.R.C. mobile control room van and then to the 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 peak efficiency.
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 1/16 in. drills. At the rear the socket strips have to be mounted and you can drill 3/32 in. holes to clear each socket, or drill a 3/32 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 3/32 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 is practically finished in order to avoid damaging it.

Mounting the Condenser

The band-spread 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 in position on the chassis to facilitate the drilling of the holes which are necessary for securing the panel to the chassis.

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—0.0015 S.W. Special, and 0.00015, Budget U.S.W. (Jackson).
- One 0.0005 S.W. Special condenser (Jackson).
- One 0.003 coil and holder (B.T.S.).
- One 0.001 type 4608/S grid condenser (Dubilier).
- One 0.004 type 4608/S H.T. condenser (Dubilier).
- One 0.004 type 4608/S anode by-pass condenser (Dubilier).
- One 2 type 4608 coupling condenser (Dubilier).
- One 0.25 type 4608/S tone condenser (Dubilier).
- One 0.1 type 4608/S screen condenser (Dubilier).
- One 0.05 type 4608/S plate leak (Erie).
- One 0.04 type 4608/S tone condenser (Dubilier).
- Two 0.1 type 4608/S screen condenser (Dubilier).
- One 0.04 type 4608/S plate leak (Erie).
- 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 action condenser, 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 hand-setting condenser as well as the action 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.2 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. Note 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 than 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 reactions on the lower wavelengths, where the damping effect of the aerial-earth system becomes noticeable.

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, stocking, 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 Jan Adcock will be the soloists for the saxophone Rhapsody by Eric Coates 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 18th, and will also be relayed to Italy. The composer will be Martyn C. Webster. Those taking part will include Harry Porter (soprano), 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 16th, forty minutes of variety, including probably the popular duettists Moreton and Kaye. This theatre was opened in 1889; 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 13th, 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.—E. J. Cooper (Leamington Spa).

I also would like to say that I think V. C. T.'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:


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)

“GOOD AND BAD SETS WILL BE IMPROVED BY IT,” says MR. F. J. CAMM

Whether used as a rejuvenator of receivers, or just for extension speaker purposes, the current Stentorians will be a joy to their proud new owners for many years to come. Even if only as a matter of interest, hear one at your local dealer's. You will agree with Mr. Camm that “listeners are fortunate in having at their command a speaker so sensitively responsive.”

Chassis from 17/6. Cabinet models from 24/6, complete. “Long Arm” extension remote control, 15/6.

Stentorian
PERMANENT MAGNET MOVING-COIL SPEAKERS

WHITELEY ELECTRICAL RADIO CO., LTD., MANSFIELD, NOTTS

Stentorian Cadet Cabinet, 39/6
with constant impedance V/C.
Readers’ DX Logs

Sir,—I would like to thank my 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 a really a non-DX list of N. American amateurs. It is a list of SU1CK.; HG, ZL, BE, WA, ES, PG, OI, PE, ZX.

I append my 14 mc/s phone log for the week August 6th to August 13th: VK2ABC, AHA, NO, HF, NO, BZ, DL, VV, NX, SZ, UC, JG, VK3RM, HX, HG, ZL, BE, WA, ES, PG, OI, PE, ZX; VK4KO, BB; VK5BF; VK6MW.

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 use to the DXers overseas 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, which are 14 mc/s phone, and were received within the last month.

W7MDY, W2IKV, W3PH, W4BRX, W4JE, W5FYI, W5JYH, W6VOC, W7EF, W7GEG (Oregon), W7EIO (Montana), W8CUO, W9TOO, W9EUK, W9JSN, W9PA (Connecticut), W9SR, W9TB, W3HSC, CN8AM, VK2FY, VK2HS, VK2HAH, VK3BM, VK3PF, VK3HG, VK30L, VK5BF, VK5EP, VK5ME, VX1AZ, PY4CT, CE1A0, HC1JW, VP3AA, YY1AP, TQ6AA, CO2WZ, VP9BF, HN6PA, H7G, K4EGM, and VP9DL.

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

Readers may be interested to know that Radio Maritique on 9,700 kc/s sends a very highly coloured verification card. I did not enclose a copy.

J. STEWART (Alexandria, Dumbartonshire).

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, and also when the television was televised at the beginning of the year, very serious forms of interference were experienced. The pictures seen on television receivers on those 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 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 Ideal Home Exhibition in April, and also at the R.M.A.'s co-operative effort during the Ideal Home Exhibition shall have no breakdowns.

PRACTICAL AND AMATEUR WIRELESS September 3rd, 1938

STUDY AT HOME IN YOUR SPARE TIME

JOURNALISM

Short Story, Novel and Play Writing

There is money and pleasure in Journalism and in Story Writing. No apprenticeship, no cash payments, no examinations, no outfit necessary. For newspapers, novels or pictures, is not a gift; it is a science that can be acquired by diligent application and proper guidance. It is the most fascinating way of making pastime profitable. Trained ability only is required, we do the training by post. Let us tell you all about it:

DEPARTMENT OF LITERATURE 104.

DEPT. 104, THE BENNETT COLLEGE LTD., SHEFFIELD
THE "PYRAMID" ONE-VALVER

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

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 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 chassis 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

Front view of the panel showing the open tuning scale.
The Man with a Future

The man who soon will be in a much better position than he occupies today is the man who is devoting some of his spare time to vocational study now. He knows that training is the best means of strengthening his salary-earning ability.

Through spare-time study ambitious men everywhere have risen to positions of responsibility. They developed their natural faculties, and so progressed in an era of constantly increasing competition. Tens of thousands are doing so today. They are the men with a future.

If you are dissatisfied with your present prospects, if you desire bigger pay, promotion, let the I.C.S. advise you, free and without obligation. Write, or fill in and post the coupon. But don't delay.

---

Wiring Diagram of the "Pyramid" One-valver

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Greatest, largest and most famous of all institutions in the world are noted for spare-time training by the postal method. Branches in 30 countries, students in 50.
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

Panel drilling dimensions for the "Junior" Crystal Set.

positioned in the opening, the mounting bracket for the tuning condenser should be fitted to the condenser and the dial then

Panel drilling dimensions for the "Junior" Crystal Set.

L

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.

Operating Notes

Make quite certain that the condenser 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 2000 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 signal 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.

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 fin. 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

LIST OF COMPONENTS FOR THE "JUNIOR" CRYSTAL SET

One tuning condenser, without dial or slow-motion. Popular log, 0.005 (Jackson).

One tuning dial, square plane, degree and scale (Jackson).

One coil, C.69 (Bulgin).

One crystal detector, R.D.40 (Jewel Penn).

One switch, S.98 (Bulgin).

Two terminal blocks, A.E., output (with terminals) (Belling and Lee).

One panel, 8in. x 6in. (Peto-Scott).

One fixed condenser, 0.001 mfd., type 4601/S. (Dubilier).

One pair earphones (Ericsson).

One tuning condenser, without dial or slow-motion.
The holes will have to be very accurately drilled and the escutcheon plate attached.

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 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.

Stability

In a receiver of this type instability in the H.F. stages must be avoided. The 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 enounced in screened slewing, and for connection to the top cap of the two valves in question we have adopted the metal screened cap connectors supplied by Bulgin. By using a length of screened slewing for the connection, and clamping 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.

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 full constructional details and operating instructions, together with the Wiring Plan and details for drilling the panel.

NEWNES' TELEVISION AND SHORT-WAVE HANDBOOK

3/6, or 4/- by post from GEORGE NEWNES, Ltd., Tower House, Southampton St., Strand, London, W.C.2.
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 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 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 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.

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 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.

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 Schott effect. There are several ways in which this can be accomplished, and now one is 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 led 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 msh ratio.
Varley COIL UNITS

Have been selected by Mr. F. J. Camm for his Exhibition Sets

F. J.

Camm’s Admiral 4-Valve Receiver

The B.P 116 Coil Unit was specially selected for this receiver. Unit comprises one serial coil and two intervalve H.F. coils complete with screened anode leads. Covers medium and long-wave bands and switch has three positions to control external on-off or radio-gram switch.

B.P. 116 THREE GANG COIL UNIT

PRICE 21/-

** * *

Press Button 3-Valve Receiver

The well-known Varley B.P.114 coil unit is featured for this receiver. Built on similar principles to the B.P.116 coil unit.

B.P. 114 TWO GANG COIL UNIT

PRICE 13/6

** * *

Write for complete catalogue of J.F. Transformers, Chokes, Coils, etc.

Varley (Propr. OLIVER PELL CONTROL LTD.), Cambridge Row, Woolwich, S.E.18.

Please forward complete catalogue of components.

Name
Address

P.W.

PRACTICAL AND AMATEUR WIRELESS

September 3rd, 1938

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 operating took place in the club-room at 80, Thobalds Road, W.C.I, on Friday evening, August 19th. It was attended by short-wave listeners and amateurs from all over London. Mr. F. J. 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 CBCM. The 4.61 Tridet 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 RX 25’s and F 29’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 1fr. stamp will get you a copy by return.


THE EASTBOURNE AND DISTRICT RADIO SOCIETY

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

ERFORD 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 meeting shows great improvement, and at the present rate of progress several of the A.A. members will soon reach the standard required for the full G mark test. It is to be hoped that soon some of the manufacturers will be approached with a view to giving reduced terms to 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. Broughton (G1F), 2, George Gardens, Cindwell Heath.

WIRELESS TRANSMISSION FOR AMATEURS

Edited by F. J. CAMM

Contains all the information an amateur requires for the construction and maintenance of his own transmitter. With 120 illustrations. 3s. net. (Postage 6d.)

F. J. CAMM says:—

The author, a noted expert, has written a book which contains 220 photographs, diagrams and plans.

PRACTICAL WIRELESS SERVICE MANUAL

Edited by F. J. CAMM

A complete, practical, and up-to-date work on the design of radio receivers and transmitters. By F. J. Camm for his practical wireless knowledge. It contains 350 valuable photographs, diagrams and plans. 3s. net. (Postage 6d.)

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USEFUL RECOMMENDATIONS

As a result of the R.M.A. Television Convention, the largest to be held anywhere in the world, many dealer groups have held special meetings in a praiseworthy effort to make constructive suggestions for the improvement of the present B.R.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 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.R.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 are lost intransmitting "clutter" with south coast broadcast. 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.

PRACTICAL AND AMATEUR WIRELESS

One of the new Baird television receivers which combines an all-wave radio receiver.

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 900 watts. Topping the list are YNOP, Radio Bayer, on 52.1 m. (5.738 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 me/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 Llanos, 45.91 m. (6.535 mc/s), 200 watts; YNOD, Onda Latina, on 45.63 m. (7.306 mc/s), 70 watts; and YNGU, Alma Pico, 3296 m. (9.3 mc/s), 30 watts. YNLF, YNLG, and YNOP relay their programmes from medium-wave stations.

Two Newcomers in Dominican Republic

Official lists give details of two new broadcasting stations in the Dominican Republic; they are HISP, Puerto Plato, on 45.7 m. (6.555 mc/s) and HIBJ, 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 HIAL, Trujillo City, La Voz de Quisqueya, an older established station on 25 watts which is sometimes heard on 45.77 m. (6.55 mc/s). It broadcasts daily (Sundays excepted) from G.M.T. 16.50-18.40, and from 21.40-00.40. Address: Radiodifusora Comercial HIAL, Señor Dr. Luis Santamaria, Ciudad Trujillo (Dominican Republic).

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

"PILOTUNE" Piano Key and Press Button tuning are the most accurate methods available. You must tune in correctly. It is an automatic mechanical operation and cannot develop what technicians call "DRIFT."" or in other words, imperfect tuning.

Remember this. With the "PILOTUNE" combined Automatic tuning and Hand controlled station selector Knob, you are not limited to just 8 or 6 pre-selected stations—the whole World of World's best stations.

"PILOT MODEL 53."

A 5-valve All-wave Superhet for quality reception of the World's best stations. 3 wavebands, 3 moving coil speaker. Large dial illuminated and calibrated for stations and wavelengths. Many other refinements that make it wonderful value for money.

TABLE MODEL 52, for A.C., mains. 10 Gns. Model 535, as above, but for A.C./D.C., mains. 14 Gns.

"PILOTUNE" PIANO KEY MODEL PT56.

A 6-valve, 9 Piano Key and manual tuning All-wave Superhet, 3 wavebands, 3 moving coil speaker. Rotary drum dial illuminated and calibrated for stations and wavelengths. Electronic tuning beam. A simple set to handle and it gives superb results.

TABLE MODEL PT35, for A.C., mains. 14 Gns.

Console Model PT36, for A.C./D.C. mains. 18 Gns.

18 MODELS TO CHOOSE FROM.

Prices 9 to 35 Guineas.

PILOT ALL-WAVE RADIO

PILOT RADIO LTD., 87 Portobello Road, London, W.8.
ELECTRICAL MAKE YOUR OWN RECORDS ON DISC TURNTABLE AND RECORDING Electric FENGHEF set has full sound range, cover, power and support for each band. Order now. Set with Tracking Pick-up and Pick-up convert for £11.5.0. 3.51. 12 Volt or 6 Volt. Complete set, by Ardente.

218, UPPER THAMES STREET, LONDON,

set, by Ardente. fine job, 20 watts pure output, A.C. mains, 218.


METEES.-We carry lame stocks of Meters, all ranges and aims Relays, 10/-.

Sets, ce. Large 7in, coils in tnahog. case, Sin. flaring spark. 25/10;-. SPARK COILS.-With fine thread adjust., 101. 2/9 pair.

and headbands. Maker's price to -day, 12/ -..Our price, 9/9 per pair.

HEADPHONES.-Lightweigid, 2,000 ohms, 416.

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 glass. What is the best way of formers for this, as I understand that there are many possibilities open to the home-constructor in this particular field."—G. E. (Hamstead).

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. As I should like 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 wave-lengths. 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

"I have a metal rectifier taken from an old set and would like to have a diagram showing the connections of this rectifier to a 12-volt supply, and if so, which is the better method to use for this purpose?"—C. T. A. (E.5).

The type is H.T.15 as far as I "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 an example of coils, it is generally used in connection with a musical instrument, and the primary winding should be so disposed that a tight inductive coupling is provided and this may be entered 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 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 resistive 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 like to know which is the better method to use for this purpose?"—E. C. (Blackheath).

This rectifier is rated to deliver 200 volts at 30 m.A. The input, as a half-wave unit, is 250 volts at 80 m.A, but as a voltage doubler the input may be 140 volts at 120 m.A. Care should be taken, as this rectifier is taken from this rectifier does not rise above 40 m.A.
This IMPORTANT GUIDE to SUCCESSFUL ENGINEERING CAREERS

After months of intensive effort and research, we are pleased to announce that the 1939 edition of our Handbook, "ENGINEERING OPPORTUNITIES," is now out of the publishers' hands and ready for free distribution. Containing 268 pages of practical guidance, this book is, beyond argument, the finest and most complete handbook on Successful Engineering Careers ever compiled. It is a book that should be on the bookshelf of every person interested in engineering, whatever his age, position or experience.

The Handbook contains, among other intensely interesting matter, details of B.Sc., A.M.I.C.E., A.M.I.Mech.E., A.M.I.A.E., A.M.I.W.T., A.M.I.R.E., CIVIL SERVICE, and other important Engineering Examinations; outlines courses in all branches of CIVIL, MECHANICAL, ELECTRICAL, AUTOMOBILE, RADIO, TELEVISION, and AERONAUTICAL ENGINEERING, BUILDING, GOVERNMENT EMPLOYMENT, etc., and explains the unique advantages of our Employment Department.

WE DEFINITELY GUARANTEE "NO PASS - NO FEE"

If you are earning less than £10 per week you cannot afford to miss reading "ENGINEERING OPPORTUNITIES." In your own interests we invite you to write (or forward the coupon) for your copy of this enlightening guide to well-paid posts - NOW.

There is no cost or obligation of any kind.

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

409A, SHAKESPEARE HOUSE, 17, 18, & 19, STRATFORD PLACE, LONDON, W.1.
RADIO REPAIRS AND ELECTRICAL ACCESSORIES ARE DEALT WITH!

SCORES OF PROVED MONEY-MAKING IDEAS FOR ONLY 2/6

ASTOUNDING NEW WORK FOR ALL WHO WANT TO INCREASE INCOME IN SPARE TIME!

JUST PUBLISHED!

WHETHER you are a clerk, shop assistant, engineer, motor mechanic—no matter what your job is, you'd give a lot, wouldn't you, to be able easily, quickly, to turn to a spare-time occupation offering you perhaps several pounds extra every week? For only 2s. 6d. you are presented with this big opportunity to make money! It buys you "MONEY MAKING MADE EASY" packed with clever suggestions worth many pounds!

Every idea is a winner—each one based on the experience of men and women who have tried them and made money. If a money-making idea has a snag in it, it does not appear in "MONEY MAKING MADE EASY"!

Throughout, the book is written in the simplest possible language and in a thoroughly practical way, and as you have wireless or electrical knowledge, you are given ideas which you will be able to turn to good account. If you want to run a thrift club to bring you as secretary extra money every week, all essentials are given so that you can start work to-day. And it is the same with every other activity outlined in this unique book of profitable spare-time activities.

NO MATTER WHAT YOUR JOB IS, THIS BOOK WILL SHOW YOU HOW TO EARN MORE IN LEISURE MOMENTS!

Get "MONEY MAKING MADE EASY" for 2s. 6d. from your nearest bookseller (this will save you postage) or send the coupon below to the publishers with 2s. 10d. to cover postage, insurance and carriage.

To The Book Publisher, C. Arthur Pearson, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Please post me by return "MONEY MAKING MADE EASY" for which I enclose Postal Order 2s. 6d., plus 4d. to cover postage, insurance and carriage.

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MANY OF THE IDEAS IN THIS WONDER BOOK CAN SET YOU ON THE ROAD TO BIG MONEY AT ONCE!

Packed with Practical Start-Now Information

Remember this—there may be something in this book which will suddenly give you the germ of an idea for a new product—a new industry—a vast new undertaking that will bring you riches beyond your wildest dreams! This is quite possible, for the book also contains at the end a chapter dealing with those modern industrialists such as Aspinall, the Adana home printing machine expert; Smith, the Potato Crisp maker; Bullin, of Holiday Camp fame, etc.—men who saw an opportunity and worked their way to big success.

Money-making ideas dealt with—

Drapery Clubs, Men's Clubs, Money Clubs; Insurance Agencies; How to make money with pets, rabbits, goldfish, birds; Inventing Card Games and Competitions; Home-made articles; River peddling; Hotel host and hostesses; Teaching bridge, golf, dancing; How to give swimming lessons; Boating; Running White Drives; Producing Amateur Theatricals and Films; Photography for profit; Stamp collecting for profit; Radio repairs; Antiques; Work for the electrician; Confectionery; Printing; Money-making with a car; Chances for gardeners; Professions that bring profit; Teaching Short-hand, Typewriting; Teaching in Evening Schools; Property buying for profit, etc., etc.

How to Run Clubs for Profit!

Be a Space-Time Printer and Make Money

How to make money from gardeners

Shopkeepers are a source of profit

How and Where to Sell Photographs

A Good Cook Can Make Good Money!

If folk call you "BRIGHT" you are bound to turn "MONEY MAKING MADE EASY" into many times the 2/6 it costs you!
CIRCUIT BALANCING

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 diaphragm the best method of energising ideas should like to see there is room for a period of more than a fortnight after the receipt of a complaint from three neighbours, prosecution may take place.

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

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New Season’s Television Sets

Morecambe Again

Griff Colliery Band

Water Polo Match

ROUND the WORLD of WIRELESS

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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.

Popular Set in Norway

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New Season’s Television Sets

Morecambe Again

Griff Colliery Band

Water Polo Match

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-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 Follies” 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 form 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.
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 applications 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 Hamersmith. A 100 w. amplifying system will be employed with provision for microphone and gramophone amplification. This installation is a model of its kind, as 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, Acoustic, 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 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 NICHELLS, 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 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, furn, knitwear, and confectionery.

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 a variety programme called “Variety in Miniature,” on September 12th. The artists will be Evans and Monelle, “In original songs of the piano”; Regents in the Regional; Stan and Jan, “Two Devonshire Rustics”;

Eric Warr will conduct the B.B.C. Midland Orchestra on September 13th, in a programme which will include Four Ballet airs, by Moszkowski.

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 Tordor condenser factory, when a huge pressing machine crashed through one of the floors causing much damage to several departments.

Musical Comedy Hour
MARIAN BROWNE (soprano) and Haydn Adams (tenor) will take part in a Musical Comedy Hour on September 14th, in the Welsh Regional programme. Selections will be played from “The Little Domino,” “Vernique,” and “Yonne.”

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 more gradual control 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, G.C. Newnes, Ltd., Tower House, Southamton Street, Strand, W.C.2. All envelopes must be marked Problem No. 312. Saturday following at about midday.

Solution to Problem 311
The inductance value of the two coils which Jackson used were not matched and thus the two-valve con- denser would not tune to the same frequency at different parts of the dial. The following three readers successfully solved Problem No. 311. They have each been des- tinely forwarded to them: E. Sulman, 134, Whitton Road, Beddington; W. B. Young, 13, Beech Hill Avenue, Mansfield; Nota: G. Greenfield, 10 T. W. Holmes, 3, Grinwis Avenue, Manchester, 36.
F.G. 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 across the accumulator circuit, charging 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 to 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 buffer 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 preferable 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 indicating may be cut from a daily paper and inserted in the small slots above the buttons, or 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 preset 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 sprays or fumes on the thin metal plates which form the basis of the pre-set condensers. If these facts are borne in mind, the reliability of the automatic tuning arrangement will be just as great as ordinary tuning systems.

Control Knob Standardisation
Complaints are made from time to time regarding the odd appearance which is obtained when different components are employed—manufacturers all employing a different pattern for the control knobs. It should be remembered, therefore, that

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

One semi-circular dial (Polar).
One R.P.14 coil (Valvey).
Two tuning condensers, 2-gang, .0003 bar type (Polar).
One reception condenser, .0003 mfd. Compox (Polar).
One push-button switch, S.221, with knobs and escutcheon (Bulgin).
Ten pre-set condensers.
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 output condenser L.F., type 451, .01 mfd. (T.C.C.).
One tone condenser, type 451, .04 mfd. (T.C.C.).
One H.F.C. H.F.9 (Bulgin).
Three variable resistors—two 2000 ohms, one 50,000 ohms (T.C.C.).
Two grid leaks, 5 meg. 1 watt (Erle).
Two screen resistances—one 30,000, one 20,000 1 watt (Erle).
One anode resistor, 80,000 1 watt (Erle). One anode resistor, 10,000 1 watt (Erle).
One on-off switch, S.112 (Bulgin).
Two terminal strips—A.1, A.1, and E.1, L.S. (Bulgin).
One panel, 11in. x 9in. alu. (Peto-Scott).
One chassis, 11in. x 11in. x 5in. 34al. (Peto-Scott).
One bias pot., 50,000 without switch (Erle).
Fuse, 100 mA (Microfuse).
One fuseholder (Mirofuse).
One valve, 210VPT, 7-pin metalised (Cossor).
One valve, 210 SPT, 7-pin metalised (Cossor).
One valve, O.T.220, 5-pin (Cossor).
One anode pot., 50,000 with switch (Erie).
One Stentorian loudspeaker (W.B.).

The Push-button Unit is obtainable in various colour schemes for this modern receiver.
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 intervalue 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 are dozens of methods of providing tone control, although most of them operate simply by supressing 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 any, 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 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 condenser. For present requirements a choke fulfils this requirement. The reason is that 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.

High-Low Control
The simple circuit given in Fig. 1 represents the type of "two-way" 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 the condenser and 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 cheek and form a complete winding spool. Through the centre of this spool is passed 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 two cardboard discs should be cut 1½ 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 cheeks into place. Allow the glue to set completely, and then make a couple of small holes in one of the cheeks.

(Continued on page 665)
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 trifle 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.

Glancing now at the pictorial representation of the completed chassis, Fig. 2, and remembering that the overall measurements of this small receiver are only 6½in. by 6in., by 1½in., 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 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 bandwidth 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 3½in., 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 end of the it will be seen goes directly to the fixed vanes of C4, whilst the other is made straight to the anode socket of the valve holder to the grid and anode sides being adjacent.

The valve holders 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 assuring considerably to attain midget component layout.

The aerial terminal comprises an insulat-
H.T. Voltage

The H.T. voltages are optional, provided that due adjustment is made to the bias of the output valve, but the most favourable tappings would be 106-v. for the detector, and 192 for the output valve, with 3-v. bias.

Adjustment of the condenser coupling CI should be made when combating dead spots due to the resonance of the aerial, and if desired, a doubler or di-pole aerial could 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 constructive work will have to be

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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 obliquity 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...
I myself working on 6.4 metres. And for a note to be made of it. Home he 'phoned and reported this at this occurrence that when he got started without any trouble, as though happening a Riley car passed by and a stopped on its own.'

And could not be started again; 40 yards towards Clevedon, when the car about, and he and his passenger friend was passing in a small car 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? 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. While this was one

Now comes the real hot number, me.

...on its own account. This seems quite possible to me. What is your idea, please? Now comes the real hot number, me. A bad thunderstorm, same road but halfway between Bristol and Clevedon.

"My friend was driving a Morris 'to' 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: 'I 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

Some Problems

I Invite my readers over the appended letter from H. V. B. (Wrexall):

"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, me. A bad thunderstorm, same road but halfway between Bristol and Clevedon.

"My friend was driving a Morris 'to' 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: 'I 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 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.
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 highest minimum. Readers will remember the very large array of knobs which characterised the first commercial sets only a few 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 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 picture pulses, the original contrast control carried out the former function, but had no effect on the synchronising signals at all. The sound control together was 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 industry connected 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 made to television 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 sub-divided 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 using a black and white picture, instead of the more familiar green colour. The pictures shown in the States are shown on three Londey standard tubes with big screen television apparatus definitely show black and white images, and this presents a marked advance in modern electronic methods of television.

Fig. 1.—Here is a Baird “Two Control” television set.
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 radiogram suitably for hotels and clubs, and a very wide group of picture sizes could be seen. These ranged from the large screens 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 30ins., and in the smallest it is 4ins. by 3ins. The cheapest

**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-screens which are designed on this principle.

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 brilliance or contrast and sound volume. The new Pilot receiver 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 £29 9s. In the same class the Pye Model 819 is a lower-priced model, but does not include the gramophone section and gives a picture 4in. by 3in. The price of this is £23 1s.

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 3in. (Invicta).
- 4in. by 3in. (Pye).
- 4in. by 4in. (Marconiphone and H.M.V.).
- 5in. by 4in. (Cossor).
- 5in. by 6in. (H.M.V.).
- 6in. by 6in. (Marconiphone).
- 7in. by 5in. (Kolster-Brandes).
- 7in. by 5in. (Invicta, Pye).
- 7in. by 6in. (G.E.C.).
- 7in. by 5in. (H.M.V., Marconiphone, Pilot, R.G.D., Tannoy and Vidor).
- 9in. by 7in. (Machall).
- 10in. by 8in. (Ultra).

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

**Cossor Table Receiver Model 54, with 5in. by 4in. picture.**

**In the small table models this Marconiphone receiver shows the small picture measuring 4in. by 4in.**
Micro-adjustment for U.S.W. Coils

A handy adjustable condenser attachment, as shown in the accompanying sketch, and now I am able to transfer the condenser 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 adjustable bypass 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 discarded curtain runner. The end contact strips, to which it is soldered, are also of the same gauge aluminium, and finally a refinement was obtained by fitting each end with 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. Grieves (Esher, Surrey).

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 height of 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 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 fitting illustrated, to ensure a uniformity of drillings. One piece of heavy brass plate about 1 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. Róbert (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 down through the wiping contacts of the moving vanes of the gang condenser, and taken down through the internal lead. The sleeving is earthed by soldering a bare wire round it at the points indicated and connecting the wire to earth.

WIRING DIAGRAM OF THE "ADMIRAL"

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 when 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.

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

One coil unit—B.P.I.16 (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—3.100 (Belgium).
One aerial series condenser, type 451 (T.C.C.).
One tuning condenser—Compact 4502 (Polar). One volume control, 50,000 type B (Duhiler). Fixed resistances:
Three type F. 30,000 1 watt, three type F. 20,000 1 watt, two type F. 1,000 1 watt, one type F. 2,000 1 watt, one type F. 3,000 1 watt, two type F. 1 meg. 1 watt, one type F. 20,000 1 watt, two type F. 1,000 1 watt, one type F. 5,000 1 watt (Duhiler). Fixed condensers:
One 2.0 mfd. type T.C.C. 50; one 1.0 mfd. type 341; one 0.45 mfd. type 341; two 0.45 mfd. type 341; one 0.005 mfd. type 451; one 0.002 mfd. type 451; one 0.001 mfd. type 451 (T.C.C.). Tone-control potentiometer, 25,000 type B (Duhiler).
Chassis—14in. x 10in. x 1in. Alu. (Peto-Scott).
Panel—14in. x 16in. Alu. (Peto-Scott).
Four valveholders—Two Varley-210, one H.L.2, one Penn220 (Mardia).
One micro-dial (Microlux).
Fuseholder (Microlux).
One 120-volt H.T. batteries and one 2-volt 40 A.H. accumulator (Blafox).
One Stentorian loudspeaker (W.B.).

September 10th, 1938
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 certain 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.," "Maxwell's lines per sq. cm.," or "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 being sensitive in practice. The "dynamometer principle." 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.

"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 reduced.

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 utilized to boost the lower frequencies.
The Importance of Correct Adjustment in Various Modern Radio Circuits, and the Method of Carrying Out Balance

By W. J. DELANEY

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 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. 1. 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, 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 0.00015 mfd. short-wave tuning condenser and mount this on a small bracket connected to earth. To the fixed vane 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.

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 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 valve 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.
CIRCUIT BALANCING

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 connected to operate in place of one, and the incoming signal is split into two, each half of which is fed to a separate valve. Thus the output from the two valves is then combined to deliver a single signal to the speaker. Obviously, here too, the 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 distortion. A resistance-capacitor or parallel push-pull system fulfills 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. 6 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 transform push-pull stage an approximating 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 enables this point to be satisfied. Similarly, here the two halves should be accurate in balance in modern apparatus and

THE MODERN LOUDSPEAKER

(Continued from previous page)

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

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Leaves from a Short-wave Log

The News Tower Broadcast

ULSDP<br>By E. C. WIGGINS AND W2XAF, <br>Shweetnady (N.Y.), U.S.A., on <br>19.56 m. (15.33 mc/s) and 31.48 m. (9.53 mc/s) respectively, transmit every evening in English, for English-speaking listeners throughout the world.

All-India Broadcasts

THF schedule of the British India transmissions has now been fixed as follows:

VU2B, Bombay, 31.41 m. (9.55 mc/s), on 60.48 m. (4.96 mc/s) from G.M.T. 12.00-17.00; VUC2, Cuttack, 31.48 m. (9.53 mc/s), G.M.T. 07.00-08.06; VUC5, 61.48 m. (4.88 mc/s), G.M.F. 11.36-17.06; VUD2, Calcutta, 31.33 m. (9.575 mc/s) G.M.T. 01.00-03.30; 06.30-08.30; on VUD6, 60.98 m. (4.92 mc/s), G.M.T. 00.00-09.00; VUM2, 60.48 m. (4.96 mc/s), G.M.T. 12.00-17.00.

Submarine Transmissions

FOR the first time in radio history four submarine engineers have succeeded in broadcasting speech from a submarine immersed off the Barbelt 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 80-kilowatt transmitters, the following additional frequencies have been officially allotted to the Rome (Ponto Smirneides) stations: 13.85 m. (21.56 mc/s), 13.90 m. (21.52 mc/s), 13.91 m. (21.66 mc/s), 16.81 m. (17.85 mc/s), 16.83 m. (17.83 mc/s), 16.58 m. (17.82 mc/s), 19.54 m. (15.36 mc/s), 19.75 m. (15.10 mc/s), 19.87 m. (15.11 mc/s), 25.21 m. (11.9 mc/s), 50.96 m. (9.69 mc/s), 31.02 m. (9.67 mc/s), 41.38 m. (7.36 mc/s), 41.53 m. (7.22 mc/s), and 48.47 m. (6.19 mc/s).

Albania on Short Waves

FURTHER information is now available regarding the installation of a 3-kilowatt short-wave transmitter in the vicinity of the capital (Tirana); tests will be made on the following additional frequencies: 10.067 mc/s) or on an adjoining wavelength, thus providing a possible way to pick up broadcasts from an anti-Hitler transmitter which operates every Sunday evening from midnight to 02.00, and which is operated by the Albanian Fascists.

Moscow Calls the World

RKL, Moscow (U.S.S.R.), on 19.89 m. (14.98 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 02.00-03.30. 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 popular, it is rated as 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. Eudardo P. Hernandez, Apartado Postal, 257, San José. Next in importance are TIPG, on 46.8 m. (6.41 mc/s), La Fortaleza de Dantzig, and TIGCH, on 31.54 m. (9.58 mc/s), both working on a power of 10 and 15 kilowatts. The latter station sends reports to Radiodifusión La Reina del Aire, TIGCH, Alma Tica, San José. Finally, TIRC, a 900-watt transmitter operated by the Acción Católica, 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 08.00-11.00, and again from 06.00-11.00. The standard time of Costa Rica is G.M.T. less six hours.

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 Australian Wireless (Australasia), Ltd., will mature in the near future. So far, VPD2 has only been working on 31.45 m. (9.65 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, 50.94 m. (9.69 mc/s), 29.23 m. (11.85 mc/s), and 19.79 m. (15.16 mc/s).

Another German Mystery Station

IN accordance with the still undiscovered Deutscher Freiheitsender (German Liberty station) working nightly on 29.8 m. (10.076 mc/s) or on an adjoining wavelength, which jamming occurs during the hours when picking up broadcasts from an anti-Hitler transmitter which operates every Sunday evening from midnight to 02.00 and which is now picking up broadcasts from an anti-Hitler transmitter which operates every Sunday evening from midnight to 02.00 and which is now picking up broadcasts from an anti-Hitler transmitter which operates every Sunday evening from midnight to 02.00, the police have failed to discover the location of the transmitter, and it is thought that it may be a portable or even a mobile transmitter or even installed on a ship in the Baltic. The call is: Hier der Freiheitsender Dusky (This is the Free liber station), but it is fully realised that the information thus disclosed may be misleading.
The Battle of the Buttons

RADIO LYMPIA 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 attract attention, and publicize the merits of their different systems.

Probably one of the most ingenious exhibits was that shown by the Philips firm — in which the way, they 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 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.

NEW MULLARD VALVES

NOTWITHSTANDING all the improvements in receiver design, the appearance 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 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 resistance, they will play an ever increasing part in the growth of this newest medium of home entertainment.

With the wider development of television, the valve's responsibility is correspondingly greater and the need for increased valve efficiency insistent. The new Mullard E series has been designed with the stringent requirements of television in mind, and 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 Pentodes 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 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.

The 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 tight 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 by the manufacturers to double the entertainment value of any programme.
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.

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

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.

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 Ediswan Stand, in which the Television demonstration room was all enclosed and arranged in a very novel manner.
Rothemel's Sales Manager Resigns

Mr. E. F. HEAVER has resigned his position as sales manager of R. A. Rothemel, 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. H. S. Thompson, M.B.E. (at present Postmaster-Surveyor, Manchester) to be Regional Director, North-Western Region; Mr. J. Sweeney (at present Assistant Surveyor, Manchester) 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.

Rothemel's Sales Manager Resigns

Mr. Eric K. Kenny has resigned as Managing Director but will continue as Chairman of the Company. Mr. Eric K. Kenny has had a very varied career in the Post Office, having 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 Postmaster’s Department, has had ten years’ experience as an Assistant Surveyor, and was for some time a member of the Headquarters Postal Survey Department. 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 Director 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. This is due to the need for the new Reserve and its proposed functions, Sir Kingsley, in a statement, remarked that: "The work of the Civilian 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 already serving in the Royal Air Force to man the Civilian Wireless Reserve, and particularly to those who hold Post Office wireless transmitting licences. We believe 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 subdivision 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 Post Office Wireless School, Crawley.

"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 emergency equipment will also be made.

"In addition to home training, occasional attendance at Royal Air Force stations and reserve centre training 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 for Air, Air Ministry, C.W.R.J., 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 enlist 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 or the Police Reserve when called on to do so.

When required to attend a Royal Air Force station or centre, an allowance of 5d. 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.
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).

May I also take this opportunity of expressing my appreciation of our old friend Thermion, and his witty bunter, 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 SVP4TK I received a card from VP4TK, who wishes to correspond with a listener interested in S.W. who plays long waves. VP4TK's address is: Lenard Harbin, Chaguanas, Trinidad, B.W.I.—W. Walker (Birmingham).

Back Number Wanted

SIR,—I am trying to obtain a back number 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.]

To Joggins, his neighbors.—White.

"Here, old mule, take this tin of FLUXITE. I don't think it's any good yet. You've used that tin on your set—It's on the right spot and one the right quantity on it. This makes a much stronger job when single—With FLUXITE—out IMPORTANT.

THE FLUXITE GUN

is always ready to put Fluxite on the soldering job instantly. A little pressure places the flux evenly on the right spot and one charging lasts for ages.

ALL MECHANICS WILL HAVE

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IT SIMPLIFIES ALL SOLDERING

FLUXITE LTD. (Dept. W.P.) DRAGON WORKS, BERTONDEY STREET, B.B.I.

The course extends normally over a period of two years and includes theory, practical service work and calculation, and practises for the City and Guilds of London Institute examination in Radio Engineering.

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

Subscriptions and timetable from the Director of Education.

When writing to Advertisers please mention "Practical and Amateur Wireless"

PRACTICAL WIRELESS SERVICE MANUAL

BY F. J. CANN.

From all individuals, 5/- net. or by post 5/- direct from the Publishers, GEORGE NANCE, LTD. (Book Dept.), Tower House, Southampton Street, London, W.C.2.
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 the 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 4 in. long. Push the bundle through the bobbin, making it a tight fit and midway between the top 6 and bottom 7 and by a further turn.

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 deflection coils or to a resistance in series with the coils.

LATEST PATENT NEWS

Group Abstractions 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 £1 per Group Volume or in bound volumes price 2s. each.

DISTRIBUTING MUSIC, ETC.—Sparrowe, J. W., No. 483792. Buffer valves for coupling an aerial, signal generator or amplifier to a number of lines, are fed through a filter formed by inductances L8, L9, L10 and the input capacities 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 elements are given.

LOUDSPEAKERS.—Murphy Radio, Ltd., and Brayshaw, G. S., No. 48745. A cabinet for a loudspeaker has a sheet of sound-absorbing 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 8 is located between the front and rear of the cabinet and is supplemented by a 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 nodes 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. F. S. Lewin and Caymer. Synchronizing signals are derived by calculating the values of the filter element without specifying the names of the applicants. These particulars of New Patents of interest to readers have been selected from the Official Journal of the Patent Office and published by permission of the Controller of H.M. Stationery Office and are a supplement—Latest Patent Applications.

NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of the Patent Office and published by permission of the Controller of H.M. Stationery Office and are a supplement—Latest Patent Applications.

22897.—Ferranti, Ltd., and Taylor, M. K.—Television, etc., systems. August 3.

22908.—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.


Specifications Published.

48846.—Kramolin, L. L.—Frequency changers for heterodyne receivers and modulators. (Addition to 409756.)


48894.—Radioakt.—Ges. D. S. Loewe.—Television tube. (Divided out of 31821/36.)

48896.—Telefunken Ges. Fur Drahtlos Telegraphie.—Thermionic valves and thermionic valve circuit arrangements for use on short waves. (Divided out of 48894.)

48808.—Radioakt.—Ges. D. S. Loewe. Televisieontvangers—Television transmission tubes. (Addition to 48894.)

48894.—Radioakt.—Ges. D. S. Loewe.—Grid control of cathode tubes.

48843.—Naamloze Vennootschap Philips' Gloeilampenfabrieken,—Television receivers.

Printed copies of the full Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.
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 for this consideration that I should like some suggestions regarding an easily changed all-wave unit.”—H. J. Y. (Bedford).

UN L. E. (Bedminster).

The equivalents of the valves in question are PM.12A, PM.12L and PM.202.

Hand-capacity Effects

“I have a short-wave converter and despite excellent metal parts and workmanship I am troubled with rather bad hand-capacity effects below 20 metres. The set is slightly off 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).

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 articles appearing in our pages. We regret that we cannot, for obvious reasons—

1. Supply circuit diagrams of complete receivers.

2. Suggest alterations or modifications of receivers described in our pages.

3. Suggest alterations or modifications to commercial receivers.

4. Answer general inquiries.

5. Grant interviews to querists.

Requests for Blueprints must not be enclosed with your queries. A stamped addressed envelope must be enclosed for the reply.

Inquiries must be kept as brief as possible, and should clearly state the name and address of the sender.

We regret that we cannot, for obvious reasons—

1. Supply circuit diagrams of complete receivers of commercial receivers.

2. Suggest alterations or modifications to commercial receivers.

3. Suggest alterations or modifications of receivers described in our pages.

4. Answer general inquiries.

5. Grant interviews to querists.

The coupon on page iii of cover mast can also supply various types of wire bolts and nuts which may be of use to you in this connection.

The coupon on page iii of cover mast may be of use to you in the construction of receivers described in our pages. We regret that we cannot, for obvious reasons—

1. Supply circuit diagrams of complete receivers.

2. Suggest alterations or modifications of receivers described in our pages.

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4. Answer general inquiries.

5. Grant interviews to querists.
IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, September 7th.—The St. Leger: A commentary from Town Moor Racecourse, Doncaster.
Thursday, September 8th.—George Edwardes, part 2: The Gurnor of Dally, 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 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 Rhyd Golf Club.

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 camera with his "Horchestra," but not with the Bachelor Party, which will be present in full strength with Norman Long, Russell and Marconi, The Three Musketeers, Jack Wynne, Sgt. Jerome and, need one add, Stanelli himself.

Visits 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 R.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.

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 (191.1 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 (307.7 m.)
Wednesday, September 7th.—Late 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.

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

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F. J. Camm's A.C. Four-Superhet 1.5.36 PW45
F. J. Camm's A.C. Four-Superhet (Pen, D) 1.12.34 PW51
L. B. D. L. C. Short-wave Converter (D, RC, Trans) 22.9.34
PW34 A.W. Short-wave World-Beater (D, Tr, RC) 22.9.34
Class B Quadradynne (B, D, LF, D, Trans) 28.4.35 PW63
Class B (2 SG, D, LF) 20.9.35 PW74

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Midget Short-wave Three (D, Pen) 21.3.36 PW95
Three-valvers, Bluesprints, each. 24.2.34 PW107

Three-valve: Blueprints, is. each.

Simple W. Two-valver 19.3.33 PW118
Midget Short-wave Three (D, Pen) 21.3.36 PW128

Two-valve:

1937 Crystal Receiver 5.6.37 PW135

Mains Operated.

"Vitesse" Crystal Set 19.11.35 PW142

L. B. D. L. C. Short-wave Converter (D, RC, Trans) 22.9.34
PW34 A.W. Short-wave World-Beater (D, Tr, RC) 22.9.34
Class B Quadradynne (B, D, LF, D, Trans) 28.4.35 PW63
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Heptode Super Three A.C. 10.9.33 WM200

Four-valve: Blueprints, 1s. eaeh.

Philips Short-wave Four (D, Pen) 21.3.36 WM200

A.C. Superhet (D, Pen) 29.8.38 WM299

Five-valve: Blueprints, 1s. each.

Mains Operated.

A.W. Short-wave Converter (D, RC, Trans) 22.9.34
PW34 A.W. Short-wave World-Beater (D, Tr, RC) 22.9.34
Class B Quadradynne (B, D, LF, D, Trans) 28.4.35 PW63
Class B (2 SG, D, LF) 20.9.35 PW74

Executive Short-wave Four (SG, D, Trans) 29.8.38

These Blueprints are drawn full size.

Copies of appropriate issues containing descriptions of these sets can be sent on receipt of the following fees, which are additional to the cost of the Blueprints.

A copy before the Blueprint Number indicates that the Blueprint is out of print.

A.W. in the index indicates a Radio Magazine issue, and A.W. in the index indicates a Practical and Amateur Wireless Blueprints issue.

Issues of Practical Wireless - 4d. Post Paid


The index located in the last issue provides the necessary information to Blueprints, A.W. in each issue.

F. J. Camm's " The Auto Straight Four " (HF Pen, D, Trans). 22.9.34

Band Eternally a postal order to cover the cost of the Blueprints and the required issue of the appropriate magazine is necessary.

George Newnes, Ltd., Tower House, Southampton Street, Strand, N.C.2.
MISCELLANEOUS ADVERTISEMENTS
Advertisents are accepted for these notices at the standard rate, 6d per word. Words in black face upon capitals are charged double the standard rate. May be subject to a minimum charge $2.50 per paragraph. Display lines are charged at $2.50 per inch. Enquiries should be addressed to the Secretary, "Practical and Amateur Wireless."}

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Supplements, Clearances, or Secondhand.

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CONVERSION UNIT for operating D.C. Receivers or from AC. Mains Improved type, 120 watt output and 20,000 watt input. Send for our comprehensive list of speakers, resistances and other components.

WARD, resistances and other components. Send for our comprehensive list of speakers, resistances and other components.

NEW ARRIVAL CATALOGUE.-showcases of New Radio Equipment and Accessories. A typical range of speaker components is always ready for immediate despatch. The first goods at the right prices.

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A complete range of Hi Fidelity P.A. Amplifiers for A.C. or D.C. mains operation. With the exception of the 30- and 60-watt systems, all the Premier Amplifiers are supplied in Birch Cracked Steel cases; the 126, 250 and 500 watt cases, incorporating the "Matchmaker" output transformer, enabling any single or combination of speakers to be driven without any fear of overloading. Various input levels are provided. The built-in Pre-Amplifiers ensure that the gain is sufficient for any low level crystal or velocity microphone. A twin crystal of the 6L5, 16-18-20 and 20-60-watt amplifiers is over 100 decibels. Tone controls are also incorporated.

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15-watt A.C/D.C. 6 60 0
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ADVERTISEMENT INDEX

PRACTICAL AND AMATEUR WIRELESS

FREE ADVISORY COUNCIL BONUS

This coupon is available until September 17th, 1938, and must accompany all Queries and Wrinkles.
Special Contents include:

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

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THE AERIAL AND INTERFERENCE

Practical and Amateur Wireless

Edited by F.J. Camm

A GEORGE NEWNES Publication

Vol. 13, No. 133
September 17th, 1938

AND PRACTICAL TELEVISION

The CIVILIAN WIRELESS RESERVE

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Just Published!

EVERY PRACTICAL WIRELESS SERVICE MAN SHOULD HAVE IT.

PRACTICAL WIRELESS SERVICE MANUAL

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"

With this sensitive instrument you can make literally thousands of tests. You can find what has gone wrong with your radio, test electric train circuits, transformers, bells, motors and carry out many interesting experiments as well.

RANGES
- 0.5 volts
- 0.20 volts
- 0.100 volts
- 0.400 volts
- 0.10 mA
- 0.50 mA
- 0.250 mA

Resist/valve test.
Plug-in test for valves.

Complete in velvet-lined case with testing leads.

Contents of this week's number include:
REGINALD FOORT AT HOME
WE GOT OUR MAN
A Dramatic Crime Article
DON CRISTOBAL
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CANADA'S SADDLE-BAG PREACHERS
DON JUAN IN THE BOSS'S CHAIR

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THE NEW
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Improving Your Loudspeaker

The Organ Breaks Down

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

Push-button Tuning

Street-corner Interviews

Problems of Interference

Confiscated Set

Cabinet Design

ON OTHER PAGES

Page
Civilian Wireless Reserve .
The Modern Loudspeaker .
Short-wave Section .
On Your Wavelength .
Practical Television .
How Valves are Made .
Readers' Wrinkles .
New Album Section .
The Axial and Interference .
Trade Notes .
Readers' Letters .
Club Reports .
Queries and Enquiries .
Blueprint Service .

World of WIRELESS

Colchester Radio Show

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 made 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.

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 a known technically as a "cypher." One of the pedal notes remained open towards the end of a time and although the mike was switched off, before it became fully ineffective the wailing of the note could be heard fading away.

The cost of this attempt to organize a staff of B.B.C. lecturers on television to undertake general propaganda and co-operate with dealers who are featuring television receivers.

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.

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New Television Post

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.
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 1 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.

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

A view of one side of the main hall at Radiolympia, showing the Cossor stand in the foreground.

A practical 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 stations on the air until the end of the year.

Australian Short-wave Transmission

Schedules (October, 1938)

K2ME (Sydney), 31.5 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.

Midland Variety

On September 16th, Arthur Marshall, who is a schoolmaster, and Hughes and Lever, who were originally Northamptonshire articles, 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 payable article is promised to listeners who like to hear personalities, gossip and variety, by the news that Robin Russell, B.B.C.'s variety assistant, Glasgow, is to write the first of a new series to be called "Radio Outlook," on September 21st. He will start off with a piece on the use of the telephone, dramatised on "March of Time." 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 allotted 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, Robin Tonkin, and Billy Thorburn and his Music, with Eddie Goery 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 mail 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 R.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 Envelope No. 313, 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. He obtained more gradual variations in tone, giving three readers successfully solved Problem No. 311, and three books have accordingly been forwarded to them.

E. B. Lord, 3, Ingenuity, Harold Park, Romford, Essex; W. Sutt, 4, West都很, 8, West End Road, Rayleigh, Essex; A. H. Cook, 9, 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 owners of wireless sets was formed, and 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 unknown 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 methods of wireless were discovered and record distances were covered with infinitesimal powers. But the amateur had no means 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.

The result 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 sound technical knowledge among amateurs published in the Press 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 made. 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 (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 any doubt of nationality or descent, the burden of proof will rest upon the candidate. Ineligibility 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 Royal Air Force Volunteer Reserve; (b) To undertake the prescribed training; (c) To undertake the prescribed training.

Discharge from the Reserve.—Members may be discharged from the Reserve at any time on the following grounds:

(a) Medical unfitness.

(b) Un satisfactory 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 will be arranged and mobile 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 in 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 uneasy 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 obvious fault in home reproduction is “coloration” of response by surroundings. Loudspeakers are hung on walls, inserted in “finite baffles” of jin, 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 ½in. thick. A baffle that also 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 warning 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.

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 ear, on walls, ceiling, 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 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.

1. The wattage in the complete circuit is given by $E^2/R_a$, which in this case equals $100^2/10000 = 1$ watt.
2. The wattage in the loudspeaker circuit is half this, since load and source impedances are equal, and is therefore .5 watt.
3. If the impedance $Z_a$ is mismatched, say, 100 per cent, i.e., if a second speaker were connected across the first, the wattage would then be given by $10000 \cdot 5000 + 5000 = 1.33$ watts. Of this new value, only .44 watt 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 failing 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 kneading across the gap, it will be heard. 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 coil gap later. Repair any tears to the cone, preferably using a rubber solution rather than a hard-setting adhesive. If any tears of the speech coil are showing up, a touch of insulating varnish will guard against corona, especially in battery receivers.
A ONE-VALVE S.W. PRE-R.F. AMPLIFIER

Details of Construction of a Useful Unit for the Experimenter are Given in this Article

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 in. by 3/1 in. will be required and, prior to drilling, the

these being 1/1 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 jin. drill, or as large a drill as possible, filing to the required diameter with a round file; the same operation applies for the h.t.-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 jin. 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 1/16 in. in thickness, and the length reduced by filing to jin.

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 runners, which are 1/1 in. deep, should be bent carefully in a vice after scribing the guide lines.

The panel can now be cut to 4/1 in. by 3/1 in. for the same gauge aluminium, the next consideration being the marking out for the drillings. This marking should be done preferably with a fine-pointed scrib-ing 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 jin. 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, 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...
SHORT-WAVE SECTION
(Continued from previous page)

for those connections going through the chassis from the switch and the coil-holder, the insulating sleeving will suffice. A final check should be made of the wiring, and if desired, a light dab of varnish can be given to each joint to protect against corrosion.

The H.T. positive (red) plug should be plugged into the 120-v. tapping on the battery, and the screen plug the 60-v. tapping for the best results, but adjustment can be made as desired, providing the Hivac valve chart is followed regarding the appropriate screen variation.

The two sockets in the slot constitute the aerial and earth connections to the receiver, while the remaining socket is for a plug and spade lead for connection to the L.T.—terminal on the accumulator. The insulating pillar terminal on the rear runner is for the aerial, and the other terminal, as mentioned, for the earth. It must be remembered that tuning is critical, and as no hand-set condenser is fitted, the reader will have to experiment with the new combined tuning, but little difficulty should be experienced after some practice.

LEAVES FROM A SHORT-WAVE LOG

Berne Also Goes Ahead

In addition to the three wavelengths on which tests are now being carried out by the Swiss Telegraphic Administration (Berne), namely, 19.6 m. (15,905 mc/s), 25.28 m. (11,960 mc/s), and 31.48 m. (9,535 mc/s), the following channels will also be tried out in the immediate future: 11.7 m. (25.64 mc/s), 13.94 m. (21.52 mc/s), 19.87 m. (17,784 mc/s), and 49.55 m. (6,055 mc/s).

Another Call from Manila

KZIB is the call-sign of a 1-kilowatt station installed by J. Beck, Inc., at Manila (Philippines); the station has been heard broadcasting on 31.98 m. (9.5 mc/s). The distance from London is approximately 6,800 m.

Two More Norwegian Short-wavers

The Norwegian Broadcasting of Oslo (Norway) has begun the construction of another 25-kilowatt transmitter for the L.T.—and Earth

It is important to remember that as designed the unit is only suitable for use with a receiver in which the L.T.— and earth connections are combined. On some receivers it will be found that the L.T. positive lead is joined to earth, and in that case the terminal B on the unit should be joined to the earth terminal and the L.T. negative lead in the unit should not be joined to the common earth line. The two filament leads (positive and negative) may then be joined to the L.T. terminals on the receiver and a risk of short-circuits will not occur.

Jeløy short-wave network. The channels and call-signs to be used are: LLA, 11.38 m. (25.9 mc/s), and LLE, 11.39 m. (20.35 mc/s). For the Oslo and Jeløy stations the following call-signs and frequencies have been adopted, some of which are already in use: LKZ, 13.95 m. (21.5 mc/s), LKY, 13.98 m. (21.46 mc/s), LKX, 16.87 m. (17,785 mc/s), LKZ, 19.78 m. (15.17 mc/s), LKQ, 25.36 m. (11.85 mc/s), LKQ, 25.56 m. (11.73 mc/s), LKH, 30.68 m. (8.77 mc/s), LKE, 31.54 m. (9,575 mc/s), LKL, 41.48 m. (9.53 mc/s), LKL, 42,92 m. (6.99 mc/s), and LKJ, 48.94 m. (6.13 mc/s).

News from Rangoon

The Burma P. and T. Department, Rangoon, advises that it is now working the new 1.2 kilowatt transmitter, XYZ, on 49.91 m. (6.0072 mc/s). The station is situated at Mingalodon. Broadcasts are given daily between G.M.T. 13.00-16.40, an English news bulletin being included towards G.M.T. 15.15. The call is: Radio Burma. Transmission closes down with the National Anthem (God Save the King).
ON YOUR WAVELENGTH

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.”

Push-button Tuning—a Reader’s View

M R. G. H. B., of Reading, submits the following viewpoints on push-button tuning:

“You may 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 bight 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 Felicite 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
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 are the ordinary leaky-grid, power grid, anode-bend and diode detectors, 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, while the latter has much smaller but a power grid 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 resistance, and the speaker should 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

* 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 to pass is a checker-up of noisy 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 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 by no means over."
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 acquire modern receivers. They cannot afford an additional complete receiver, and thus a simple add-on unit, providing television pictures, with the sound made 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 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.
Howard 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 craftsmanship 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 ones could 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 pinching - 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.

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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 several outdoor aerials. It is suitable for use on either 5, 10 or 20 metres for both reception and transmission.

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 5ft. 3 in. 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 suspected 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 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).

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The owner-driver’s Journal which tells you how to repair, overhaul, and obtain the best performance from your car.

2d.—Every Friday.

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The leading weekly for every Cyclist, Clubman, Utility Cyclist, or Tourist.

John”The Cyclist” Road Club and also take advantage of the FREE insurance offered.

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SPECIAL NOTICE

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

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 £1.0.0 for the best wrinkles 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, Southwark 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 Querries with your wrinkles.

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The leading weekly for every Cyclist, Clubman, Utility Cyclist, or Tourist.

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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 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 Plymouth 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 switchboard from which the incoming power supply to the station is distributed, and the 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 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 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 unsuitable 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.

General view of the new Aberdeen station and mast aerial.

In the New Broadcast Transmitters Station near Aberdeen which was put into Service Last Week.

Listeners who may require advice on reception are invited to write to the Controller (Engineering), Broadcasting House, London, W.I. 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 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 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 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 30ft 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)
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 Burlemque: Orchestral programme.
Friday, September 16th.—Musical and Variety programme.
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.

WELSH (373.1 m.)
Wednesday, September 14th.—Musical Comedy Hour: orchestral and vocal programme.

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.

QUALIFY FOR THE CIVILIAN RADIO RESERVE with this wonderful new book WIRELESS TRANSMISSION FOR AMATEURS

An accurate meter is vital in testing. The AvoMinor is a precision instrument which provides unique facilities for tracing faults. It is a single meter, it has 13 different ranges, is accurate, voltages and resistance with accuracy.

13 Meters in ONE

- Curves: 0-01 to 0-30
- Voltages: 0-02 volts; 0-20 volts; 0-200 volts; 0-120 volts; 0-300 volts
- Resistance: 0-1000 ohms; 0-500 ohms; 0-100 ohms

In use with instruction book, leads, test clips, ground and earth clips 45/-

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THE AERIAL AND INTERFERENCE

(Continued from page 12)

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 erected from a single -transformer at the aerial placed in that garden, and all of the houses may be found that in some localities several under certain conditions, and therefore it one receiver to be fed from a single aerial and matched feeder is employed, and the improvement. The same type of screened all obtain the advantage of the aerial the end house of a row is well clear of it, only be obtained when every source of pick-up of interference, but it must be remembered that complete freedom will not be necessary to complete screening to enclose the receiver in a completely earthed metal box. Quite a lot of inter-ference may be picked up on the wiring of a modern receiver, although a metal chassis is employed. It should be remembered that on the bottom of the chassis is open, and thus, to complete the screening it may only be necessary 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 matter of free-foolers are to erect the aerial out of the field of interference, to avoid any pick-up of the interfering part of the complete installation, and to ensure that every joint from aerial to earth is rigid and properly made so that the wires will not be introduced when the aerial system or any associated equipment moves under the action of wind or anything else.

BOOK RECEIVED


Here is an interesting volume which deals in a popular manner with the various problems and marks of interference with which all nature bristles. Some of the little mysteries which we encounter in our daily lives, even 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 setting the reader the thousand and one scientific riddles and to discuss them in non-technical language in an endeavour to increase the interest in our life.

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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-

come by using the mains unit which is fed from a 2-volt battery and delivers voltage for supplying H.T. The Simmonds unit illustrated was tested on a standard three-valve receiver with an S.C. 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 1s. 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, 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, W.C.2. These are the 37-guinea console model, and the 28-guinea vision-unit.

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 linned steel chassis covering five separate ranges—60 to 36 ke/s, 37 to 15.5 ke/s, 15.5 to 7.5 ke/s, 8.1 to 3.9 ke/s, and 4.05 to 1.7 ke/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 week we shall need from ten to fourteen days."

"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."
MODERNISE YOUR OLD SET

FIT A 1939

PRESS-BUTTON ALL-WAVE CHASSIS

Replace your set now with a Press-Button chassis and a really modern receiver. This will be yours at moderate cost. Choose one of the new ranges of Press-Button combined press-button and Manual control receivers. Press-Button has a housing in a choice of two sizes, one being 7" x 6" and the other 10" x 8". There are lots of sets for sale of the press-button variety, but you should keep the points in mind that the Press-Button system is so simple that anyone can fit a set. It has been calculated that in a few seconds you can add a Press-Button set to your set, or replace one. The simple and reliable switch of the Press-Button does away with the need for any complicated electrical system. It is a positive mechanical action, unaffected by minute or structural, and, for that reason, the Press-Button is exactly what you want. The Press-Button system is in general appearance as illustrated with similar dial, tuning and press-button arrangement.

MODEL 905. Battery and A.C. Mains. Stopped complete with valves, and controls. A.C. MODEL. 30, 40, 50, 60 watts. Radio-name distinct. Six-station press-button tuning, and variable-frequency change, bandwidth control by E.F. coupling, providing rectification, A.V.O. and A.F. output. Amplification, wattage-magnitude coupled to output power. Illuminated, miniature-call-board. 8-station Press-Button Tuning. Manual tuning. Full control. 39-stone Control. Designed to give in all respects the same quality as a set costing much more. A.V.O. and A.F. output. Rectified output. Gain: T.R.: 0.25, 0.50, 1.0, and 2.0. A.V.O. A.F. 2.00, 0.50, 0.25, 0.10, 0.05, 0.01. Price, Complete, £12 10s.

PETO-SCOTT Co., LTD. 77, (P.R.), CITY ROAD, LONDON, E.C.1
Phonetics: Chiswick 5011 and City 0165

ELECTRADIX BARGAINS

SMALL A.C. MAINS MOTORS.—Enclosed is a typical list of goods of the small A.C. type. The MOTORS.—Enclosed is a typical list of goods of the small A.C. type. The motors of this description are usually fitted in the chassis of the small receiving sets and do not require too much attention. The motors are all of recent make and of the best type. They are all self-starting and are fitted with 1/24 h.p. motors. The motors are all of recent make and of the best type. They are all self-starting and are fitted with 1/24 h.p. motors. The motors are all of recent make and of the best type. They are all self-starting and are fitted with 1/24 h.p. motors.

SMALL D.C. MAINS MOTORS.—1/10 h.p., 220 v. to 100 v., 1 amp. D.C., &Ps. 100 v. 15, 1. D.C./D.C. MOTOR SENS., 6 v. Input, 500 v. 30 m/a. output, Ws.

SMALL ELECTRAPLATING UNITS.—110/120 volt, 20 m/a. output, Ws.

SMALL E.C. GENERATORS.—1 v. to 90 v. 1 m/a. output, Ws.

SMALL HEARING GENERATORS FOR WINDMILLS.—36/12 v., 1 m/a., to clear at/50/- each. All as new.

ROTARY CONVERTERS for A.C. sets on D.C. mains. Ten sets complete with 1/24 h.p. A.C. to D.C. motor, 500 v. 10 m/a. output. 10 sets complete with 1/24 h.p. A.C. to D.C. motor, 500 v. 10 m/a. output. 10 sets complete with 1/24 h.p. A.C. to D.C. motor, 500 v. 10 m/a. output.

DOUBLE CURRENT GENERATORS, 120 v. 100 m/a., to clear at 120 v. 100 m/a.

ELECTRADIX RADIOS

ARMSTRONG 7-Stage All-Wave Radiogram Chassis incorporating Push-button Tuning, No. 909. Complete with Marked Moving-Call speaker, model A.W. 3P8. £27 19s. 6d. Free Postage and Packing.

ARMS 7 STAGE ARMSTRONG MANUFACTURING CO., LTD. 100, ST. PANCRAS WAY (Formerly King's Road), CANDEN TOWN, N.W.1 Phone: Collier 3105.

Item of Interest

Putting the Wire in Wireless

There can be hardly anyone who still remembers when a wireless set had not at least a single strand of wire in it. This wire is necessary in every one of the radio equipment, even to the extent that the entire set is composed of wire. In the old days, when a radio set was assembled, the wire was cut to length and soldered together. Today, the wire is manufactured in so-called radio sets, enough to wind eight times around 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 a 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 1/10,000 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.
The Man with a Future

The man who soon will be in a much better position than he occupies to-day is the man who is devoting some of his spare time to vocational study NOW. He knows that training is the best means of strengthening his salary-earning ability.

Through spare-time study ambitious men everywhere have risen to positions of responsibility. They developed their natural faculties, and so progressed in an era of constantly increasing competition. Tens of thousands are doing so to-day. They are the men with a future.

If you are dissatisfied with your present prospects, if you desire bigger pay, promotion, let the I.C.S. advise you, free and without obligation. Write, or fill in and post the coupon. But don't delay.

COUPON FOR FREE BOOKLET
INTERNATIONAL CORRESPONDENCE SCHOOLS LTD.

Please send me free booklet describing I.C.S. Courses in the subject I have marked X. I assume no obligation.

RADIO ENGINEERING  RADIO
RADIO SERVICING  TELEVISION

ACCOUNTANCY  HORTICULTURE
ADVERTISING  INSURANCE
AERONAUTICAL ENG.  JOURNALISM
AGRICULTURE  MECHANICAL ENG.
AIR CONDITIONING  MOTOR ENGINEERING
ARCHITECTURE  PLUMBING
BOOK-KEEPING  SALESMANSHIP
BUILDING  SANITARY ENG.
BUSINESS TRAINING  SECRETARIAL WORK
CHEMICAL ENG.  SHORT-STORY WRITING
COMMERCIAL ART  SURVEYING
CIVIL ENGINEERING  TEXTILE MANUF'G
DIESEL ENGINEERING  WOODWORKING
DRAGUETSHIPMANSHIP  WORKS MANAGEMENT
ELECTRICAL ENG.  GENERAL EDUCATION

EXAMINATIONS:

State your Exam. here.

Name

Age

Address

Greatest, largest and most famous of all institutions devoted to spare-time training by the postal method.
Branches in 30 countries, students in 50.

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 romancing 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 34th. It is alternate as the big Saturday night variety show, with:

"Sine 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 6th, with "Big-Hearted" Arthur Askey back as resident comedian, Richard Murdoch, and Phil Carlaw and the Band Waggoners.

"Scrapbook for 1923" will be broadcast on October 11th and October 13th, and "Scrapbook for 1924" 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 Hylton, 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. Whittleton (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.
A DX Log from Newcastle-u-Lyme

September 17th, 1938

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).

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 now received two numbers together, in one of which I see you have published my description of the test panel. In that I found your article for delineating the fundamental difference between a "straight" and a "superhet"; this, in conjunction with your letter from F. Lawson, Las Palmas, Grand Canary, with my "Junk Box Experiments," is making me rather favour a superhet, as old-fashioned—and my idea is to start, is making me rather favour a superhet, as old-fashioned—and my idea is to start, is making me rather favour a superhet, as old-fashioned—and my idea is to start...
ON THE AIR

Extended Broadcasts from Colombia

The following are the official attendance figures for Radiolympia:

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<td>Wednesday</td>
<td>8,418</td>
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<td>Sunday</td>
<td>12,052</td>
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<td>Total</td>
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The address is: Radiodifusora YV5RS, Caracas.

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 salient 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.

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The Extension of Prague-Podbrady

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 13.36 m. (21.64 mc/s), and OLR7B, on 13.91 m. (21.56 mc/s). OLR7C, 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.

YV5RS, at Caracas, not so far logged, is a 250 watt, on 51.41 m. (5.835 mc/s). The address is: Radiodifusora YV5RS, Estudios Universo, Caracas (Venezuela).

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 Jory.

James Leonard, WLW announcer, is vacationing in Washington, D.C., his former home.

Bill Edwards, of the WLW announcers' staff, dines 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.

John 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.
Every constructor already has a speaker. Why does Mr. Camm include a new one in each specification? Because however sensitive his receiver, its results could be spoiled by a speaker with poor response to weak signals. Because however good his set's reproduction, it could sound lifeless through a mediocre reproducer. So he always specifies a speaker he knows—the most widely used by expert amateurs and specified by expert professionals—the speaker which is regularly copied by British and foreign makers—a Stentorian. Your set would be grateful if you bought it a Stentorian. It would give you more programmes at entertainment value—more entertainment from the stations you now receive.

You can prove this. Ask your dealer to let you hear the new Stentorian, today. Prices from 23'6.

WIRELESS COILS, CHOKES AND TRANSFORMERS, AND HOW TO MAKE THEM.

Edited by F. J. CAMM.

2/6, or 2/10 by post from Geo. News, Ltd., Tour House, Southampton Street.

THE ROBERT BLAIR RADIO SOCIETY

This 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 (S.V.R.) hopes to be on full licence soon.—Hon. sec., A. B. Richardson, 21, Severn Road, London, N.19.

CANNON AND DISTRICT AMATEUR RADIO SOCIETY

This above society held its first meeting on Monday, August 21st. Mr. Ball (G2SW) was elected chairman, Mr. D. Whitehouse (G2VY) hon. secretary, and Mr. K. Greenaway (G2AR) hon. treasurer. It was decided to hold a meeting on the first Sunday of each month, and to pay 6d. at each meeting. A chisubroom is under consideration, and it is proposed to equip it with a licence 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, Tranamay House, Cannon, Stuffs, for further particulars.

PRACTICAL AND AMATEUR WIRELESS
BRIEF RADIO

DOROTHY HOLBROOK

THE rapid rise to fame of Dorothy Holbrook as a band leader of what is now recognized 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 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 her with the best tutors 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 regarded as one of the greatest authorities on harmony in the country.

People sometimes think that she had taken up literature as a profession, training, 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 theoretical 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, her voice was 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 better to start as 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 instrument should fail to attract 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 the interests of the crippled and convalescent, and there is also a postcard. the latter of which is bound to fall to the fortune ever to meet this lady radio, screen and recording band leader, who always reminds me that Dorothy Holbrook is as charming as she is modest.

DUBLIER CONDENSERS AND RESISTANCES

In the new season's catalogue issued by Dublier Condenser Co., in addition to the already well-known designs, several new patterns are included which would 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 all dielectric, low loss trimmer condenser. Amongst the other components included in the catalogue may be mentioned metalised 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 radios. The receivers listed include various models from the 2JA.C., priced at 13 gns., to model U-B-16.A.C., priced at 25 gns. Many users of radio prefer a remote model and three fine examples of this popular type of receiver are listed, viz., model C-5A.C., a 5-valve superhet.; model BTG-500.A.C., a 6-valve all-wave superhet.; fitted with the Pilotone system of pushbutton control; and model PTC-60.A.C., a 6-valve all-wave receiver with piano tuning. In this model the latest form of Pilot rotor dial is incorporated, which allows the radio to be tuned and jogged with ease. In the radiogram section is included model RBC-33.A.C., a 5-valve superhet, instrument priced at 22 gns. (A.C.-C, model 25 gns.), and model RBC-505.A.C., a 6-valve all-wave superhet, radiogram, with automatic record change; priced at 35 gns. The Pilot di-pole balanced aerial is also included and recharged receiver and transmitter and scanned aerial transformer, is also listed.

ARDEON TOUCH-PHONE SYSTEMS

A NEAT folder has just been issued by the Ardeon Acoustic Laboratories, Ltd., giving particulars of their efficient broadcasting communication systems designed for home or business use, for providing rapid intercommunication without the use of home telephones. Each complete system comprises a master and subunit or units, or a number of station units, housed in neat black cabinets. The "Diasmatic" 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 300 ft. of the broadcasting point. The "Select- 

OUR FREE CATALOGUE SERVICE

To save readers trouble, we undertake to send on catalogue by post, free of charge, direct to your door, on the solution of the form from your local newsagent or radio dealer. The most up-to-date PRACTICAL AND AMATEUR WIRELESS catalogue is the only way to secure the many new items and lines which are constantly being added to our range of products, and which also travel the world over in the "Harmony Hussars." The "Multichord" is a master to master selective loud-speaking inter-communication system, enabling two-way conversations to be carried on between any two stations. It is possible with this system for the separate and distinct private conversations to take place simultaneously without any 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 American-made components for the radio and television industries. In this catalogue are included a wide range of metal and glass sockets, in addition to the usual range of components, such as filaments, resistors, capacitors, and fuses. A large selection of multi-coils of all types, fixed condensers, tuned condensers, slow-motion drives, time-holders, insulators, jack sockets, bayonet terminals, miniature relays, miniature transformers, and valve-holders. Airials and aerial equipment and a portable case for the complete set. Expect that this catalogue should be in the hands of every constructor and experimenter, is priced at 1/-.

September 17th, 1938
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, the hiss is often a background, and when you adjust your set for foreign stations it will be working at maximum efficiency. Reception sometimes gives a sound similar to that described, although this is followed by a howl when reception is possible further on. 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 in- curable, but I would like to know if there is any cure for it, and if so what it is."—F. C. R. (Eile).

The reason is probably to be found in the fact that your car has an all-metal body. This acts as an 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 at the top 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.

The output varies according to the use of the valve. In L.F. or receiver work, the output is undistorted speech output, but when the valve is used as the amplifier in a transmitter, the wattage output (which is the first stage in the figure you mentioned) is of greater importance. The dissipation is the maximum permitted figure, and is the product of anode volts and the 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 Feedback

"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 feedback resistance for these valves. I am using a Ferranti A.F. transformer and an L.63 for the input."—H. M. I. (Nottingham).

The makers' recommendation for the valves in question is 10,000 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 mfgu resistor. 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 I use at home. I was wondering, whilst A.F. units suppressing circuits are sometimes included which prevent the satisfactory operation of a short-wave adapter, although it is generally possible to connect the output from a short-wave adapter, through a transformer, to the pick-up terminals where these are fitted. What plan, therefore, is to write to the makers of your particular set and obtain their views on the use of a converter, 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 carbon 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. Zinc-on-carborundum, for instance, is almost as good as carborundum when a good spot has been found, and is much more easily replaced. If you require a crystal of this type the Red Diamond unit supplied by the Jewel Pen Company, 222, Ct. Sutton Street, Strand, London, E.C.1, may be recommended. This was used on our crystal set described in the Show numbers.
PRACTICAL AND AMATEUR WIRELESS

BLUEPRINT SERVICE

BLUEPRINTS

CRystal SETS.

No. of Enlargements

D.C. £5 Superhet (Three-valve)........ 1.12.34

PW51

Universal S.G. Short-wave Three (D, Pen)........ 1.12.34

PW54

F. J. Canning's A.C. £5 Superhet (Three-valve).

PW54

F. J. Canning's A.C.

41et 4

PW53


PW51


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PW51
RECEIVERS, COMPONENTS AND ACCESSORIES
Surplus, Clearance or Secondhand, etc.

RADIONAUT
THE SHORT-WAVE SPECIALISTS

*CHOICE*—introduced Americans Recording Choker, 75 h. to 100 kHz, worth 5/-; our price 3/6. Silver Choker, 12/6 to 131/2.

*MINIATURES*—all brass construction, longest service, smallest, least cost. The first complete set: 15/10; 14/10. "Chas." in model name, 15/10 coin silver. 10/6. Tuning; 5/6. Tuning. 10/-.

*OFFSET WIRE*—Wally, 8d., heavy, 5d. Bean-covered Silver (all sizes); 5d., 6d., 7d. assorted. Each: 2/-, 5/-, 10/6. Reconditioned, 5/-.

W.R. Line's Permanent Vacuum Speaker, at third-cost. Est. prices 5/-, 7/-, 10/6.

*NEW*—Ex.-Sco. MOTORIZER to fit all Treasurer, 7/-, Standard Type (with Transformers), 10/-.

STANDARD R. K.—Hammar, 9/-, sprung. 10/-; 2,500 ohms, 1/6. Jensen, 1/-, 2,500 ohms with transformer; 1/-, 2,500 ohms with loudspeaker, 4/-.

UTILITY T.F. Panama YM 250, Birmingham 9/-, W.3 (first quality 15/-).

SPECIAL OFFER—AMERICAN Radio Bargains, guaranteed at 2/- paid; Garrard civilian sets, 42/6. Telcom Muliplex iron-core coils, 2/3; 3/6; 5/-; 10/-; 20/-; 30/-.

WIRELESS SUPPLIES. 64, Prestbury Road, London, E.7.

*NEW*—Radio Bargains.-Southern Radio, superhet receiver, complete with valves and moving-iron tuning. W477, 14/-; twin-gang W478, 9/-; Telsen A.C./D.C. coils, 5/-; 4/-; 3/-.

WARD, 46, Ili...-

THE NEW BAYPART CATALOGUE shows dozens of New Offers. Not one has been paid for. A splendid range of short-wave components is always ready for immediate despatch.

WARD, 46, Holborn 4631.

...PREMIER SHORT-WAVE KITS are all ready complete to the last detail. All valves and coils are included as well as theoretical and wiring diagrams, how-far to read for building and working. Thousands are giving excellent results at all cost. Each kit uses plug-in Coils and the Coils supplied come from 13 to 17 metres. All kits are supplied with a steel chassis and Panel.

1 Valve Short-Wave Receiver or Adaptor Kit 17/-

2 Valve Short-Wave Receiver or Adaptor Kit 25/-

3 Valve Short-Wave Receiver or Adaptor Kit 35/-

SHORT-WAVE CONDENSERS
TROLITOL insulating. Cased superior to porcelain. All brass construction. Fully gauged. 15 m.mfd., 1/6; 100 m.mfd., 2/-; Double-Spaced 25 m.mfd., 1/-; 160 m.mfd., 2/-; Transmitting 40 m.mfd., 1/-; 250 m.mfd., 3/-

Types.

All brass end-cap condensers. 15 m.mfd., 2/-

150 m.mfd., 7/-; 250 m.mfd., 10/-.

PREMIER MOVING COIL METERS Guaranteed Accuracy within
Model No. 2. E obsolete Co., 3m. by Sin. square, with Zero Adjuster.
0-500 micro-amperes: 3/-; 0-500 micro-amps: 4/-
0-1 m. a. 5/-; 0-25 m. a. 6/-; 0-1 m. a. 7/-
0-250 m. a. 8/-; 1-000 m. a. 10/-
22/6 50-100. 10/-

A complete range of Moving Coil Meters is now available from this catalogue for complete list.

SPECIAL OFFER ROLL SPEAKERS. 8 P.M.'s, 15/-; 10 P.M.'s, 18/6/11; 12 12% High Fidelity, 15/-; 18/-; 30/-.

AMERICAN VALVES. All the following American Valves are 6, 12, 25, 25, 50, 75, 100, 150, 200, 400, 1,000, 1000, 2000, 3000, 5000. Each 5/-.

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PREMIER 1938-1939

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Contents of this week's "FLYING," on sale Friday, September 23rd, include:

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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.

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Simplified S.W. Tuning—See Page 42

Practical
and Amateurs Wireless
Edited by F. J. CAMM

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 the 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 as a special 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 2d. post free on application to 33, High Street, Marylebone, London, W.1, or for 2d. on personal application to Broadcasting House, or any B.B.C. Regional office.

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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.

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 Alexander 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 148,888 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 23rd, playing the part of one of history's greatest queens. The play will be "Victoria and Disraeli," produced by John Chestal, with Dame Mario Tempest as Queen Victoria.

Night Ride

A NON-STOP cycle ride from Llandudno, 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 weekends 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 Skelmorlie to Carmarthen in thirty-six hours.
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

CONSTRUCTION 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 Bely-Hutchinson.

Two High-power Stations for Belgium

THE Institut National Belge de Radiodiffusion has decided to replace the two existing transmitters at Veltheim (near Louvain) by two modern 100-kilowatt stations to be erected near Wavre, south of Brussels. Work will be started on this construction without delay.

S.O.S. for Lost Poodles

A 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 tin roof of the school with 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 the conventional Town Crier's bell followed by the call: "Achtung! Achtung! this is your Burgomaster speaking."

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 26th. William Pethers will conduct and Jack Wilson will be the pianist for Myers' "Chasing Moonbeams."

"Les Miserables"

OWING to certain difficulties of casting, the B.B.C. have decided to postpone the production in serial form of "Les Miserables" until after the New Year. Its place will be taken by an adaptation by H. Beafoy 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 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 5,000 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 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, continuing later French and then English; at the age of fifteen he was learning several languages at once 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 Imperial de Radiodiffusion, P.T.T. Tunis." In the meantime a temporary 1-kilowatt station broadcasts radio programmes daily on 215 m. (1,385 kcs) from G.M.T. 11.00-13.00 and from 15.15-19.30.

"On Wenlock Edge"

THIS song cycle by Vaughan Williams, will be sung on October 2nd, by Henry Wendon (tenor), accompanied by the Whitbytes String Quartet (Seymour Whinates, Veronica Gotch, Dorothy Everett and Helen Just), and John Palmer (pianoforte).

PROBLEM No. 314

Eearths has 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? There looks will be awarded for the first three correct solutions opened. Address your envelopes to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnells, 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 5th, 1938.

Solution to Problem No. 313

As Wrigley had connected the valve he was using the screen grid acts as an anode and accordingly was not obtaining any improvements over the original valve. The top exp. is, of course, the anode.
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 civilization in general. They have maintained communication when all other means had failed; they have been the means of help and sustenance reaching people isolated by storm, flood and earthquake, and they have maintained contact between the world and emergency and distress, the true radio enthusiast, more universally known as "ham," has stepped into the breach and rendered inestimable service to civilization in general. They have maintained communication when all other means had failed; they have been the means of help and sustenance reaching people isolated by storm, flood and earthquake, and they have maintained contact between the world and

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 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

Station Requirements

No two stations are alike. The selection 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 simplest circuit and, as the experience is gained, elaborate on the original until a more ambitious receiver is evolved. Experiment, and keep on experimenting until you

(Continued overleaf)
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.A. Good Output, forms a most useful arrangement but, again, the selectivity is not that of a superhet, though the 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 interference. An untuned H.F. stage can prove most useful on all the lower bands. It will act as a "buffer" between the detector and the tuned circuits 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, 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 overall length should not exceed 60ft., 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 dipole 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 multifrange, 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 outlineing 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 in only a few cases were special precautions taken to make sections of the show 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 graduation, and there was a marked absence of synchronising doubles, the pictures remaining steady with...

PRACTICAL AND AMATEUR WIRELESS
A Serviceman's Diary

An Account of a Few of the Faults Which Have Been Traced and Remended 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 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 sidesbands of the local station—which was about 12 miles away. This peculiar form of H.F. instability occurred only in conjunction with the nearby transmitter, and the set tuning normally to all other signals. In this instance the source of trouble was traced by moving 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 action 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 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 internally. One of the wire ends came a'stitch, possibly having been loosened when soldering a connecting lead to it, but had remained in contact with the condenser itself all shaken away by vibration.

Volume Control—Nil

With another set it was found that at some times the variable microphone control in the cathode lead of the H.T. valve had no effect, reproduction being at "full blast" throughout. At other times the control would have a marked 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 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 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; unfortunately, it had not, for when the chassis was replaced the trouble re-started. This time it was taken out of the chassis with switching of voltage tests made. It was soon found that there was no H.T., although the I.T. circuit was in order. The mains transformer was suspected and removed, but when it was seen that the 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 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 the trouble was in the interests of car-radio because, when coil ignition is used a single resistor-type device is generally placed between the 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 soundproof 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 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.
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.

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 “moggered” 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 energizing current into the field coil, and eliminates the risk of shock to operators handling the equipment.

Testing Procedure

The test commences by applying a variable frequency input to the speech coil and measuring the resistance 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 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-excitation 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...
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 adjust to 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 I suppose a beard hides inexperienced Northerners and others in prominent early age, armed with introductions and others to gravitate South at an it is the ambition of many Northerners got the craze and grew beards. neat and clean shaven; Centres.

Scholarships Bennett, who came to see the Cup

And Oh! How very, very true! "

A Reader’s View of Radiolympia

M. 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. 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. For as 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

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ON YOUR WAVELENGTH

Beards at Radiolympia

That Mystic Ray of those two cars that pulled up for no
terious rays to which I have referred.

That sounds as good an explanation of those two cars that pulled up for no 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 do.

The more little stanzas, 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!”

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PRACTICAL WIRELESS SERVICE MANUAL
By F. J. CAMM.

Practical and Amateur Wireless

September 24th, 1938
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
A n 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 is it 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 impressed 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 "situation," and talked a lot of utter nonsense which could not stand the scrutiny of a schoolboy. Previously Mr. Ramsay MacDonald had spoken about the "situation" in the "wurrmmmrid."
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 away from 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 dealing with the main causes of interference in television reception, 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 broadcasting 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 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 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 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 " Paramilo..."
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 a general rule the cost of the apparatus is rather excessive. With television, however, the receiver is reasonable in price and can be a part of the 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 present 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 source. 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 photovoltaic 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 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 that it is not dependent on big screen television installations any of its outside broadcasts, except to private families, and it is claimed that in this way very highfrequency oscillations can be generated without any of the attendant difficulties.

The B.B.C. and Films

During the course of Radio-Lympia, two Gaumont British films, "Jack Ahoy" and "Aunt Sally", were televised on alternate days. Although the picture quality varied, especially from the point 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 Cinematograph Renters' Society for permission to use reissues of past film successes in its regular television programme. For 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. have already left their stamp on the habits of both town and country, but television, in its ultimate development, bids fair to bring about still further changes because of its wider domestic appeal.
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 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 \( \frac{1}{2} \) 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.

A simple method of avoiding damage to a test meter pointer.

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 top up 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 resting in a basin of cold water. The steam circles the interior of the bottle, and part of it 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 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 \( \frac{1}{4} \) in.; 1 piece of plywood approx. 3in. x 3in. x 3-16in.; 2 pieces of board, 6in. x 3in. x \( \frac{1}{2} \) in.; an empty cotton reel; some stout wire for the winding handle and spindle; a few wire nails \( \frac{1}{2} \) in. 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 sketch. When the end wire is fixed to hold coil former, and wooden pins as spindles for the revolution counter.

To construct the second wheel: on a piece of 3-in. plywood, describe a circle 3-in. dia. and divide the circle into 10 equal parts. At each point cut a slot 1/8 in. 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.

A handy dodge for making distilled water.

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THAT DODGE OF YOURS!
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not put it on to us? We pay £1-10-0 for the best wrinkles 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 Newman, Ltd., Tower House, Southampton Street, Strand, W.C.2. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.

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

A handy dodge for making distilled water.
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.

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.

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.

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 31 ls., 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 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 Transcoupler 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 impair the performance. If a longer aerial is employed, and reception of Droitwich on the long waveband may be obtained in most parts of the country, the choice of the detector valve is no longer an easy one, but can be deliberately chosen, 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 disposing 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.

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 is then bored in diameter may be drilled, but for the valveholders a hole 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 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 holes separated by a space of .009 in, and saving away the intervening wood.

Before mounting the components one important factor must be stressed. The on-off switch is included in the L.T. negative lead and, consequently, it must be insulated from the metallised chassis which is connected to the L.T. negative lead. The

This is the finished receiver, showing the neat layout.
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 metalised surface must be scraped away for a sufficiently large area to ensure that the switch 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 positive socket of a 9-volt G.B. battery, and the lead marked G.B.+ should be inserted into the positive socket of the H.T. battery and H.T.+1 should be plugged into the socket marked 90 volts, or somewhere near that value. Pull out both switches, and the receiver will be in the middle of long 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.

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 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 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.

Panel layout diagram.

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 Cool: A play by E. Eynon Evans, from Welsh.
Thursday, September 22nd.—Night's Out: A Night in Town; A Night in the Country—two sketches.
Friday, September 23rd.—White Ladies, by Frances Brett Young, from Midland.
Saturday, September 24th.—Music Hall.

MIDLAND (297.2 m.)
Wednesday, September 21st.—Water Polo: Live commentary on the Warwickshire County Finals.
Thursday, September 22nd.—The Belle of Boopaloo: A radio burlesque.
Friday, September 23rd.—White Ladies, by Frances Brett Young.
Saturday, September 24th.—Mendelssohn in Birmingham: A musical programme.

WEST OF ENGLAND (285.7 m.)
Wednesday, September 21st.—Dunda Cabinet from the Royal Bath Hotel Ballroom, Bournemouth.

THURSDAY, SEPTEMBER 22ND

WELSH (373.1 m.)
Wednesday, September 21st.—Cold Cool: 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 Spot, a Review of Saturday's sport in Wales.

NORTHERN (449.1 m.)
Wednesday, September 21st.—Manx Fairy Stories, by Doris 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.—Capboard 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.

PRACTICAL AND AMATEUR WIRELESS September 24th, 1938
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. It will be realised from the activity 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 that work is proceeding correctly, and when a chassis is completed it is subjected to one section before testing. This arrangement permits a general exterior view of the chassis assembly lines. It will be realised from the activity 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 that work is proceeding correctly, and when a chassis is completed it is subjected to one section before testing. This arrangement permits a general exterior view of the chassis assembly lines.

New Models

Several new models are being produced in this new factory, and an important feature in the very high standard of performance on the short waves. A combination of automatic press button station selection 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.

I can't enjoy the short waves on the family set!

...can't enjoy the short waves on the family set!

AND A SPECIAL SET COSTS SO LITTLE

J. E. N. was just an ordinary listener until his Short-Wave appetite was whet. He now finds that a lifetime and enjoyable pastime was worth a special set. He installed an A.C. mains receiver "TROPHY"...he will try for better short-wave listening.

TROPHY 3 SHORT-WAVE RECEIVER

FOR A.C. MAINS OR BATTERY USE.

WATERANGE 3-50 METRES.

Both models employ circuitry evolved from a recent-breaking receiver and provide automatic efficient results on short waves.

A.C. MODEL A.C. MAINS SUPPLIED ONLY. Cash or C.O.D. 8/-, 5/- down and 12 monthly payments of 6/-.

BATTERY MODEL EACH BATTERY, 2/6 or 1/- deposit and 12 monthly payments of 6/-.

EVERYTHING RADIO CASH, C.O.D. OR EASYWAY

J. C. WAIN'S FULL-BUTTON 5 SET.

Complete Pilot Another 5-SET A.C. receiver with all components with escalator design and need not be rewired. Cash or C.O.D. 14/- or 2/- down and 11 monthly payments of 9/-.

FULL-WAVE AERIAL. Absolutely essential for present-day broadcasting. Complete outfit for indoor work with all aerial and lead-in wire, transformer insulators and nomenclature. Life value 10 years. Special Prize, 7/12 cash or 2/- down and 12 monthly payments of 6/-.

PRACTICAL WIRELESS 1940 CRYSTAL SET.

Complete kit for instant erection with all components with ready-drilled 014.4 cone for replacement or extension purposes. £5.10/-, or 5/- down and 11 monthly payments of 1/6.

WIRELESS CONSTRUCTOR'S ENCYCLOPEDIA

8/- or 5/6 by post from

PETO-SCOTT CO. LTD.

77 (Pr.W.5), City Road, London, E.C.1.

Tel. : Bowbrook 9911 (2 lines), Chiswick 5525.

WE ARE AGENTS FOR-

Both, B.T.S., Cossor, Eken, and Pye Pritis, and manual control A.C. and Battery All-Wave receivers all available on easy terms from £1 down. SEND NOW for complete receiver, short-wave and kit list. No third party collections.

NEW MODELS

- AND NEW MODELS SHOULD BE CHAMPIONS OF THE WORLD!

Several new models are being produced in this new factory, and an important feature in the very high standard of performance on the short waves. A combination of automatic press button station selection 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.
PRACTICAL AND AMATEUR WIRELESS

September 24th, 1938

ROTHENBERGL SOUNO RECORDER IN THE SAHARA

The once inhospitable tract of the Sahara Desert has been long been esteemed 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.

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 Riart, has returned, having 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 among
adjuncts at lectures given in connection
with the Expedition's activities. The
Compagnie Poste-Parisien are so satisfied
with the results obtained from the rec-
er that another expedition sent out
by them to Asia 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 of the Civilian Radio Reserve, which invited amateur transmitters to join. This is work of first National importance, and there is a huge field amongst experimenters for a book which will explain, not only how to build amateur transmitting sets, but also how to learn the necessary lore and absorb the license.

WIRELESS TRANSMISSION FOR
AMATEURS deals with the subject in a
yet fascinating way, and the text is rendered even more lucid by the use of many practical and easily understandable diagrams.

From all bookstalls: 2/- net, or by post 2/-1/2 from
GEORGE NEWNES, LTD. (Dept. B),
DOLLISS HILL RADIO COMMUNICATION SOCIETY

The meeting held on September 6th, the president, Mr. S. Hedgeland, 2DBA, introduced the paper on "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.B.E., on the history of short-wave radio and its development into "Aerial and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

October 6th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

October 11th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

October 18th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

October 25th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

November 1st, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

November 8th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

November 15th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

November 22nd, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

November 29th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

December 6th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

December 13th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

December 20th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.

December 27th, Lecture by Mr. S. Hedgeland, 2DBA, entitled "Aerials and Aerial Design," several points, not generally well understood, were gone into and explained in detail.
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 should also be seen to follow every movement of the control knob, and when the condenser is slightly moved the vanes should answer to each movement of the knob or indicator is fitted to the drive this should be carefully watched whilst the knob is turned fast in both directions, and then be stopped and turned back two press-on lids from 1lb. paint tin, 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 encountered by a knot jumping the pulleys the ends of the cord were laid side by side for a distance of about 1in. 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 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 soldered back to back.

Two Press in Type Tin Lids Soldered Back to Back.

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-spread tuning is used whilst 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 with 1500 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 drive to the other.

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 1in. spindle. A length of 1in. diameter brass rod was then turned down in the lathe until it fitted the hole in a 1in. pulley, and the latter was slipped up to the shoulder which had been left and there locked into position. A 1in. 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 tin, and these also are drilled and fitted with a boss with set-screw for locking on the condenser spindle.

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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. 2.—A fly-wheel made from a tin lid filled with lead, and the best method of joining driving cords.

TIN LID

FIXED SPINDLE FOR
CONTROL KNOB

BIND ENDS OF
CORD INSTEAD OF
KNOTTING

PULLEY
LEAD FILLING

SIMPLIFIED CONTROL
Details of Short-wave Tuning and a Suggestion for a Home-made Drive. By W. J. DELANEY.

For the benefit of new readers backlash may need explanation. It is normal for this—either too much oil or grease for this—either too much oil or grease on the drive, or an inefficient design of drive. By W. J. DELANEY.

In a short-wave receiver with a reliable slow-motion drive and to make certain that no backlash is present. For the benefit of new readers backlash may need explanation. With a suitable arrangement of gears, 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 drive to the other.

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THE WIRELESS CONSTRUCTOR'S ENCYCLOPÆDIA

By F. J. CAMM 6th Edition
(2 Volume Set)

Wireless Construction, Terms, and Definitions explained and illustrated in concise, clear language.

From all Booksellers, or by post 5s.6d. from George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2
The programme of transmissions from the All-India Radio 10-kilowatt short-wave transmitters is now re-adjusted as under, until further notice: VU6C2, Calcutta, on 31.48 m. (9.53 mc/s), daily from G.M.T. 15.30-17.30, and on 21.48 m. (4.96 mc/s), from G.M.T. 10.36-16.06. VU6M2, Madras, works on 06.06 m. (4.98 mc/s) from G.M.T. 11.00-18.00 daily. VUDB, 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 VU6Z2, daily, on 31.28 m. (9.59 mc/s) from G.M.T. 11.30-16.30 with an S.B. on 00.06 m. (4.98 mc/s). Through VU6Z2, 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 06.00-07.30, with a third transmission between G.M.T. 11.00-16.30 on 61.16 m. (15.15 mc/s).

Ankara Calling
Both early morning, and towards evening, one may now hear test transmissions from the new 20-kilowatt Turkish short-wave station (FAQ) at Ankara. The wavelength is 19.74 m. (15.16 mc/s). TAP, on 31.7 m. (9.45 mc/s), will also be tried out shortly. All announcements and call are given in the English language.

Broadcasts from Curacao
PJCI, a 130-watt transmitter operated by the Curacaoche Radio Vereening at Willemstad, Curacao, Netherlands East Indies, on 31.67 m. (9.73 mc/s), is reported to be working daily from G.M.T. 23.36-01.36. The transmitter is also entitled to use 30.6 m. (9.29 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. (9.86 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 YR6AA, and Bucharest as its location; the wavelength used is 20.61 m. (14.15 mc/s). According to the "Call Book" the transmitter is operated by Engineer Popescu-Malasci, of Curve Davila, 143, Bucharest, but all reception reports should be sent in a sealed envelope to the Radio Club, C.A. Roscetti, 6, Craiova, Romania.

Tune in to British Guiana
V7BG, Georgetown, a 200-watt transmitter on 48.94 m. (6.15 mc/s) has been heard during the early part of the week, or so. The station broadcasts twice daily, namely from G.M.T. 13.30-16.30 and from 21.00-01.00. It closes down with the melody: Good Night, pretty Maiden, Good night.

A Good Canadian Programme
CFRX, the short-wave outlet of CFEF, 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 CFEF is linked with the Columbia. Broadcasting is made daily between G.M.T. 12.30 until 04.00, on weekdays. The Sunday transmission is made between G.M.T. 15.30-04.00. Address: Rogers Majestic Radio Corporation, 37, Bloor St. West, Toronto (Ontario), Canada.

Altered Programme Times
ZIKZ, the 100-watt station at Belize (British Honduras), working on 28.3 m. (10.56 mc/s) now transmits every Wednesday, Friday and Sunday from G.M.T. 01.30.

Concert from Cheltenham
THE CITY OF BIRMINGHAM ORCHESTRA goes to Cheltenham on September 25th to give a concert of popular and symphonic music, parts of which will be broadcast. There is a local conductor, Eric Woodward, for this concert. Mr. Woodward is himself a bandleader. The well-known violinist, Marie Hall, who lives at Cheltenham, will play Mendelssohn's E minor concerto, with the Orchestra.
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 later 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 Yardley 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 boiling 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 meg ohms, 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."

Two Great New Books!

PRACTICAL WIRELESS SERVICE MANUAL
Price 5/-, or 5/6 by post

WIRELESS TRANSMISSION FOR AMATEURS
Price 2/6, or 2/10 by post

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 orchestras, 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.R. 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.
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 "Prefect 3." While this set worked quite well it didn't give the entertainment that I required, and with some experimentation I now own a make -attached—that gives grand results on the loudspeaker from all over the world.

In your issue of July 16th, 1938, you ask for logs and sets from Empire readers, and this one, I think, would suit many. Personally, I require only the B.B.C. Empire programmes (13-49 m.) and the Indian broadcasts (160-49 m.), and after 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 30-metre 'phone model and the aerial is a Lissen doublet (N.S.) 20 ft. high. All stations received between 06.00-09.30, and 22.00-24.00 B.S.T., on 'phones, during the last two months.

-20-metre C.W.—

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<thead>
<tr>
<th>Time</th>
<th>Station</th>
<th>DX</th>
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<tr>
<td>07.30</td>
<td>K5AA</td>
<td>5</td>
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<tr>
<td>19.30</td>
<td>VP3AA</td>
<td>5</td>
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<tr>
<td>22.00</td>
<td>VP2EE</td>
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<td>22.05</td>
<td>VP2EF</td>
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<td>23.00</td>
<td>NYE4</td>
<td>5</td>
</tr>
<tr>
<td>23.20</td>
<td>K5AM</td>
<td>5</td>
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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.

Proposed Club for Leicester

SIR,—I have been a consistent reader of your highly praised radio paper for nearly two years, and it has helped me times out the radio 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 gained from the pages of PRACTICAL AND AMATEUR WIRELESS, and secondly to call the attention of those interested in short-wave radio work in live 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 MILSTEIN (3, Winstie Drive, Thurstonam, 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 two valve, and the antenna a half-wave cut for 20 metres running N.-W.-S. All the stations were heard on the loudspeaker, the set was made on an 8-valve G.B. Tmh-f.

PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.
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, Eithorne Road, Holloway, N.19 (phone: Archway 1919). 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 Bairdtron 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 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

A s 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 "puck" 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 due to 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 intended for mains operation. The total range is from 10 to 3,000 metres in five ranges, and by utilizing 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 utilizing the secondary emission has before been applied to photo-electric cells and similar apparatus, but it has now been applied to valves.
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. (Bedford).

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 currents 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. control. It is advisable to avoid using 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).

I t would be possible to operate this receiver from a standard H.F. 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).

T HEoretically a superhet is no different from a normal T.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 wanted 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-

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the settlement of difficulties arising from the construction of receivers described in 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 correspondents.
(3) Suggest alterations or modifications to the circuits described in our correspondents.
(4) Answer queries over the telephone.
(5) Draw up circuit diagrams.

Requests for Blueprints must not be enclosed with queries. All sketches and drawings which are sent to us should be marked and addressed to the Editor. Requests for Blueprints must not be enclosed with queries. Answers to queries are dealt with by a separate department.

Experimenters' Short-wave Three

"In your Experimenters' S.W. Three of July 30th certain components are recommended. I have obtained separate components for the converter. I should be glad to know how these are connected."—A. C. (Shoreditch).

IN place of the couple which is no longer on sale, the Bulgin component type L.P.10 may be employed as a substitute. If separate components are employed the high value of resistance (from 30,000 to 60,000 ohms) should be joined to the anode of the valve and also to one side of a fixed condenser (0.1 to 1.0 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 the PT and positive and the other side of the resistance a second resistance should be joined, having a value of 10,000 ohms, and from the mid-point 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 know if there is any 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 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

"I would be quite in order to use battery triodes, or, alternatively, you could use a Class B valve. We published a design round the latter valve, but any good pair of triodes could be used by selecting the same current 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 tubes? I am uncertain whether this is a 2.5 volt valve or whether it is a mains component."—G. I. (Newcastle).

T HE valve is a power pentode with a 25 volt 3 amp heater. It is rated at a maximum anode voltage of 180 with 125 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).

T HE 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 winding 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 the point of view?"—H. (Edgeley).

I t 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.
RECEIVERS, COMPONENTS AND ACCESSORIES

PRACTICAL AND AMATEUR WIRELESS

September 24th, 1938

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