

A CALIBRATED WAVEMETER— See  
Page 51

# Practical and Amateur Wireless

A GEORGE NEWNES Publication

Vol. 14. No. 341.  
April 1st, 1939.

3<sup>d</sup>

EVERY  
WEDNESDAY

Edited by F.J. CAMM

AND PRACTICAL TELEVISION



The  
A.C.  
Spare-  
Parts

3

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# CRACKLES—TRACING & CURING—SEE PAGE 62

**Practical and Amateur Wireless**

Edited by F. J. CAMM

Technical Staff:  
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Vol. XIV. No. 341. April 1st, 1939.

## ROUND the WORLD of WIRELESS

### Spare Parts Receivers

IN this issue we describe an A.C. three-valver built from spare parts retrieved from a junk box. We have already described a battery receiver built on these lines, but it is regretted that we cannot describe receivers using all the parts which are likely to be available to every reader. The description which has been given, and which is to be found in this issue, will, however, enable the reader to see on what lines it is possible to build a receiver from old parts. We cannot enter into correspondence regarding the use of alternative coils and other components in these receivers, but the information and circuits which have been given should enable anyone to build a similar type of receiver from spares. From time to time we shall describe other receivers and endeavour where possible to introduce those components which we have ascertained are present in the largest quantities in the constructor's spares box. The A.C. receiver, described in this issue, was built for a special purpose for a listener who had the parts available and who wished to ascertain what results could be obtained on these lines. Modifications will, of course, suggest themselves to those who have alternative parts available.

### Postal Losses

THE Postmaster-General regrets to announce that some first-class mails for Belgium were destroyed when the aeroplane conveying them crashed at Brussels in the early morning of March 14th. The correspondence involved consisted of letters and postcards posted in London on March 13th between the times indicated below:

Head Post Office, E.C.1: After 7.0 p.m. and up to 11.0 p.m.

Fenchurch St., Lombard St., Ludgate Circus and Throgmorton Avenue B.O.s: After 6.0 p.m. and up to 7.0 p.m.

Elsewhere in E.C. District: After 5.30 p.m. and up to 6.30 p.m.

District Head Offices and Charing Cross B.O.: After 6.0 p.m. and up to 7.0 p.m.

Elsewhere in Head Districts: After 5.30 p.m. and up to 6.30 p.m.

Sub-Districts: After 3.30 p.m. and up to 4.30 p.m. (approx.).

A small amount of first-class mail from the Provinces reaching London between 6.0 p.m. and 8.0 p.m. on March 13th was also involved.

### Baird Television

THE ninth Ordinary General Meeting of the Baird Television Company will be held on Friday (March 31st), at Caxton Hall, Westminster. Later in the same day the General Meetings of the holders of the Preferred and Deferred Ordinary Shares will also be held and there will also be an Extraordinary General Meeting.

### ON OTHER PAGES

	Page
A Calibrated Absorption Wavemeter	51
Coil Connections Simplified	53
On Your Wavelength	55
Short-wave Section	57
Readers' Wrinkles	59
The A.C. Spare Parts Three	60
Crackles, Tracing and Curing	62
British Long Distance Listeners' Club	65
Practical Television	67
Practical Letters	68
Club Reports	69
Queries and Enquiries	71

### Howard Marshall's Radio Home

WE understand that Mr. Howard Marshall, the popular B.B.C. commentator, has arranged for the B.B.C. to wire his home so that he can broadcast without introducing a "studio atmosphere." Well-known sportsmen and others will be able to meet in his drawing-room and discuss various events for relay by the B.B.C. in a more homely atmosphere.

### B.B.C. Exhibition

THE B.B.C. Travelling Exhibition will be on view to Liverpool and Merseyside generally at the Walker Art Gallery, Liverpool, for nearly three weeks from April 4th; and it is hoped to broadcast during the evening of April 4th some comments on the photographs in the Exhibition from the Gallery itself. The

broadcast will also include visitors' questions and the answers to them given by a B.B.C. official on the spot.

### Clifford Whiteley

THE Mayfair "showman," Clifford Whiteley, the man who "discovered" Jack Jackson, the band leader, Naunton Wayne, the compère, Eve Becke, the singer, and the man who pioneered the Floor Show in London's West End, is to be featured in his own life-story on March 28th (National) and March 30th (Regional).

### C.W.R. Unit for H.M.V.

THE H.M.V. recording studios at Abbey Wood have formed a C.W.R. unit under the leadership of Mr. W. S. Purser. He was one of the earliest workers in the field of radio communication.

### Radiolympia

AS already announced, this year's Radio Exhibition will be held from Wednesday, August 23rd, to Saturday, September 2nd, inclusive. Sir Stephen Tallents, at a recent meeting, stated that attempts will be made to make this the finest and most attractive radio show ever staged in the world.

### An American Record

TWO engineers at the Columbia Broadcast System's WABC-W2XE transmitters at Wayne recently set up a world record for changing a water-cooled power amplifier. This was accomplished in the space of 1 minute 11 seconds. The B.B.C. state that to change one of the large valves at Droitwich would take about 4 minutes, but the smaller valves in the Regional transmitters could be changed in less than 2 minutes.

### Launch of New Aircraft Carrier

BARROW-IN-FURNESS, on Lancashire's northern coast, will be the scene of an important launch on Wednesday morning, April 5th, when the new aircraft carrier, H.M.S. *Illustrious* will go down the slipway. She will be the biggest ship launched at Barrow. Lady Henderson, wife of Vice-Admiral Sir Reginald Henderson, Third Sea Lord and Controller of the Navy, is to perform the launching ceremony; and a description of this and of the whole scene will be broadcast by the B.B.C. in the Regional programme, by Thomas Woodroffe, from Vickers-Armstrongs' Naval yard.

# ROUND the WORLD of WIRELESS (Continued)

## Elgar Oratorio

DERBY Choral Union and the City of Birmingham Orchestra will be heard from the Drill Hall, Derby, on April 5th in Part 2 of Elgar's "The Kingdom." The soloists will be Olive Groves and Freda Townson, Parry Jones and Redvers Llewellyn. Harold Gray, who will conduct, succeeded Sir Henry Coward in 1931. The Derby Choral Union gave its first concert in 1867; it has had Patti, Lloyd, Santley and Foli as principals. The chorus numbers about two hundred.

## General Release

ON April 5th Martyn C. Webster will compère one of the "General Release" programmes of songs from current films. The Midland Revue Orchestra will be conducted by Reginald Burston. The vocalists are Richard English, of Gloucester, who first broadcast about eight years ago, and the Rhythmettes, a close harmony trio. Regional as well as Midland listeners will hear the programme.

## Good Friday Concert

A CONCERT of Church Music will be broadcast from the Royal Institution for the Blind at Edgbaston on Good Friday. The organist will be G. D. Cunningham, City Organist of Birmingham, and Edgar Morgan will conduct the B.B.C. Midland Singers.

## Tunes for Everybody

ONCE again the B.B.C. Scottish Orchestra will devote itself, on April 7th, to a selection of "Tunes for Everybody." Conducted by Ian Whyte, the orchestra will play favourite classical pieces whose melodies are familiar to all listeners, and also less pretentious but equally pleasant tunes.

## Television Official for U.S.A.

WE are informed that Mr. D. H. Munro, Television Productions Manager at Alexandra Palace, is to be released temporarily to the Columbia Broadcasting System of America for work in connection with the opening of the C.B.S. television service. He will sail for the United States of America on May 4th, and expects to be away from London for at least six weeks. Mr. Munro joined the B.B.C. in 1926 as an announcer at the Aberdeen station.

## INTERESTING and TOPICAL NEWS and NOTES

came to London in 1929 as Productions Assistant at Savoy Hill and was intimately concerned with developments in multi-studio presentation involving the use of the then new dramatic control panel.



H.M. the King, accompanied by the Queen and the two princesses, arriving at Portland Place for an official visit which their Majesties paid recently to Broadcasting House.

As the operator of an advanced type of control panel, Mr. Munro was responsible for co-ordinating the "Round the Empire" broadcast of 1932 in which King George V gave the first of his memorable series of Christmas messages to the world.

## London Music Festival, 1939

WE are informed by the B.B.C. that the cast for the Beethoven "Mass in D," which Toscanini will conduct in the Queen's Hall on Friday, May 26th, and on Whit Sunday (May 28th), has now been completed by the engagement of Zinka Milanov (soprano), who took part in the Verdi programmes under Toscanini last year.

Mary Jarred, previously announced as one of the soloists in Beethoven's Ninth Symphony, which Toscanini will conduct on Monday, May 22nd, is unable to take part in this work, owing to a previous engagement preventing her attending rehearsals. The services of Margaret Balfour have fortunately been secured in her place.

## Australian Short-wave Transmission Schedule (April 1939)

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

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

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

## Northern Music Hall

NORTHERN listeners on April 5th will hear some of the variety turns from the Winter Gardens, Morecambe, followed by an excerpt from Frank A. Terry's show, "Pleasure on Parade," from the Grand Theatre at Doncaster.

## Glastonbury Town Band

THE Glastonbury Town Silver Band, conducted by Lionel A. Levey, will broadcast from a Bristol studio on April 3rd. The band has gained numerous awards in contests, and made its first broadcast nearly three years ago. The soloist will be Hooper Bussell (baritone), who is well known as a concert artist in the West, and first broadcast in 1933.

## Variety from Bath

IN the feature entitled "Theatres of Variety," a programme will be broadcast from the Palace Theatre, Bath, on April 5th. The artists taking part will be Robert Naylor, "the popular singer," with Mildred Kramer at the piano; Walter Niblo, "comedian"; Michael Moore, "interviewing the stars"; and the Palace Theatre Orchestra, under the direction of Lawrie Jackson.

# SOLVE THIS!

## PROBLEM No. 341

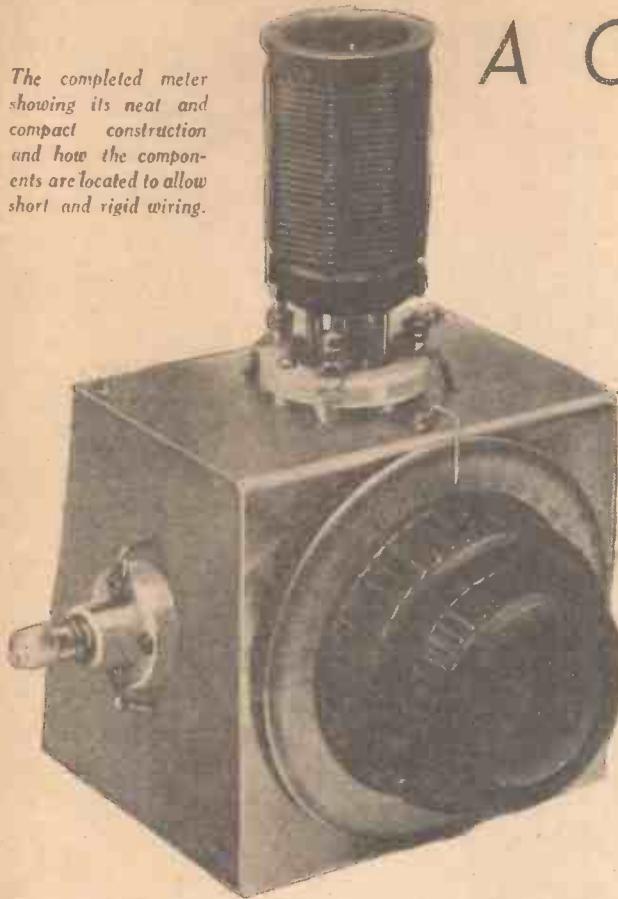
Boyce built a four-valve superhet using all the correct parts, but when first switched on he could obtain no signals. He therefore borrowed a signal generator and commenced to tune-up the receiver. He adjusted the second I.F. transformer and then connected the generator to the grid of the frequency-changing valve but could not obtain a signal in the output stage. He tested the secondary of the I.F. transformer and this was in order, and then he found also that the primary was in order. A D.C. test showed that the frequency-changer was passing anode current correctly, but no adjustment of the trimmers could enable him to obtain the note from the generator in the oscillator stage. What was wrong? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 341 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, April 3rd, 1939.

## Solution to Problem No. 340

The gang condenser which Houten obtained was tracked for 110 kc/s components and his I.F. transformers and coil were designed for 465 kc/s.

The following three readers successfully solved Problem No. 339 and books have accordingly been forwarded to them: R. Sandfield, 14, Varseng Road, Rainham, Kent; K. Russell, 83, Beaconsfort Road, West, Southbourne, Bournemouth; R. Bell, Little Cottage, High Road, Woolsey Terrace, nr. Crook, Co. Durham.

The completed meter showing its neat and compact construction and how the components are located to allow short and rigid wiring.



# A Calibrated Absorption Wave-meter

Describing the Construction and Operation of a Piece of Apparatus which is Most Essential in All Receiving and Transmitting Stations - - - - By L. O. SPARKS

of hearing and recognising a call-sign or, on the other hand, switching off without completing his log.

This, of course, applies in particular to the short waves, and for this reason the calibration curves given in this article have been compiled to cover the wavebands usually covered by the S.W. listener. There is no reason why the unit should not be used on the medium and long waves, once suitable

coils have been calibrated, but that must be left for another article.

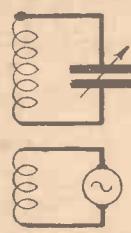
The holder of an A.A. or full transmitting licence will know from experience the value of a meter of this type, but for the benefit of those just entering this sphere of radio I would mention that it offers one of the quickest and simplest means of checking the frequency of the transmission, the adjustment of the tuned circuits, and the approximate output of the apparatus.

## Construction

The unit shown is constructed from 5-ply wood, obtained

from an old baseboard, and a small piece of 18-gauge aluminium measuring 4½in. by 7in. Although the metal panel and top appeared to be quite secure when screwed to the front edge of the small baseboard, it was decided, as rigidity is very important, to make quite sure that movement would not take place by fitting the two side pieces as shown. It will be noted that fillets are fitted to strengthen the joints formed between the sides and the base, and the bottom of the metal panel and the base.

The wiring will be obvious from the illustration in the first column.



The theoretical circuit of the meter.

After cutting the 5-ply to the shapes given, make sure that all edges are square and finish them off with fine sandpaper. The metal should be marked out while it is still flat, the hole for the fixing of the variable condenser being in the dead centre of the upright panel. The four-pin valve-holder, of the baseboard mounting S.W. type, is mounted in the centre of the horizontal portion of the panel, while the lamp holder can be fixed to one side as shown.

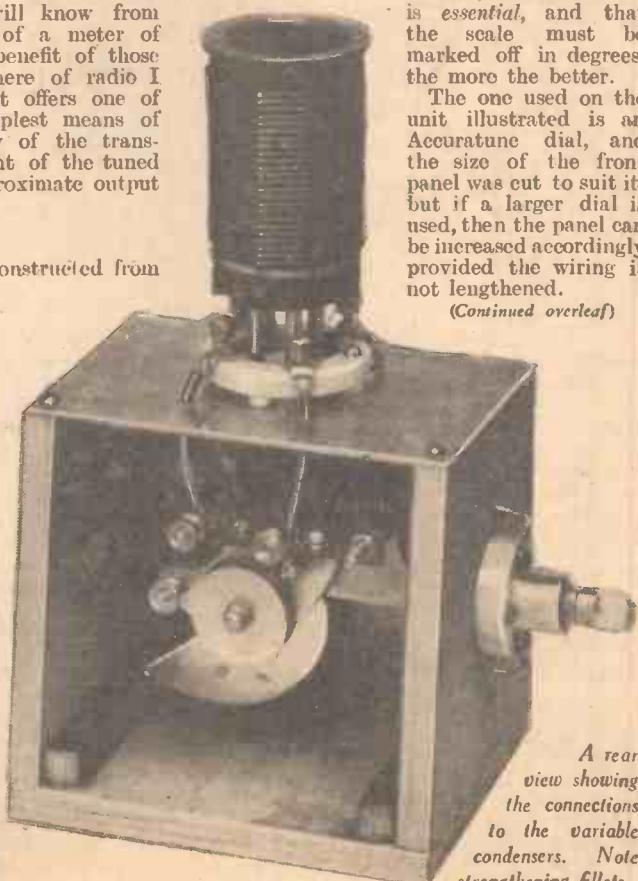
Six holes are drilled, four round the valve-holder and two round the lamp holder, to allow connecting wires to pass through the metal. When making the connections, use good insulating sleeving, and see that no burrs are left which would cut it through.

The slow-motion knob will have to be fitted according to the type selected. It is not a super-critical item, but in your own interests it should be remembered that

smooth, constant action is essential, and that the scale must be marked off in degrees, the more the better.

The one used on the unit illustrated is an Accuratune dial, and the size of the front panel was cut to suit it, but if a larger dial is used, then the panel can be increased accordingly provided the wiring is not lengthened.

(Continued overleaf)



A rear view showing the connections to the variable condensers. Note strengthening fillets.

### A CALIBRATED ABSORPTION WAVE-METER

(Continued from previous page)

One of the two items which is very important, that is, if full use of the calibration curves is going to be made, is the variable condenser. This is the "Special" S.W. type produced by Messrs. Jackson Bros., its value being 0.00015 mfd.

This component is provided with two forms of fixing, and it is quite immaterial which is used, though many will find, as I did, that the single-hole arrangement is quicker and quite satisfactory. If other types are used it is possible that the calibration curves will not hold good over all frequencies, as the condenser might have higher or lower maximum and minimum values of capacity or its vanes might be so shaped that the variation in capacity would not follow the same law as the J.B.

It is very essential to see that the component is firmly fixed to the front panel, and that the connections are made as indicated in the diagram.

The second of the two important items for this unit are the coils which have been specially produced by Messrs. Peto-Scott.

They are of the four-pin two windings type, and are designed to cover a total waveband of 84 metres in three sections, namely, 12 to 26 metres, 22 to 47 metres, and 42 to 96 metres.

The normal grid winding is connected across the tuning condenser, and the reaction section is used for the separate

which will produce a silent point in the receiver's reproduction. This will indicate that the meter circuit is tuned to the exact frequency of the station being received, and it is then only necessary to refer to the graph for the coil in use to determine what that frequency is. This is readily done by finding the point on the horizontal scale

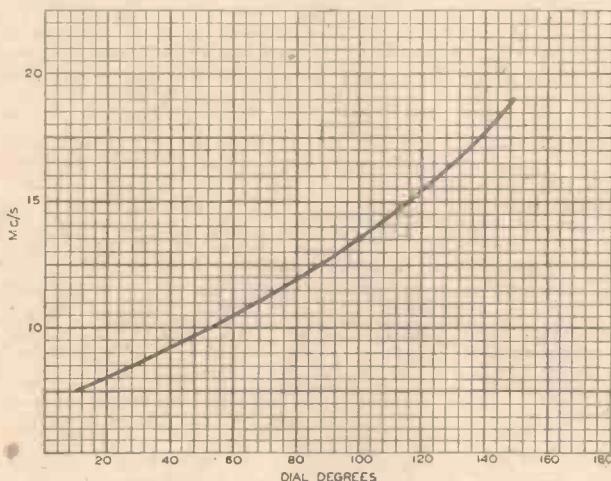
the incoming signal and the receiver, so it will be necessary to experiment to discover that degree of coupling which will give the greatest and sharpest effect. If the receiver is very close to the oscillation point, when tuned to the transmission, it will be noticed that very little coupling will be necessary for the meter to be effective. In some cases it is sufficient to lay the lead-in across the coil winding while in others the lead-in may have to be loosely coiled, say, a couple of turns, round the meter coil before definite indications are obtained. Always remember that the weakest coupling consistent with results will be the most accurate.

If it is desired to use existing coils, it will

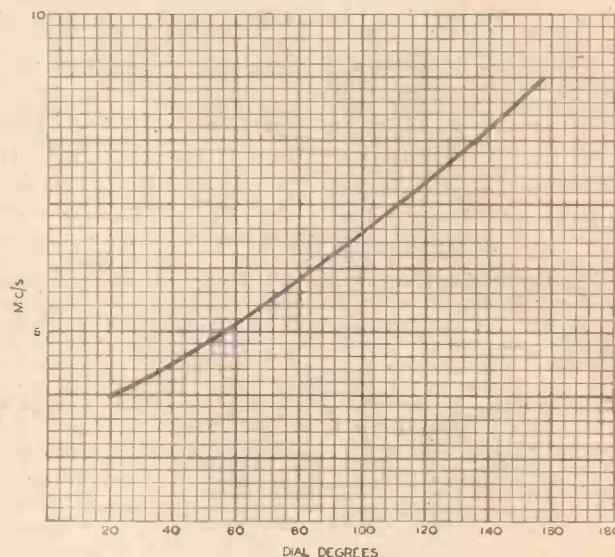
be necessary to calibrate them individually after the meter is constructed, and this can only be done by taking transmissions of known frequency and plotting the meter dial reading against station frequency. It is advisable to secure at least twelve points for each curve or coil.

which corresponds with the dial setting of the meter, and then drawing an imaginary line upwards until the curve is reached. Tracing this point to the left until it intersects the vertical scale will give the frequency.

The degree of coupling required between the meter coil and the aerial lead-in will vary according to the strength of



The curve of the "blue" spot coil covers a waverange of 15.6 metres to 20.2 metres.



The "red" spot coil had its readings taken between 79 metres and 32.2 metres.

inductively coupled circuit across the indicator lamp.

It will be noted that the graphs are plotted between frequencies and dial readings, therefore, those not too familiar with wavelengths in terms of frequencies must remember that frequency in Kc/seconds

300,000 or, the other way round, wavelength equals 300,000 f(Kc/s), and get in the habit of thinking in frequencies rather than wavelengths.

#### Operation

As the operation of the unit depends, as its name implies, on actual absorption of the signal under identification, it is necessary, in the case of a receiving station, to bring the coil of the wavemeter close to the aerial lead-in after the receiver is tuned, spot on, to the transmission.

By rotating the tuning condenser of the unit very slowly, a setting will be reached

#### Mr. Walker Wants to Meet You

MR. WALKER, fruity, friendly, Cockney junk man of "Band Waggon" fame, is to go on tour for the B.B.C.

He has been appointed a sort of Variety Ambassador whom listeners will hear every week in the all-Regional "Roundabout" series, which begins early in May.

Ever since it was announced that the "Band Waggon" programmes were to come to an end on March 15th, listeners have been asking, plaintively: "What is going to become of Mr. Walker?" For Mr. Walker, with his stories of curious how-d'y-e-do's, had become something of a national institution, and listeners were reluctant to let him go.

According to present plan, he will visit each Region in turn, seeking those interesting local characters which abound in the

provinces and bringing them to the microphone, as he did so capably during a recent "In Town To-night" broadcast. He will be particularly anxious to meet people who, no matter what their walk of life, have a musical background, so that, after chatting to them on the air, he can say: "Now come on, chums, let's hear what you can do." For example, he may find some West Country fisherman with an interesting tale of the sea to tell before introducing to listeners the fisherman's choir to which he belongs.

So, if you one day see a shortish, plump, pleasant little man with a bowler hat and a rather rolling gait, coming towards you down the garden path, he won't necessarily be trying to sell you something. He will probably be Mr. Walker—wanting to meet you.

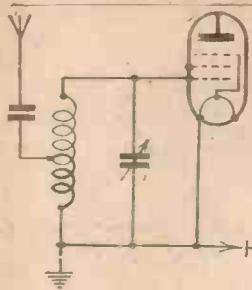


Fig. 1.—Simple tapped aerial-grid coil. It may be compared with Fig. 2.

# Coil Connections Simplified

How to Understand the "Sense" of the Windings and the Correct Method of Connecting the Two Ends of Each

By FRANK PRESTON

MANY constructors are baffled by the "sense" of the connections to the various windings of a modern coil. This is of particular importance when a coil has been made at home, or when specific instructions for connection are not available for a factory-made component.

Let us start by considering the aerial and grid windings of a typical coil of the broadcast or of the short-wave type. This input winding might be a separate coil of wire inductively coupled to the grid winding, or it might be integral with the grid winding. This point will be made clear by reference to Fig. 1, where a single-waveband coil is shown for simplicity; the same

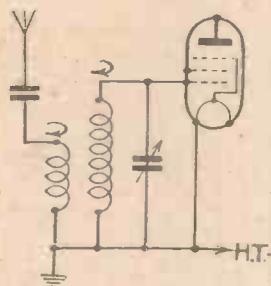


Fig. 3.—This arrangement would be inefficient due to both windings being in the same direction.

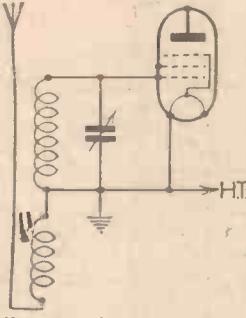


Fig. 4.—Another method of showing the separate aerial winding.

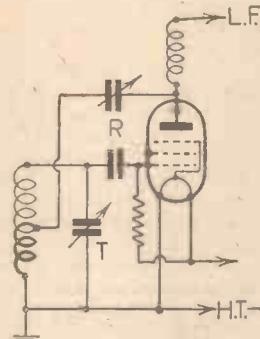


Fig. 5.—A reaction tap; compare with Fig. 1. This is not a sound practical arrangement.

principles apply when there is a tapping and a wavechange switch. It will be seen in this case that the aerial lead-in is connected through a series fixed condenser to a tapping on the grid winding. In this case the single winding actually behaves as two windings, since the portion shown in heavy line is common to both the aerial and the grid circuit. The circuit is, in fact, comparable in almost every respect to that shown in Fig. 2.

## Direction of Winding

The main point of difference is that in Fig. 2 both windings (assuming that the aerial coil be considered as a separate winding) are in the same direction, the aerial and grid being connected to the upper ends of each. In Fig. 2 the two windings are in opposite directions. Why? The explanation is that when the alternating or high-frequency current is induced into one winding from another the phase is reversed. In Fig. 1 the connection between the two windings is electrical (by direct connection), whereas in Fig. 2 it is electromagnetic. If the coil were wound and connected as shown in Fig. 3, it would, in the majority of instances, be far less efficient, although it might not fail to operate fairly well if the two windings were very close together. It will be understood, however, that by reversing the connections to either the aerial or grid winding in Fig. 3, the effect would be the same as if the direction of winding were reversed.

## High and Low-potential Points

It is because of the facts just explained that care should be taken in winding coils to note the direction of the turns on each of the windings. In most cases it is most convenient to run them all in the same direction, although there are cases where it is better, for practical reasons, to reverse the direction of one of the windings. But that is rare, since it is usually best to have the low-potential ends of adjacent windings together, separating their high-potential ends. The ends of a winding connected, directly or through a condenser, to earth are referred to as being at low-

This system will work, but it is not generally very satisfactory in practice. But look at Fig. 6, and you will notice that this is identical in principle with the Fig. 2 circuit. Both windings are in opposite directions, and the lower ends of both are earth-connected; the upper end of one goes to the grid and of the other to the anode, through the reaction-control condenser.

In Fig. 7 the two windings are in the same direction, so the lower end of one and the upper end of the other must be connected to the high-potential points in the circuit. Also in this instance the reaction condenser is shown in the earth lead instead of in the anode lead. Theoretically, it does not matter in the least in which reaction-winding lead this condenser is placed, although in practice it is a good plan, whenever it is convenient, to place the condenser in the earth lead, so that hand-capacity effects are obviated—both reaction condenser and the hand of the operator are at earth potential.

Fig. 8 is the same in form as Fig. 4, for the two windings are made continuous and are in the same direction; thus, the upper end of the reaction winding and the lower end of the grid winding are joined to earth. Apart from the fact that the reaction condenser is differently situated, the Fig. 8 connections are identical with those shown in Fig. 7.

## Reversed Corrections

If the reaction connections were reversed not only would the coil be less efficient, but reaction or feed-back would be entirely absent. Instead of signal strength increasing as the capacity of the reaction condenser were increased, it would become less. Also, tuning would tend to flatten instead of being sharpened as it is when reaction is correctly applied. In this case the reaction winding would serve only to damp the tuning winding and produce a marked decrease in efficiency.

Combining the typical arrangements of Figs. 2 and 7, we have a complete three-winding tuner shown in Fig. 9. This is a sound method of making a simple short-wave tuner, whilst one for any other

## The Reaction Winding

The same general rules apply when considering the reaction winding. One method of applying reaction is shown in Fig. 5, and it is evident that the coil arrangement is similar to that shown in Fig. 1.

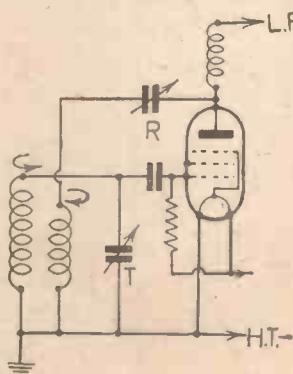
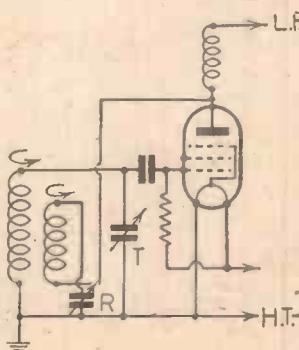
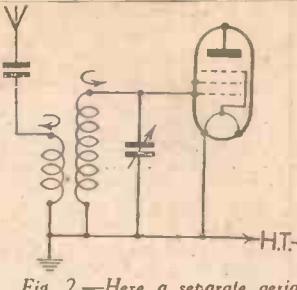


Fig. 6. (Left)—This reaction circuit is identical in principle with the aerial-grid circuit shown in Fig. 2.

Fig. 7. (Right)—When both grid and reaction windings are in the same direction as shown here, the connection to one should be reversed to obtain the correct "sense".



## COIL CONNECTIONS SIMPLIFIED

(Continued from previous page)

wavelength range can be made in a similar manner by using finer-gauge wire and by pile-winding when dealing with a long-wave tuner.

## Reducing Coil Size

In constructing a two-range broadcast tuner it is often more convenient to place the reaction winding on a separate former which can be supported inside the former used for the aerial and grid windings. This makes the complete tuner more compact. But it does not affect the method of connection. The only difference is that it would generally be necessary to allow rather more turns for reaction because of the smaller diameter of the former.

Another method of effecting an economy in overall dimensions—important when using a number of coils together as an all-wave unit—is to place the aerial winding directly over the centre of the grid winding. Due to the closeness of coupling only about two-thirds as many turns would be needed as when following the general layout indicated in Fig. 9. It will be appreciated that this method of construction is applicable more particularly to a single-range

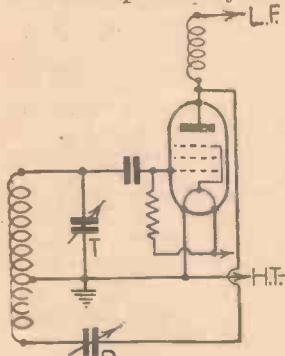


Fig. 8.—This reaction circuit is of the same form as the aerial circuit shown in Fig. 4.

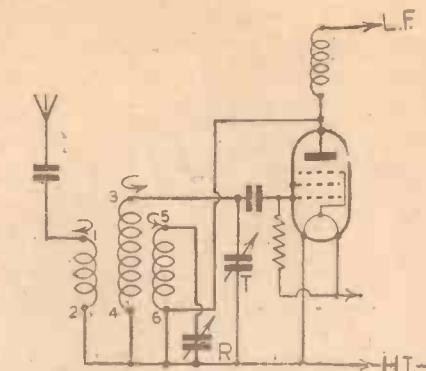
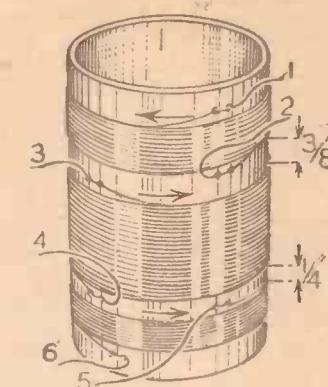


Fig. 9.—A complete three-circuit tuner shown diagrammatically and in practical form.

maining two-thirds over the long-wave section. Both portions of the winding would, of course, be in series, and it is important that they should be both in the same direction and in the opposite direction to the grid windings.

## All-wave Arrangement

When making an all-wave tuner consisting of a number of separate and individually complete single-circuit tuners, the connections shown in Fig. 10 are most satisfactory. It will be seen that each tuner is made to cover a particular wave-band, and that only one tuner is employed at a time; in other words, two or more windings are not arranged in series. To use a set of coils in this manner it is necessary to employ a double-pole rotary switch, or a three-pole rotary switch when the tuners embody reaction windings. The different sections of the switch are mounted together on a common spindle, and care must be taken to see that when the switch is in any one position a pair of corresponding windings is brought into circuit. This is obvious, but a mistake has often been made in this



respect due to careless mounting of the switch sections and failure to note the corresponding contacts. This is particularly true when a multi-way switch having, say, 12 positions is used. Standard switches of the rotary type and suitable for ganging can be obtained in three-, four-, six-, nine-, twelve- and eighteen-way models, and they may be obtained in a special form for all short-wave working. The main portions in this case are of ceramic material.

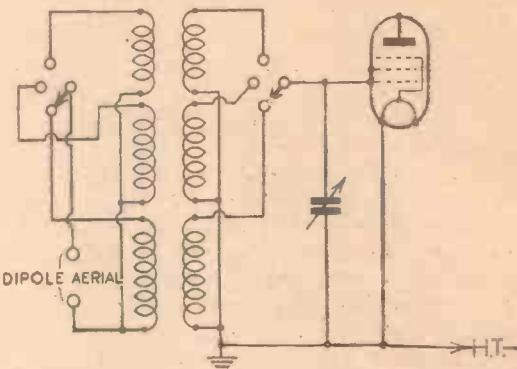


Fig. 10.—A satisfactory three-range tuner with aerial and grid windings.

## IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, March 29th.—Visit of the B.B.C. Symphony Orchestra to Preston.

Thursday, March 30th.—Band programme:

A Sullivan Half-Hour.

Friday, March 31st.—Il Trovatore (The Troubadour), an opera by Giuseppe Verdi.

Saturday, April 1st.—Motor Racing at Donington: A commentary on the British Racing Drivers' Club's Empire Trophy Race.

## REGIONAL (342.1 m.)

Wednesday, March 29th.—Miners' Wives, feature programme.

Thursday, March 30th.—The Worcestershire Hunt Point-to-Point: A Commentary on the race for Lady Dudley's Cup, from Crowle.

Friday, March 31st.—Love from a Stranger: The Oxford Repertory Company, from Midland.

Saturday, April 1st.—The Bassoon Factory, a symphony in one movement for five bassoons, several actors and orchestra, from Scottish.

## MIDLAND (297.2 m.)

Wednesday, March 29th.—Listeners Answer Back at Kettering.

Thursday, March 30th.—The Worcester-shire Hunt Point-to-Point: a com-munity on the race for Lady Dudley's Cup, from Crowle.

Friday, March 31st.—Love from a Stranger: The Oxford Repertory Company.

Saturday, April 1st.—English Folk Music: Orchestral programme.

## WEST OF ENGLAND (285.7 m.)

Thursday, March 30th.—For Western Farmers in Particular: Agricultural Scholarships, a discussion.

Friday, March 31st.—Clowelly, Devon, feature programme.

Saturday, April 1st.—Sports Special, a feature for Fans.

## WELSH (373.1 m.)

Wednesday, March 29th.—A light pro-gramme from the Town Hall, Denbigh.

Thursday, March 30th.—Choral pro-gramme.

Friday, March 31st.—A Welshman's Calendar: E. Morgan Humphreys.

Saturday, April 1st.—Orchestral concert.

## NORTHERN (449.1 m.)

Wednesday, March 29th.—Miners' Wives, a feature programme.

Thursday, March 30th.—Music of the People: A Derbyshire Concert from Staveley.

Friday, March 31st.—Northern Music Hall: Variety from the Alexandra Theatre, Hull.

Saturday, April 1st.—Northern Choral Singing.

## SCOTTISH (391.1 m.)

Wednesday, March 29th.—Variety from the Empress Playhouse, Glasgow.

Friday, March 31st.—Edinburgh Gaelic Choir.

Saturday, April 1st.—The Bassoon Factory, a symphony in one movement for five bassoons, several actors and orchestra.

## NORTHERN IRELAND (307.1 m.)

Wednesday, March 29th.—Organ from the Ritz Cinema, Belfast.

Friday, March 31st.—Irish Rhythms: Orchestral concert.

Saturday, April 1st.—Association Football: Ballymena United v. Portadown, a commentary during the second half of the match, from the Showgrounds, Ballymena.

# ON YOUR WAVELENGTH

## 15 Years of Progress

HAVE you ever stopped to consider the progress which has been made in the short space of 15 years, yet that, basically, wireless sets are the same to-day as they were 15 years ago? I am reminded of this progress by an article in the Osram G.E.C. Bulletin. One has only to recall what a radio receiver looked like 10 years ago and compare it with the current models to obtain a good idea of the strides made in design. Some of the illustrations to the article show sets which were the very last word when they were introduced. Now we are on the threshold of a radical departure from type, for television is knocking at the door, and seizing with avidity upon anything of value to its own organism. Television is here, and you will not only not be able to close your eyes to it but certainly you will not be able to close your pockets to it. Within a comparatively short time you will be considered hopelessly out of date if you do not own a television receiver. Do not wait in the expectation that design will change. It will not, nor will prices show any marked decline; for they have been stabilised.

## Television in the Cinemas

SO many contradictory statements have appeared in the daily papers about large-screen television that the B.B.C. have issued a special statement about it. This makes it clear that they do not object to the rediffusion of national events; where, as in such items as sporting events, a promoter is concerned, the B.B.C. merely asks that no exclusive rights shall be given to any one group or system. They further state that dealers may give demonstration performances of television provided that no charge is made. They state that large-screen projection of television programmes is still regarded as experimental, and permission to use B.B.C. transmissions in this way will be subject to certain necessary restrictions. Experience of the results will afford guidance to future policy, which is still under consideration by the Television Advisory Committee.



*By Thermion*

## The B.B.C. Market Research

ACCORDING to the B.B.C. analysis of the questionnaire it recently circulated to listeners, 60 per cent. of sets in use to-day are at least three years old, 40 per cent. were purchased four years ago or earlier, and these figures were obtained from an examination of 101,803-replies received. The following are some of the figures:

1938 :	16.5 per cent.
1937 :	22 per cent.
1936 :	21 per cent.
1935 :	14.5 per cent.
1934 :	11 per cent.
1933 :	7 per cent.

and before 1933 : 8 per cent.



"George, Mr. Smith from the next flat says he's come to fix the wireless!"

These figures seem to indicate the reliability of sets produced several years ago.

## The B.B.C. Budget

THE B.B.C. last year had an income of £3,800,051, and of this sum a half, or £1,892,081, was

spent on programmes, according to the B.B.C. twelfth annual report. No less than £352,846 from revenue, and £66,247 from capital was spent on television. Foreign broadcasts cost £38,958 from revenue and £103,000 from capital. The programme expenditure increased during the year by £162,426 compared with 1937. Developments in hand include the extension of Broadcasting House, which seems so soon to have outgrown itself, and the building of new premises at Belfast. The new transmitters at Start Point and Clevedon in the West Region and at Daventry for foreign broadcasts will be completed in the near future. It is contemplated that the London and North Regional transmitters will be replaced by high-power stations and that the outside broadcast equipment will be improved. The total broadcasting time last year was 79,525 hours, which shows an increase of 2,000 on the previous year, whilst the breakdown percentage was .023, which aligns with 1937.

## Radiolympia Poster Competition

I HAVE adversely commented upon the posters used in previous years to advertise Radiolympia. Last year's poster effort gave me the impression of an addled egg which had been thrown against a blackboard. This year the R.M.A. has invited designs, and there is to be a prize of £25 for the idea which is accepted. The committee is considering suggestions only from staffs of radio manufacturers.

## "Advice to Inventors"

READERS who require a copy of this book to which I recently referred should send six penny stamps to Mr. K. T. Hardman, 110, Singleton Avenue, Birkenhead.

## An Interesting Life Story

I SEE that yet another radio star has decided to write his life story. This time it is Carroll Levis, the popular young Canadian, who has had an extraordinarily interesting career. They call him "Lucky Levis," and

although his hair is silvered, he is only twenty-nine. In his brief career he has worked as an itinerant sign-writer, a circus performer, a hypnotist, and a radio announcer. His is yet another story of a man who came to England without anything but a few pounds in his pocket and an idea in his head, and has succeeded in making himself one of the most popular personalities of the day. He is now writing his own life story, which is appearing week by week in *Tit-Bits*.

### Competition

I WILL award a book to each of the six senders of what I consider to be the best 250-word essay entitled "What I would like to see at Radiolympia." Attempts should be written on one side of the paper and should reach me not later than April 24th. Essays should be constructive, and the winning essay will be sent along to the Radio Manufacturers' Association.

### The "P.W." Catalogue

READERS of this journal can obtain free of charge a catalogue of the standard technical books, including wireless books, which are published from the offices of this journal. Send a postcard to the Editor, PRACTICAL AND AMATEUR WIRELESS, Tower House, Strand, London, W.C.2, marking it "Catalogue" in the top left-hand corner. The list will be sent to you by return.

### B.B.C. Exhibition to Visit Liverpool

I AM informed that the B.B.C. Travelling Exhibition—illustrating almost every activity of the Corporation—is to visit Liverpool this month. It will be housed in the Walker Art Gallery, where (thanks to the ready co-operation of Liverpool's Libraries, Museums, Arts and Music Committee) it will be on view free to the public from Tuesday, April 4th, until Saturday, April 22nd.

At three on Tuesday afternoon, April 4th, the opening ceremony will take place, and it is to be attended by the Director-General of the B.B.C., Mr. F. W. Ogilvie. The Exhibition will be opened by the Lord Mayor of Liverpool, Alderman Sir C. Sydney Jones; and the ceremony will be presided over by Alderman H. A. Cole, chairman of the Libraries, Museums, Arts and Music Committee.

### Behind the Scenes of Broadcasting

THE B.B.C. Exhibition is, in effect, a three-dimensional "poster." Its purpose is to take listeners behind

## Notes from the Test Bench

### A Soldering Point

WHEN making connections in modern receivers it often happens that three or four leads have to be joined together and then anchored to one point. For instance, two or more wire-ended resistors and condensers may have to be joined to earth. If these components are placed in position singly, the application of the iron for the last connection may result in the earlier ones coming adrift, and the process is not, therefore, a simple one. One method of overcoming the difficulty which is usually adopted is to twist all the leads together and solder them as one. In a receiver recently serviced this had been done, but the leads had not been properly cleaned first, and one of the fixed condensers had been waxed by the makers—the wax extending over the wire end. When the wires had been soldered the wax had run and two of the leads, although embedded in the solder, were not in electrical contact with the others, thus preventing, in this case, the set from working. Multi-contact tags will overcome this difficulty, or each lead should first be tinned thoroughly before they are twisted together.

### H.F. Chokes

IN making an all-wave receiver the design generally calls for an all-wave H.F. choke. Special components for this purpose are readily available, but it is possible to make shift with ordinary broadcast and short-wave chokes, connecting these in series. The short-wave component should be next the anode, or in other words, at the high-frequency end of the circuit, and the broadcast choke at the earth end. In some cases it may be found worth while to include yet another short-wave choke between the broadcast choke and the H.T. or similar connection.

### Coil Matching

WHEN using many coils in a ganged tuner, it is often difficult to obtain accurate matching, either because of stray wiring capacities, or because different coils are in use. Although turns may be stripped from a coil to effect accurate matching a better plan is to mount a small copper disc on a threaded rod inside the coil formers and adjust the position of the disc (which should be connected to earth) until the required inductance value has been obtained. With careful tests it may be found that only one coil gives trouble and, therefore, only one such disc may be required. A signal-generator or some similar instrument will be of assistance in accurately judging the correct matching value.

the scenes of British broadcasting in a way that explains clearly and simply the evolution and development of Radio the Science, and Radio the Entertainment.

It gives a wide-angle view of broadcasting as it is—and as it was. Technical and general information is presented in a way answering many questions which listeners frequently ask about "how it works," what studios and their equipment are like, and so on.

Working models give life to several of the chapters of broadcasting's inside story; and there will be on view a number of microphones—the up-to-the-minute types, and some of the "mikes" used in the early days.

### Pictures from Studio Productions

**PHOTOMONTAGE**—the skilful arrangement of medleys of photographs—is used to illustrate many aspects of the B.B.C.'s work; and the pictures come from notable outside broadcasts and from studios in London and provincial broadcasting houses. Variety, drama, orchestral, talks and many other programmes are illustrated. The News, the Weather Forecast, Recording Systems, Transmitting Stations—all are represented on the picture-covered screens.

### Northern Programmes

SIX screens are devoted to illustrating North Regional programme activities—an addition to the display since it concluded its tour of Midland towns.

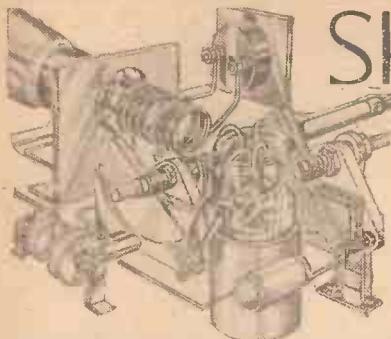
Some listeners in the Merseyside districts may already have seen the Exhibition in London (it was there early last year), or when it was on view at the Empire Exhibition in Glasgow. But for the majority in this densely populated area it will be a first opportunity to "peep behind the scenes of radio" and to learn something more of the B.B.C.'s work—for Liverpool will be the first city or town in the North Region to be visited by the Exhibition.

## PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM

400 pages, 6/- or 6/6 by post  
from

GEORGE NEWNES, LTD.,  
Tower House, Southampton Street,  
Strand, W.C.2.



# SHORT-WAVE SECTION

## A.C. OPERATED SHORT-WAVE SETS

How to Overcome the Main Trouble with Mains Operated Short-wave Apparatus—Namely, Hum.

MANY constructors have attempted to make up an A.C. version of our Simplest Short-wave Receiver, or have built a similar receiver to their own design, only to find that results are very unsatisfactory owing to the hum background. Similarly, some listeners have tried to operate an ordinary battery short-wave receiver with a simple type of A.C. mains unit, or battery eliminator, and have experienced the same trouble. In most cases the hum is only troublesome because headphones are relied upon for reception, and you can include headphones in almost any standard broadcast A.C. receiver, which is apparently perfectly free from hum on the loudspeaker, only to hear the noise quite clearly in the 'phones. It would, therefore, appear that special precautions are necessary in A.C. short-wave apparatus, and the following are some of the cures which have been found to be effective in cases which have been tried out. Firstly, there is the question of the layout, and it is presumed that the average listener knows the necessity for using twisted flex for heater leads, and the need for making certain that the H.T. smoothing choke is placed in such a position that no interaction can take place with any other inductive components, such as tuning coils, H.F. chokes, etc.

### Loose Laminations

A more important point in this connection, however, is the locking of the core or laminations of both smoothing choke and transformer. Whilst in an ordinary broadcast receiver slight looseness may not

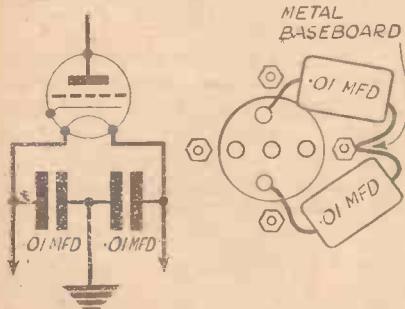


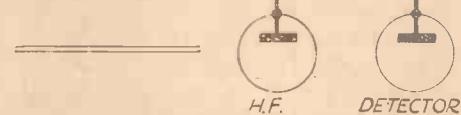
Fig. 1.—Condensers across the heater circuit as shown here should be used. The detector stage is usually best for this scheme.

occasion trouble, in the short-wave set the vibration set up in the chassis from the vibrating laminations may easily give rise to excessive hum level in headphones. Therefore, make quite certain that this point is attended to.

In the general design of the circuit and in the method of wiring, however, there are a number of points which require special attention if hum-free results are to be obtained. In the ordinary type of A.C. receiver, the heater winding is provided with a centre-tap, and this is joined to earth. Although in some cases in a broadcast set

this is not fully effective, and an artificial centre-tap is provided by using a variable resistance joined across the winding, this

Fig. 3.—When using a mains unit it may be necessary to provide additional smoothing for the detector stage, as shown here.



also is often ineffective on a short-wave set. In the Air Hawk 9 receiver, the most effective connection for the heater circuit was found to be a direct lead from one H.T.+

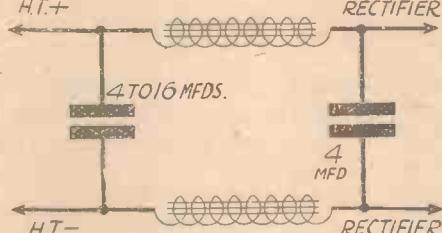


Fig. 2.—An additional choke in the H.T.—line may be needed if all other schemes fail.

side of the first valveholder to the earth terminal, but when this was tested out it was found that one side of the heater circuit had to be earthed to give hum-free reception, but a reversal of the mains plug necessitated the earthing of the other side of the heater circuit. Therefore, if this method of wiring is adopted, the mains plug should be marked so that in the event of its removal, it will be reinserted in the correct position to give the desired results.

### Filtering

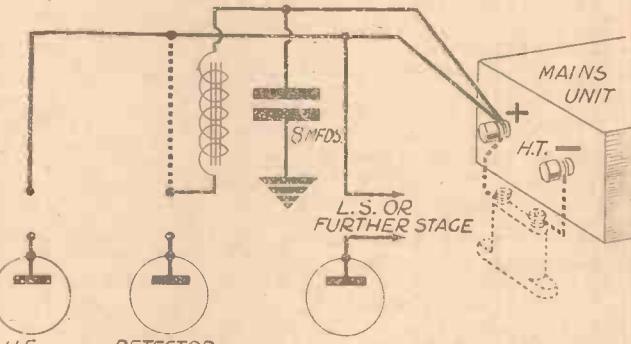
A plan which is often more effective, especially with a single valve receiver, however, is to earth the heater circuit through a condenser filter, and for this purpose a condenser should be joined to each heater terminal on the valveholder, and the two condensers then connected together and to earth as shown in Fig. 1. In most cases a capacity of .01 mfd. will be found effective, although this may be reduced in some instances to .001 mfd. In a multi-valve receiver the detector valve is generally the best place for this earth connection, but before making the connection permanent the two condensers should be held against each valveholder in turn, whilst they are connected to earth, in order to ascertain which circuit provides the best results.

Another point to receive attention is the

capacity of condensers used for decoupling purposes on the H.T. side. It will often prove necessary to use 8-mfd. electrolytics in this connection, the size of the resistance apparently not being so critical as the condenser capacity. Again, the detector stage is generally the most critical one.

### Mains Units

When using a simple mains unit for a battery-type receiver, the smoothing may often be increased with advantage, and an additional fixed condenser of large capacity across H.T.+ and H.T.—terminals may be all that is required. If this does not remove all trace of hum, then it may prove worth while to use a further filter network, consisting of a smoothing choke and con-



denser joined in series with the H.T. lead. If the receiver is a single valve set the total current will be quite low and, therefore, a small choke may be used, as the inductance will be kept on the high side.

### Multi-valve Receivers

If a multi-valve receiver is in use, then it may prove necessary to feed the detector stage alone through a similar filter as shown in Fig. 3. If this is not fully effective, the additional filter may be connected to the mains unit and a flexible lead taken from the receiver side of it and used to feed the H.F. stages, experiments being carried out to ascertain which stage is in need of the additional smoothing. Unfortunately, short-wave apparatus does not seem to lend itself to rigid rules and each receiver has, therefore, to be tried on its merits.

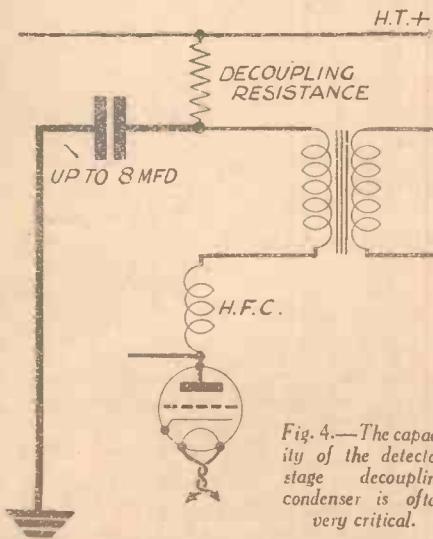


Fig. 4.—The capacity of the detector stage decoupling condenser is often very critical.

The suggestions given should enable even the most obstinate cases of hum to be removed, or at least kept down to a very low level, but there is one further idea which might have to be adopted in a

**SHORT-WAVE SECTION**

(Continued from previous page)

severe case which does not answer to the above arrangements. In some short-wave transmitters it is often found desirable to include a smoothing choke in both H.T. + and H.T.—leads, and therefore, if all other methods have failed the addition of another

smoothing choke in the H.T.—lead should be resorted to. In only one case have we found it necessary to adopt this additional smoothing circuit, and a rearrangement of the general circuit wiring enabled it finally to be dispensed with. If, therefore, the former methods have proved not fully effective, and it is desired to avoid the

expense of the additional smoothing choke, it may be necessary to consider a modification in the receiver design, paying special attention to the layout of the detector stage, screening the valve in a metal screening box, and using a separate heater lead to that stage, instead of including it in the general heater network.

## Leaves from a Short-wave Log

**Spanish Nationalist Radio Relays**

THE main programme of the Nationalist (Franco) station at Salamanca (Spain) on 238.5 m. (1,258 kc/s), which includes war news bulletins in several European languages, is now relayed three times daily by the following short-wave transmitters : FET1, Valladolid, on 42.82 m. (7.006 mc/s); FET5, Burgos, on 40.8 m. (7.353 mc/s); EDR3, el Tablero, Tenerife (Canary Islands) on 28.94 m. (10.36 mc/s); and by Radio Malaga, on 20.77 m. (14.445 mc/s) and 41.56 m. (7.22 mc/s). The times of transmission are : G.M.T. 14.30-15.00; 20.30-21.30, and 22.45-23.30.

**New Copenhagen Channel**

OZH2, the new 5-kilowatt Skamlebaek (Denmark) transmitter, is testing occasionally during the afternoon hours on 19.58 m. (15.32 mc/s). Reports of reception should be addressed to Stadsradiofonien, Heibergsgade, 7, Copenhagen, K, Denmark.

**Rome Uses an Extra Wavelength**

TRANSMISSIONS from Rome (1) are frequently made through the I2RO6, Prato Smeraldo, 25-kilowatter working on 19.62 m. (15.29 mc/s). A nearby channel, namely, 19.7 m. (15.23 mc/s), is also allotted to this station.

**HVJ, Vatican City, Moves Again**

IN view of continuous interference with its broadcasts on 31.41 m. (9.55 mc/s), the Vatican City transmitter is now working on Sundays on 31.06 m. (9.66 mc/s). This is the channel used by LRX, Buenos Aires (Argentine Republic).

**Good Signals from Uruguay**

CXAS, Colonia (Uruguay), on 31.12 m. (9.641 mc/s), has been well heard lately when relaying a radio programme from LR3, Radio Belgrano, Buenos Aires. The studio announces itself as *Radio Colonia*, uses a vibraphone interval signal every fifteen minutes, and does not appear to close down before G.M.T. 07.00.

**Logging Chile**

CB970, Valparaiso (Chile), on 30.88 m. (9.7 mc/s), *La Voz de Chile*, is the short-wave outlet of CB76, the 10-kilowatt medium-wave station in that city, and in some instances you will hear the two call-signs coupled in the announcements. Both are owned and operated by the Co-operative Vitalica. Reports should be addressed to them through Casilla Postal (Post Box), 1,627, Valparaiso (Chile).

**Bogota in the 31-Metre Band**

SINCE HJ7ABD, Bucafamango (Colombia), moved from 31.17 m. (9.621 mc/s) to 61.35 m. (4.89 mc/s), with the new call-sign HJ7GAH, another Colombian station has been logged near its own channel. This would appear to be HJ3CAT, Bogota, a 5-kilowatt transmitter on 31.15 m. (9.63

mc/s). The station may be identified by its five or six chime signal, and by the fact that it closes down with the playing of one of Sousa's popular military marches.

**And Newfoundland**

VOFB, a 500-watt transmitter at St. John's, is reported to be testing on 31.15 m. (9.63 mc/s).

**Add Nicaragua to Your List**

TWO stations in Managua (Nicaragua) which radiate the same programme simultaneously are YNPR, on 34.92 m. (8.59 mc/s), 800 watts, and YNRF, on 44.38 m. (6.76 mc/s). The call is : *Aquí la Voz de la Radio Pilot*, and the studios are on the air from G.M.T. 19.00-19.30, and from G.M.T. 00.30-02.45 or 03.00. The programme usually opens with a March. Reception reports should be sent to Radiodifusores YNPR y YNRF, Apartado Postal, 164, Managua (Nicaragua), Central America.

**A Newcomer to Venezuela**

LISTENERS report the reception of broadcasts on 61.86 m. (4.85 mc/s) of a station giving the call-sign YV1RZ, Valera. The power is officially stated to be 1 kilowatt. Interval signal : four chimes.

**Short-wave Commentary of the Boat Race**

ON April 1st the University Boat Race is to be the subject of a commentary from the air. John Snagge will, as usual, give his vigorous description of the race as seen from a following launch, but in addition Joly de Lotbinière, Director of Outside Broadcasts, will provide a commentary from a 'plane cruising at a minimum height of 2,000ft.

The object of this interesting experiment is to overcome the difficulty of estimating the distance between the two boats.

This year John Snagge will be on the launch *Consulta*, not the *Magician* as in previous years, and he will give the bulk of the commentary. When the boats begin to draw apart he will put in a radio appeal to his colleague above, who

will be able to form a fairly accurate estimate of the distance between the boats. Both launch and 'plane will keep in radio contact with a receiving station on the roof of Harrods' Depository.

**South African S.W. Stations**

IT is reported that the South African Broadcasting Corporation's two 5kW short-wave stations now use a different call-sign for each of the four wavelengths employed. The station at Roberts Heights, near Pretoria, uses ZRG (31.5 m. and ZRH (49.94 m.), and that at Kliplheuwel, near Cape Town, uses ZRL (31.23 m.) and ZRK (49.2 m.).

**Amateurs in Lithuania**

THE total number of licensed amateur transmitters in Lithuania is now stated to be forty-five and a national organisation of amateurs has now been formed. The organisation is known as L.B.M. and the address is P.O. Box 100, Kaunas, Lithuania.



Two American girls are here seen posing for the television camera in a unique beauty contest staged at Palm Beach. The judges made their selection from televised images several hundred feet away without actually seeing the beauties in the flesh.

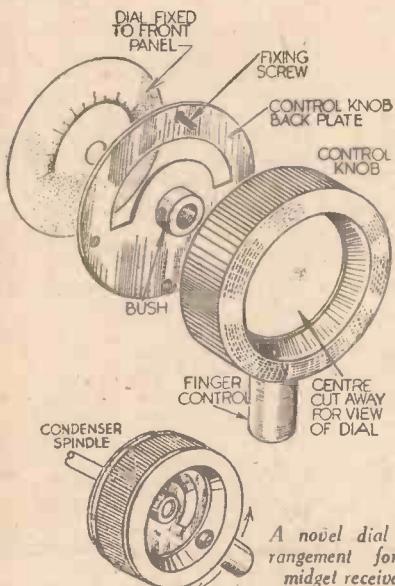
## A PAGE OF PRACTICAL HINTS

SUBMIT  
YOUR  
IDEA

THE  
HALF-  
GUINEA  
PAGE

## A Dial for Midget Receivers

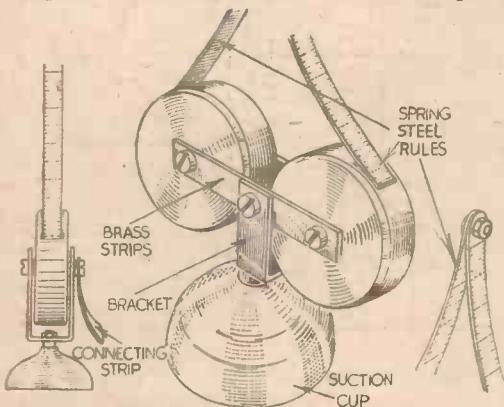
WHILE redesigning my midget receiver I decided to fit a dial, and there being a lack of room to spare for the ordinary dial, I had to resort to the following dodge :



A novel dial arrangement for a midget receiver.

A knob of approximately 2in. diameter was taken, and the centre cut out, as shown. A semi-circular slot was cut from a disc of polished aluminium, and after fixing a bush to the centre the whole disc was screwed to the back of the control knob. A dial was made and stuck to the panel of the receiver in such a way as to show through the slot in the aluminium disc, with the addition of a small plug as a finger control easy reading of the dial was obtained.—J. E. HIGHAMS (Acton).

A Collapsible Aerial for a Portable THE accompanying sketch shows an aerial that rolls up when it is not being used; it is constructed from two



Flexible steel rules are used for this collapsible aerial.

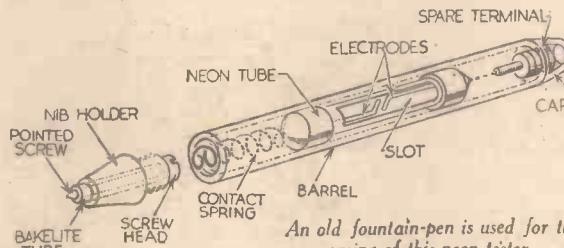
## THAT DODGE OF YOURS!

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

## SPECIAL NOTICE

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

steel rules such as may be bought in any 6d. stores. Brass strips are cut, as shown, to form mountings for the reels, which are fastened to the strips by screws passed through holes bored through the reels at the centres, as indicated. A suction cup



An old fountain-pen is used for the casing of this neon tester.

is attached to the bottom of the upright support, and this holds the extended rules on top of the receiver when in use.—G. F. PATON (Kilmarnock).

## A Simple Neon Tester

THE body of the tester consists of an old fountain-pen of the stud-filling variety. The nib and filling mechanism are removed, and a small slot cut in the side of the barrel. A piece of bakelite tube is tapped out to take a 5BA screw about 3in. long, which just projects through the end of the tube. The end of the screw is turned or filed to a point. The tube is fixed in the hole left by the removal of the nib.

A small neon tube of the tubular type is fitted into the barrel so that its electrodes are visible through the slot. If necessary, a piece of packing will have to be put in the barrel first. A phosphor-bronze spring is now put on top of the tube, and the top part screwed in so that the spring touches the head of the screw. When testing the mains to find which is the earthed side, the point of the tester is just touched on the lead (one at a time) and it will be found that the tube will not glow on the earthed lead. A small terminal may be arranged at the other end of the tube if the

tester is to be used for other kinds of testing.—P. WATSON (Wealdstone).

## A Permanently Wired H.T. Battery Container Unit

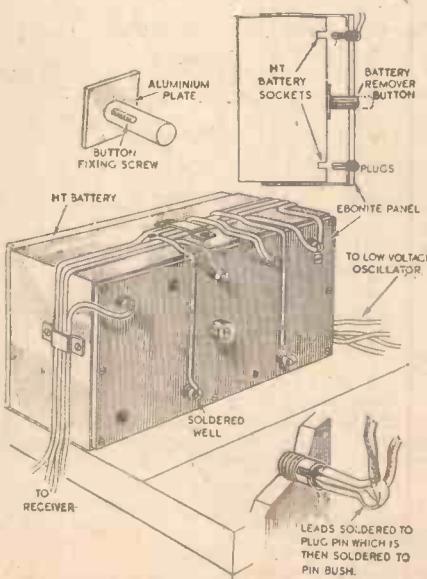
TO facilitate a number of connections to be made to a single H.T. battery, necessitated by running a receiver and a low-voltage oscillator from the same supply, I have constructed an aluminium battery container as illustrated in the accompanying sketch.

By providing an ebonite front panel, drilled at points in line with the battery sockets when this is fitted, bare wander-plug pin bushes could be fitted, leaving the plug pins to be fitted finally as desired, and soldered as shown in the inset diagram and pictorial. In this manner the leads from the apparatus could be clamped to the top of the battery container, and so remain undisturbed when the battery requires replacement.

As the size of the container resulted in rather a flush fitment at the back, it was necessary to provide some means for assisting the removal of the battery, so I arranged a small push-button from ebonite and a piece of aluminium as depicted, positioning this in the centre of the unit.—S. G. SANDERSON (Sherborne).

## Coils, Chokes &amp; Transformers

Price 2/6—by post 2/10



A compact battery unit housed in an aluminium container

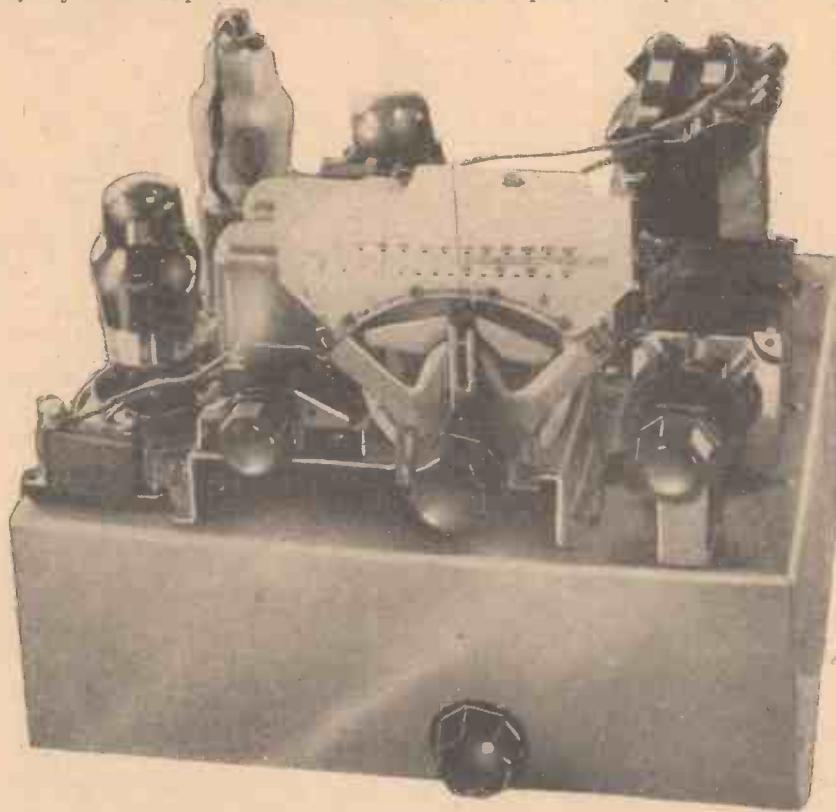
**C**ONTINUING our series of receivers which may be constructed from obsolete components, we give details here of a three-valve A.C. mains receiver which has recently been constructed from a varied assortment of old parts, some of which were over five years old.

Despite the very rapid advances that have been made in radio design since the majority of the components and the circuit

that a screen-grid H.F. stage is used in conjunction with a leaky-grid detector, and a pentode output valve. Power

# THE A.C. SPARE

## A Useful Three-valve A.C. Constructed from the Old in Most "Sp



### The completed receiver.

design were current practice, excellent results have been obtained.

## Circuit Considerations

The circuit is given in Fig. 1, which shows

A single tuned circuit precedes the

A single tuned circuit precedes the screen-grid valve, the volume control not only increasing the resistance in the

cathode circuit when volume is required to be reduced, but also reducing the resistance shunted across the aerial tuning coil, thus by-passing the aerial input voltages. This method of both cutting down the aerial input and at the same time reducing the gain of the valve gives a continuously variable control which is very effective in practice.

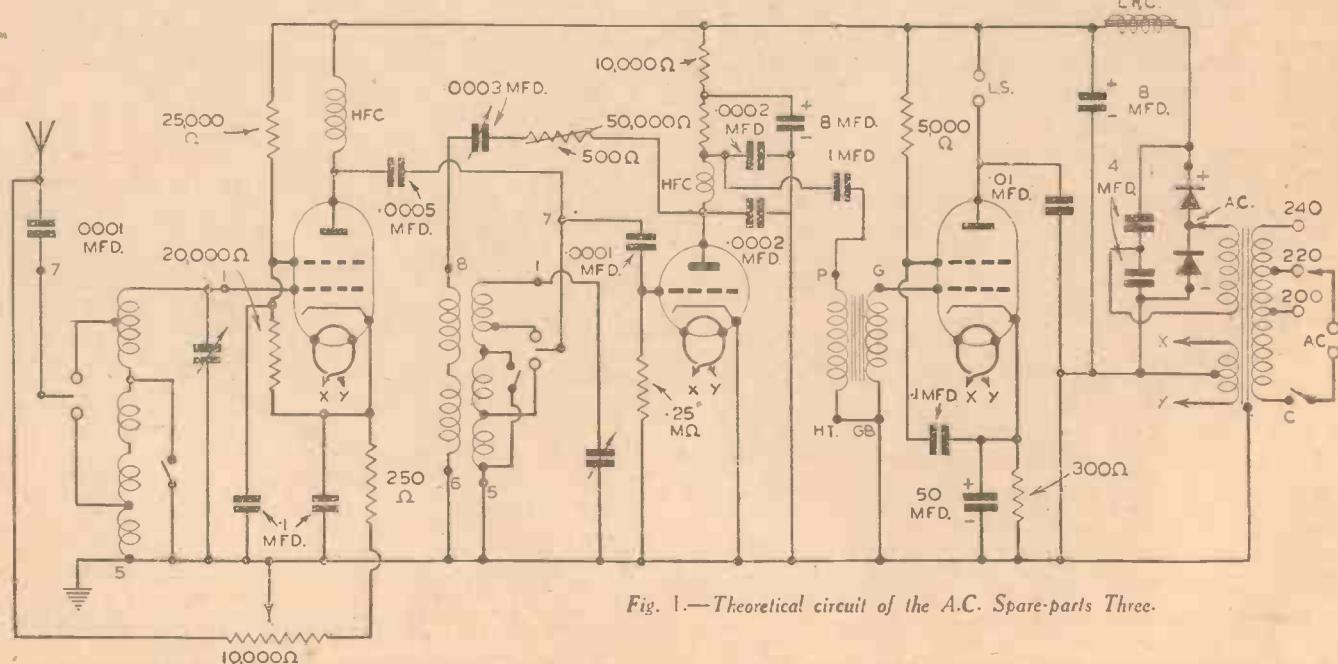
Choke capacity coupling is used between the H.F. and the leaky-grid detector stages, a tuned-grid coil being used. This arrangement gives a good compromise between selectivity, sensitivity, and quality.

It will be noted that a 500-ohm resistance

## LIST OF COM

- One screen-grid H.F. valve. Marconi VMS4B.  
 One triode detector valve. Marconi MH4.  
 One pentode output valve. Marconi MPT4.  
 One H.T.8 Westinghouse metal rectifier.  
 One mains transformer to suit H.T.8 rectifier,  
     with 4-volt 4-amp. L.T. winding.  
 One two-gang 0.0005 mfd. tuning condenser.  
 One aerial tuning coil. Colvern G.10.  
 One tuned grid coil with reaction. Colvern G.3.  
 Three valveholders.  
 One 4 : 1 L.F. transformer. R.I. Parasfeed.  
 One 10,000 ohm volume control.  
 One 25,000 ohm resistance.  
 One 20,000 ohm resistance.  
 One 250 ohm resistance.  
 One 500 ohm resistance.  
 One 0.25 mezzohm resistance.

is inserted in the reaction circuit, which otherwise is quite normal. This is to stop parasitic oscillation caused by the detector valve going into oscillation at a frequency determined by the combined constants of the reaction circuit and that portion of the grid circuit between grid and earth,



*Fig. 1.—Theoretical circuit of the A.C. Spare-parts Three.*

# E-PARTS THREE

Receiver which may be  
and Ends to be Found  
ares" Boxes

and shown up by the set going into oscillation, especially on long waves, with the usual slight "plop," but without giving the usual heterodyne whistle on the received signal, and before the full reaction amplification has been reached.

From the point of view of progressive and efficient reaction, we have found the following combination of values to give the best results:

Detector anode by-pass	0.0002 mfd.
Reaction condenser	0.0003 mfd.
Stopping resistance	500 ohms.
Detector grid condenser	0.0001 mfd.
Detector grid leak	0.25 megohm.

## COMPONENTS

One 10,000 ohm resistance.  
One 50,000 ohm resistance.  
One 5,000 ohm resistance.  
One 300 ohm resistance.  
Two 8 mfd. electrolytic condensers (or 8+8 block).  
Two 4 mfd. 200 volt working paper condensers.  
Two 0.0001 mfd. condensers.  
Two 0.0002 mfd. condensers.  
One 0.0005 mfd. condensers.  
Three 0.1 mfd. condensers.  
One 1 mfd. condenser.  
One 50 mfd. electrolytic condenser.  
One 0.01 mfd. condenser.  
Two H.F. chokes.  
Two on-off switches if not included in coil unit.  
One .0003 mfd. reaction condenser.  
One L.F. choke capable of carrying 50 m/A.

We cannot guarantee that these values are the best for every coil, but they will certainly suit the majority. Coupling between the detector and output stages is by means of a parallel-fed transformer, the transformer ratio being 4:1.

It will be noted that the screen of the output valve has been decoupled. This is not always necessary, but the valve we used had a fairly high magnification and was getting beyond its best. Decoupling of the screen was necessary to stop L.F. oscillation.

The 0.01 mfd. condenser between the pentode output valve anode and earth provides fixed tone control, but may be altered to a variable tone control in the normal way, viz. by the inclusion of a variable 20,000-ohm resistance between the condenser and earth.

H.T. supply is obtained from an H.T.8 Westinghouse metal rectifier, and is smoothed by an L.F. choke and an 8 mfd. condenser.

The total current taken by the three valves will be approximately 50 m/A, and the unsmoothed output of the rectifier about 300 volts, which is not sufficient to allow of the use of a mains energised loudspeaker. For those who have mains energised speakers with field resistance of 2,500 ohms, and would like to use them, we would point out that the voltage drop in the field will be about 125 volts, so that, allowing for a smoothed output of 250 volts, the rectifier must deliver 375 volts, unsmoothed, at 50 mA. In this case, it will be advisable to use the H.T. 9 rectifier.

## Components

The complete list of components is given below. We have given the makes we have used ourselves, but good results will be obtained from alternatives, provided they

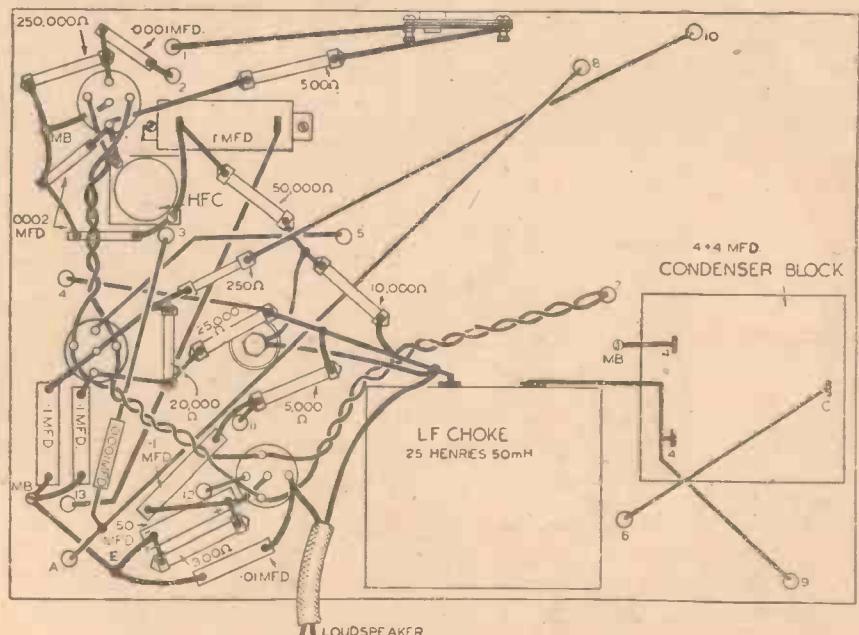
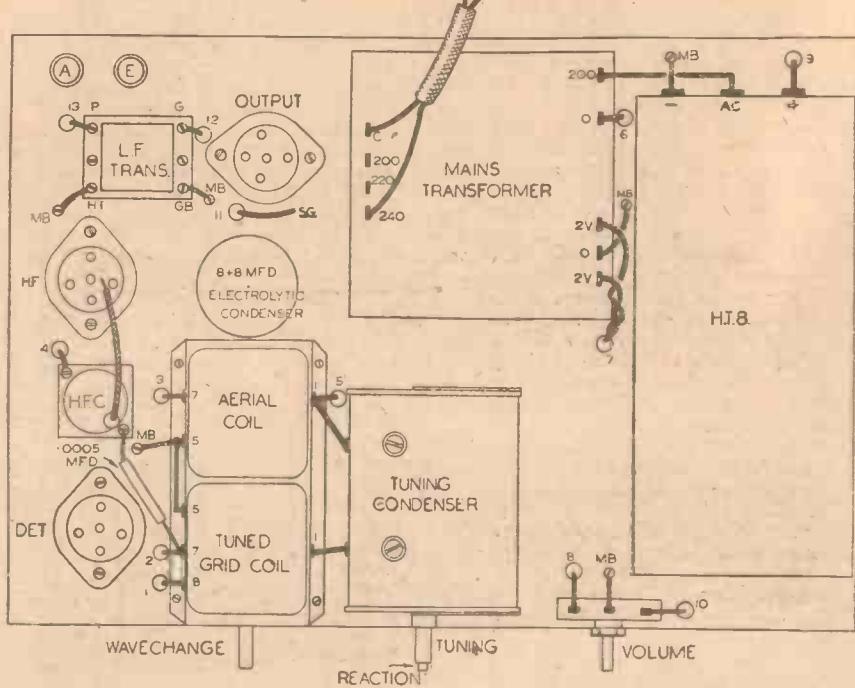
of the connections to a good many of the earlier types of coils which are likely to be used in a receiver of this type, are given.

## Alternative Components

The only alternatives that are likely to cause any bother in constructing a receiver to this design are coils and valves.

We have dealt with the coils above. As regards valves, any high impedance triode will do for the detector, but it may be necessary to alter the value of the 50,000 ohm load resistance shown in our

WIRING DIAGRAM



are of reliable make. If alternatives are used for the coils and transformer, for example, the connections will be numbered or lettered differently, and we call your attention to an article on page 331 of the issue of June 18th, 1938, where details

diagram. With the pentode output valve, different makes require different values of bias resistance, and screen decoupling may not be necessary. The only really serious difficulty lies with the H.F. valve.

(Continued on page 63.)

# Crackles — How to Trace and Cure Them

How to Locate the Commonest Causes of Internal Background Noise, and Some Simple Cures By W. J. DELANEY

A VERY large proportion of the queries received by us relate to troubles caused by crackles or similar noises. It would also appear that the average service-man finds that the majority of receivers sent to him for repair or for servicing are sent because they are causing trouble from this same source. Unfortunately it is not possible to give any indication of the exact nature of crackling noises, and there are a hundred-and-one sources of such trouble. In the case of a listener who does not possess elaborate testing apparatus the usual course is to suggest that a milliammeter be included in each anode circuit in the receiver and a flickering of the needle will, in most cases, indicate the most likely source of the trouble. Unfortunately, however, this is not always a reliable method and therefore it is proposed to enumerate some of the troubles which have definitely been located in this connection, and it is hoped that one or more of these will be found to assist anyone who is troubled with this particular fault in a modern receiver.

### Loose Connections

The commonest cause of crackles is a loose connection. Unfortunately, however, such a source is not always easily located. A badly soldered joint, a loose screw, or similar fault can give rise to the trouble, but luckily such a fault is easily identified. All that is necessary is to subject the set to a shock, preferably by striking the cabinet sharply with the hand. If the trouble is accentuated when this is done, then a loose connection should be looked for. It is presumed, of course, that the aerial and earth connections have first been removed in order to make quite certain that the trouble is not being introduced via the aerial system. When the crackles are accentuated by striking the cabinet the next process is to find the source. This means, generally, that the receiver must be stood up so that both top and bottom of the chassis are accessible. A long strip of ebonite, wood, or other insulated material should then be prodded



*Fig. 2.—If a terminal is tightened too severely the bolt may be loosened causing crackles by the loose internal connection.*

into the receiver, especially at all points where joints are made. This will generally enable the source of the noise to be located and the cure is to make the joint sound.

### Shorted Turns

Another source of the trouble, and one which is not easily found, is where some inductive component has one or more short-circuited turns. Tuning coils, H.F. chokes, L.F. chokes and mains transformers

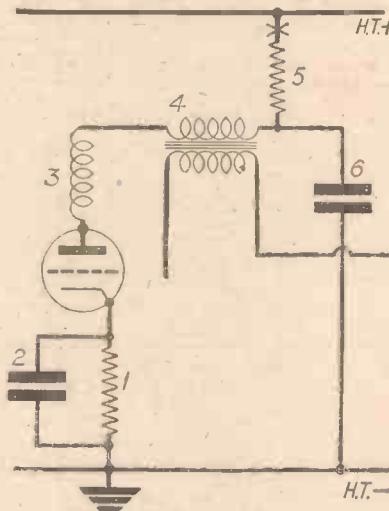
are the most likely sources of this, and no simple means of testing is available. The D.C. resistance of such components will be of such a value that even if four or five turns are shorted out the average meter will not indicate the change in resistance. Special high-frequency measurements are called for, and these are beyond the majority of listeners. Replacement is a simple method, using a component which is known to be in order, or by cutting out various stages in turn it is also sometimes

due to an excessive current through them and provided that the receiver has been built to a published design, or is a commercial model, the rating of various components of this type may be regarded as satisfactory, and therefore a breakdown would most likely be accompanied by a cessation of signals or at least a reduction in the normal signal strength.

### Unusual Faults

To add to the above general faults there are several unusual troubles which have been experienced. Amongst these may be mentioned the dial lights or indicating lamps used for waveband indication in some receivers. The holders for these are often riveted to a metal bracket and the heat of an enclosed type of receiver can soften the insulating washer used in the mounting and cause the holder to become loose. It then vibrates with the speaker vibrations and introduces noise due to the slight arcing which may take place across the contacts. A loose bulb will, of course, give the trouble but will quickly be identified as the light will flicker and accompany the noise. An unexpected fault in the lamp is a partially broken filament. This will arc and complete the circuit, giving a more or less continuous light (especially when operated from an A.C. winding on a mains transformer), and thus the modification of the light will not be seen, but the noise will be generated inside the bulb.

Where no meters are available for test purposes, a method of locating a faulty component which is often adopted, although not theoretically sound, is to short-circuit various components. This must be done very carefully, and the short-circuit must only be of the shortest duration, as the



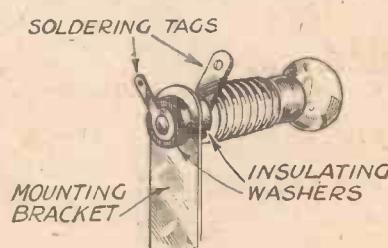
*Fig. 1.—A meter included at the point marked X will generally indicate the presence of a faulty component giving rise to crackles.*

possible to identify such a fault. In the case of a mains transformer or choke, the introduction of shorted turns generally results in the generation of excessive heat, and, therefore, if noises are experienced and one of these components is found to be unduly hot, a careful check of the current flowing will enable you to ascertain whether or not the component should run hot, and if not, then shorted turns should be suspected. A field winding on a moving-coil loudspeaker can also be suspected for the same reasons.

### Switch Contacts

All switch contacts should be suspected when crackles are experienced. Wear can introduce small particles of metal which can get into moving parts and give rise to the trouble, and, therefore, when all other tests have been applied without success, a good plan is to dismantle switches, thoroughly clean them, and reassemble. Make certain that any springs used in switches are strong enough to ensure good contact, as it is possible for these to weaken and introduce the trouble.

Resistances and condensers can introduce the trouble, but this is generally found to



*Fig. 3.—A pilot or dial lamp-holder is often the cause of crackling noises.*

excessive voltage which may be introduced to another part of the receiver by such a short-circuit may result in damage. When the defective component is shorted, of course, the noise will cease. It has, of course, only been possible to touch very briefly on the main troubles which are likely to be experienced, but as already mentioned, those sources which have been mentioned have actually been found in receivers which have been serviced.

## FLASHES OF FACT

### PRACTICAL AND TECHNICAL PARAGRAPHS

WHEN the electrons are moving along and constituting an electric current, a certain electrical pressure is created between the two ends of the circuit. It is necessary to know, and to be able to state, how much pressure exists; therefore, a unit has been devised for this purpose, and it is known as the volt. Electrical pressure is also expressed as electro-motive force and written e.m.f.

If an e.m.f. is applied to a circuit in which there is resistance (see the first of this series) a certain current will flow and the size or magnitude of the current will depend on the e.m.f. (Volts) applied and the value of the resistance. The Unit of resistance is the Ohm, and that for current is the Ampere.

THESE three items, namely, E (for electro-motive force), R for resistance and I for current are most intimately related, in

#### THE A.C. SPARE-PARTS THREE (Continued from page 61.)

Some readers may not have a spare variable-mu valve, in which case volume control may take place in the L.F. stage or simply as an aerial shunt across the coil. In either case, the cathode resistance of the H.F. valve must be joined direct to earth. Note too that different types of H.F. valve may necessitate alterations to the values of the two resistances forming the screen grid potentiometer. These details may be obtained from your valve catalogues, but the values we have chosen are about right for most valves.

A different type of power supply may, of course, be used, provided that it delivers sufficient voltage at the current of 50 m/A. A valve rectifier will be found quite suitable.

#### Construction

Either base-board or chassis construction may be used. The former is cheaper and easier, but the latter makes a more workman-like job and certainly helps to avoid instability. If a wooden baseboard is used, it is essential to cover it with metal foil.

Whichever method you use, mount the components first, and then do the wiring—the whole job can easily be done in three hours. We used a metal chassis which we had by us and the layout is shown on page 61. The layout and proportions shown allow for plenty of room for components and quite widely differing sizes and plenty of spacing between them. If the H.F. and detector valves are not metallised, it is advisable to put a valve screen round both or to erect a metal screen between them.

Provided the H.F. chokes are mounted in the positions shown, it does not matter whether they are of the screened variety or not.

Wiring is very simple, and easily checked when completed, but be sure to check it before you insert the valves and switch on. If you are at all doubtful, insert a 60 m/A fuse in the H.T. positive supply lead.

Results will naturally depend on the efficiency of the valves and coils. Provided these are not much below normal, it will be possible to get quite good quality from the local stations and also to receive a good many of the continental stations free of interference. We have been able to pick up most of the British Regional Programmes at good strength, and also Radio Normandie. There are many others which have given good results in London.

fact, there is a Law, known as Ohm's Law, which expresses their relation to each other.

OHM'S Law states that current (I) equals electro-motive force (E) divided by resistance (R). This enables the current flowing in a circuit to be calculated, when the voltage and resistance is known. This is often required in radio circuits.

If the voltage and current in a circuit are known, then it is quite an easy matter to determine the resistance, because R is equal to E divided by I. From these two examples, it will be seen that if I and R are known, then E can be determined by multiplying I by R.

FOR many parts of a radio circuit high resistances are required, running into millions of Ohms. To avoid confusion, the Megohm is widely used, this being equal to one million ohms.

WHEN a current is flowing through a circuit, a certain amount of heat is generated. To generate this heat, power is required, and it is possible to calculate this quantity from the e.m.f. and the current. Power (expressed as so many Watts) equals E multiplied by I. But by twisting Ohm's Law round a little, it can also be written as Watts (W) equals (I multiplied by E), multiplied by R. This would normally be written as  $I^2 \times R$ . A further twist gives us W equals  $E^2$  divided by R.

FREQUENCY is the name given to the number of alternations or complete changes in direction of flow of an alternating current during the period of one second. To avoid the use of a long string of figures when expressing high frequencies the terms kilocycle and megacycle are used. The former denotes a frequency of 1,000 cycles or periods per second, and the latter 1,000,000 per second.

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MANUAL TUNING ONLY VERSION. Battery Model 902. Circuit and appearance as above, but without press-button tuning. Normal list value £6.16.6. Peto-Scott price £4.17.6, or 5/- down and 18 monthly payments of 6/1. We save you £1.19.0.

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6 stages, 4 valves. All-waves, 19 to 2,000 metres. Powerful superhet circuit. A.V.C. Station dial. 3 watts output. All-world reception by hand tuning and 6-station medium and long-wave automatic press-button tuning. Size as above. Complete with valves, knobs and press-button executives. Normal list value £8.19.18.

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ALL-WAVE S.G.3. Battery Model 901. Five-valve sensitive 3-valve H.F. Pent. Det. and Harries distortionless output pentode. Wave-range 19-2,000 metres. Station and multi-controlled scale. All-world reception. Low H.T. consumption. With all valves. Normal list value, 5 guineas. OUR PRICE, £2 12.6. or 5/- down and 12 monthly payments of 6/2. We Save You £1.22.6.

ALL-WAVE 8-STAGE A.C. Superhet. Model 909M.T. 6 valves. Wave-range 19-2,000 metres. A.V.O. Station dial. P.U. sockets. 3 watts output. Normal value, £9 19.6. OUR PRICE, £8 19.6, or 8/9 down and 18 monthly payments of 8/9. We Save You £2.

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There's nothing like your own broadcasting station or a Peto-Scott high-fidelity microphone—the latter in particular—for perfecting your microphone technique. You can use a Peto-Scott Mike with your present radio set or any kind of amateur, rich, clear and perfect reproduction being always provided. Buy your mike now AT THE PRESENT LOW PRICE.

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Transverse Current model mounted with on-off switch on beautifully chromium-plated stand extending when open to a height of 6 feet. Complete with transformer and bias battery and 25 feet of flex. Cash or C.O.D. 2 guineas, or 2/6 down and 10 monthly payments of 4/6.

**DESK MODEL.** Same microphone unit as used for above but housed in handsome bakelite Table Stand complete with transformer bias battery and lead. Cash or C.O.D. 25/-, or 2/6 down and 9 monthly payments of 3/-.

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\* See left-hand col. for more hand-tuning chassis.

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Now—more than ever are the short waves humbling with the world's news events in addition to the thrilling broadcasts exclusive to the short waves. Every home needs a TROPHY and any model from this popular range can now be yours at a great saving. ALL-BRITISH and BETTER.

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Battery and A.C. 3-valver which have sold to shortwave beginners better than all other makes put together. Coverage 6-550 metres. Belt-loading coils. Calibrated scale. Built-in speaker. Phone jack. Pleasing cabinet. With coils for 12 to 52 metres. A.C. MODEL. Cash or C.O.D., 26 8s. or 7/6 down and 18 monthly payments of 7/9. BATTERY MODEL. Cash or C.O.D., £5 15s., or 7/- down and 18 monthly payments of 7/- Down. 12 months' guarantee.

### TROPHY 5

This 5-valve Junior A.C. communication type is confidently recommended for serious shortwave work. Bandspread tuning on continuous wavebands of 6-550 metres. V.O. and B.F.O. switches. Built-in speaker and phone jack. A world-beater in performance and price. Cash or C.O.D. £9, or 10/9 deposit brings immediate delivery, balance in 18 monthly payments of 10/9. As illustrated.

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# New Season's Receivers

## Review and Test Report of Two New Commercial Superhets—by the G.E.C. and Pilot

THE first receivers to be released in the G.E.C. radio programme for the present season are three in number, and form what is designated the 4050 series. They are an A.C. model, an A.C./D.C. model, and a battery model. A high-quality 5-valve all-wave superhet circuit is incorporated in an attractive moulded cabinet in the case of each model, and multiple push-button tuning is common to them. The actual wave-range covered by these receivers is: short, 16.5 to 50-metres; medium, 192 to 550 metres; and long, 1,000 to 2,000 metres.

There are two rows of push-buttons:

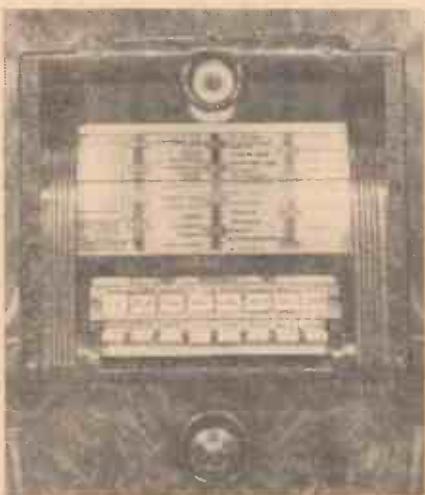


A new G.E.C. 5-valve all-wave superhet—in its attractive moulded cabinet.

sout in the lower row for switching, and eight above for station selection. These eight buttons can be adjusted to select any eight stations on the medium and long wavebands. Alternatively, one or more buttons can be used for the instantaneous selection of any band among the short waves. Three of the buttons in the lower row control the wavebands and automatically switch on the set. The fourth button switches off the set.

For manual tuning a control is mounted on the side of the cabinet, and in front of the cabinet are independent tone and volume controls. The large tuning dial is floodlighted, and is clearly calibrated in wavelengths and station names.

Osram valves are used exclusively in these models, and the loudspeaker in-



This illustration shows the dial and controls of the Pilot Model T-63 receiver.

corporated has been chosen specially for its power-handling capacity, high sensitivity and outstanding response characteristic. The undistorted power output in the mains-operated models is 4 watts and  $\frac{1}{2}$  watts in the battery model, which has two tetrodes in quiescent push-pull in the final stage of its circuit.

Provision is made for the connection of an extension speaker, and also for the connection of a gramophone pick-up, to each of the models.

We have tested Model BC.4050 with both the simple and the special types of aerial. On the ordinary inverted "L" type of aerial, such as is used by the majority of listeners, the sensitivity on all bands is of a high order. All worth-while stations were easily received and background noise was at a minimum. The band which appeared most efficient on the particular model we tested was the short-wave section, at which the results appeared to be rather better than would have been expected from this type of circuit, namely, the absence of an H.F. stage in front of the frequency changer. One or two channels were lost on the medium and long waves, but this was overcome by using the special type of all-wave aerial. Quality was very good and no doubt the bakelite cabinet goes a long way to preserving the tone in a self-contained receiver of this type. The tuning control, which is situated at the side of the cabinet, and which has to be pushed in to operate the manual drive, is very sensitive and enables accurate tuning on the short waves to be carried out. The tone control gives a wide variation, and the receiver costs 10 guineas.

### Pilot Model T-63

This receiver has the novel organ-key tone control and other selector mechanism, and is particularly noticeable for the large tuning dial which is provided. This is in the form of a part cylinder occupying a large space on the front of the cabinet, and there are three columns of wavelengths and station names. Three windows beneath this dial indicate short, medium and long waves and are separately illuminated to show which band is in use. There are eight of the small piano-type keys and these switch the set off, select the waveband and in addition four of them are marked "bass," "mellow," "treble," and "speech." These enable the desired tone of reproduction to be obtained. Pressure of any of the wave-range buttons brings the set into operation, and the single control knob beneath the keys is in two sections, one for tuning and the other for volume! A "magic-eye" tuning indicator completes the panel layout.

The set employs a four-valve combination—triode-pentode, H.F. pen. double-diode-triode and pentode output stage, with the addition of a valve rectifier and the cathode-ray indicator. The first I.F. transformer is of the iron-core type with permeability tuning and the second is of the standard capacity tuned type. The tone control circuits are included in the anode circuits of both the output stage and the triode section of the D.D.T. valve. The sensitivity of the model which we tested is

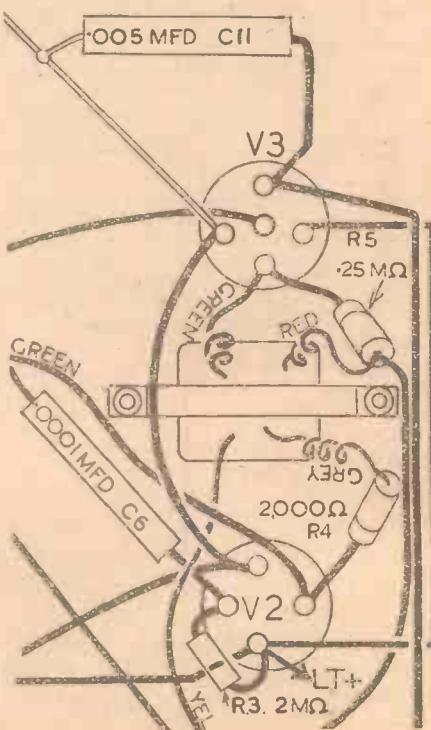
extremely high, and on several stations the arms of the tuning cross on the indicator overlapped a point which is not often experienced with our aerial. As a result of the high sensitivity the background noise naturally rises to a rather high level, but the tuning indicator enables the set to be muted until a station has been properly tuned in and therefore this is not normally troublesome. The sensitivity on all wavebands appeared to be about the same and the American short-wave broadcast stations were received comfortably. The price of this model is 12½ guineas.



### *Pilot Model T-63 receiver.*

## 50/- ALL-WAVE THREE

[N the wiring diagram published in our issue dated March 18th Condenser C11 was wrongly connected to the filament of the output valve. The L.T. positive circuit was also incomplete, and the illustration below shows the correct filament connections to V2 and V3.

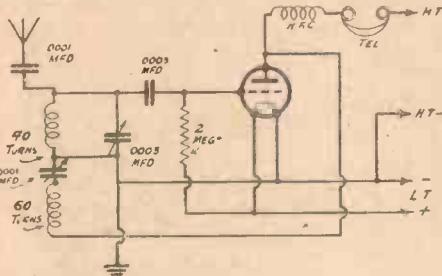


# The British Long-Distance Listeners' Club

## Medium-wave Reception

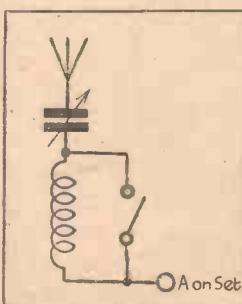
A MEMBER is interested in logging as many long-distance stations as possible on the medium waves, and he asks for the best type of circuit. In view of the high power of the British stations on this band, selectivity is undoubtedly the first consideration, but as we have already pointed out on numerous occasions, selectivity is only obtained at the expense of sensitivity. It is therefore necessary to consider whether an expensive or a simple receiver is to be used. In the latter case listening will have to be carried on after the local stations have closed down. In that case selectivity of a high order will not be called for, and there are still a number of

use the trap the set is tuned in the normal way until the desired station is received—ignoring any interference. When accurately tuned the wave-trap condenser should be slowly adjusted, at the same time keeping the station in tune by adjusting the normal tuning condenser. A point will eventually be found where the interference is eliminated and the required station is heard at maximum volume clear of other signals. There is another form of trap which is joined direct across the aerial circuit, that is, between aerial and earth, and this cuts out everything but the desired station. The only drawback to this arrangement is that signal strength usually suffers, whilst the drawback to the first arrangement is that it only eliminates one interfering station.



Although not possessing high selectivity, this is a very good circuit for long-distance medium-wave reception.

long-distance stations "on the air." A circuit such as that shown below could then be used, winding the coils on large-diameter formers—say, 3 to 4 in. Thick wire, either 20 or 22 D.C.C., with a slight space between the coils, will ensure good signal strength, and the necessary selectivity could be introduced by means of a standard aerial condenser of the value indicated. Of course, a set of this type could be used for normal reception purposes, but the tuning is naturally bound to be rather flat, and difficulty will be experienced in most parts of the country in separating the two locals unless an inefficient aerial system is employed. For long-distance work, say, on Sunday morning, however, it will prove ideal.



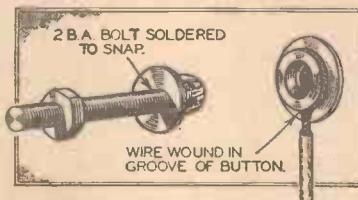
A simple wave-trap to overcome selectivity difficulties.

## Additional Selectivity

IN the event of a receiver of this type being put into use and additional selectivity required for ordinary reception purposes, it should be remembered that the standard wave-trap could be added. This consists of a standard tuned circuit, and the tuning condenser may be included in series or across the coil. In most cases any old coil may be used, although for maximum efficiency an iron-core coil should be employed. The aerial is then joined to one side of the circuit and the other side is joined to the aerial terminal on the receiver. To

## Experimental Connections

WHEN carrying out experimental work it is often found desirable to have some ready means of making and breaking connection, so that modifications may be made quickly on a given item which is being received. The ordinary crocodile clip is generally employed for this purpose, but on occasions this method of connection can prove troublesome on account of the movement of the clip, which may give rise to crackles or other background noises. One method of overcoming this trouble, which has before been mentioned, and which is now being increasingly employed by experimenters, is to use press-stud fasteners. It does not take a minute or two to anchor wire ends to either part of the combination, and they are, of course, preferably soldered. By attaching them to the pieces of apparatus which are to be used for the experiment, substitution may be quickly made and reliable contact obtained. These studs may be removed from old gloves or may be purchased in various sizes. For larger pieces of apparatus, such as may be employed in experiments with mains equipment



A useful method of rapid connection, using press-stud fasteners.

ment, the large components used for attaching carpets to the floor will prove of great utility. By attaching one part of the clip to a bolt anchored to the chassis and connected to the appropriate point, components or leads may be attached in a minute, and meters or similar apparatus may be inserted in a circuit without seriously modifying the wiring and thus giving rise to false readings or indications.

**The CYCLIST - - 2d.**  
Every Wednesday.

## AROUND the SALES MORE BARGAINS NOTED

THERE'S disappointment in being too late. For the special benefit of "Practical Wireless" readers let us examine right now a few worthwhile Bargains which, in view of VERY LIMITED STOCKS, must be ordered IMMEDIATELY.

The best buy of the week is an all-mains 6-stage radio or gramo chassis. At 6 gns. it is a real bargain and as you should have full details, let us refer you to the picture below. Order now is good advice.

Undoubtedly the best offer in Short Wave bargains is the N.T.S. Bandspread S.G.4, complete kit with coils for 12/94 metres, and free valves, retailing at 49/- cash, or 3/6 deposit secures. In this range also is the 3-valve Bandspread pentode output kit at 42/-; 2/6 deposit secures this kit also, and again there is a splendid offer of 3 free valves. 27/6 is all you need pay for a complete one-valve kit with 3 coils for 12.94 metres, the necessary valve and an excellent pair of lightweight headphones; this is a good proposition for the Short Wave beginner, and 2/6 down and 10 monthly payments of 3/- represent exceptionally easy-payment terms. Note also the excellent kit offers mentioned later on.

Amplifier bargains seem to be very few and far between and N.T.S. seem to beat the book with their A.C.7-watt 4-valve model to clear at 70/-; A Push-Pull circuit is employed, giving an output of 7 watts, and undoubtedly it is the ideal amplifier for everyone; 5/- only is the deposit required. The huge demand has prompted N.T.S. to look around for some more 4-watt battery amplifiers for P.A. work and boosting up low-powered battery sets, and a 4-valve push-pull output model is now available at only 55/- (complete and ready for use). Terms are 4/6 down and 12 monthly payments of 4/9; "Practical Wireless" readers will perhaps agree that the price is exceptionally low. We all realise the value of a good microphone. You should possess a good mike for connection to your radio set or amplifier, and the N.T.S. table model at 25/-, or the professional model at 42/- should be secured now; a deposit of 2/- only is required for either microphone, balance over 12 months.



All-Mains 6-Stage All-Wave S/Het Chassis and Speaker  
This excellent replacement chassis is yours for only 5/- down and 18 monthly payments of 7.11. 1939 MODEL, ALL WORLD RECEPTION on 9-2,000 metres. Station-name illuminated dial. Amazingly efficient 6-stage circuit. Over 2 watts undistorted output. A.V.C. and volume control. Size 11 ins. wide, 71 ins. deep, 81 ins. high. Complete with specially matched speaker giving wonderfully natural reproduction right up to the full output. Pick-up sockets. Despatched with all valves and knobs. Fully tested for A.C. or D.C. supplies 200-250 volts. From N.T.S. only. GUARANTEED 12 MONTHS.

A stupendous bargain aptly describes a special value offer. To pay only 5/- for 3 new 2-volt valves—standard U.S.A. types, in fact—together with 3 valveholders, data and diagrams, is to pay a fraction only of the real list price. Order NOW; it is understood that stocks are low.

It is quite obvious that if you have a cabinet you like and a speaker, you can save money by securing a radio chassis only. Note the following amazing N.T.S. chassis bargains. Battery S.G.3 at 19/6, a Battery Straight 3 model at 12/6 (both less valves), a Class "B" 4 (with valves) at 59/6, an A.C.4 (with valves) at 55/-, and an All-Wave A.C.4 chassis, complete with valves, at 79/6, or 5/- down and 15 monthly payments of 6/-. Thousands of these chassis have been sold of late.

MR. CAMM gave a wonderful report a week or so ago on the N.T.S. PENTAKIT. This amazing-value kit comprises all parts for building alternatively a 1, 2 or 3-valve receiver, Adaptor or Converter and with each kit is presented FREE a complete set of valves (British) including a pentode output. This receiver, with the coils supplied, covers from 9-2,000 metres and costs only 42/- cash or 2/6 with order and 12 at 3/9. Performance and value is certainly outstanding.

More useful bargains. From N.T.S. only order a Gramocord Pick-up at 6.6 (List 15/-) or a bargain component parcel at 5/9 (plus 9d. for postage and packing); the list value of this particular parcel is roughly 8 times the price asked.

N.T.S. all-wave "World" kits cannot be beaten for value. The "World" S.G.3 costs only 29/0 (deposit 2/6), and the "World" S.G.4 retails at 42/-. Valves are given FREE with these kits. If you do not already possess the self-locating type of coils you cannot do better than buy a complete set of 10 inductors for 9.2,000 metres, with either of the above kits, offered as a very special bargain at the moment for only 17/6. Described in a FREE booklet.

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**FREE :** The following catalogues post free on request: 1939 Bargain Chassis, Kits, Amplifiers, Valves and the N.T.S. revised short-wave book. N.T.S. cash prices are the lowest and terms are the easiest.

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**THE SUPERSEDER**. Makes H.T. from your L.T. 2-volt battery. Westinghouse rectified and smoothed, 3 tappings. Lasts indefinitely. A boom. List £3 15s. New, guaranteed, 37/6.

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**Impressions on the Wax****A REVIEW OF THE LATEST GRAMOPHONE RECORDS****Parlophone**

THIS month Richard Tauber features two of Johann Strauss' lovely songs, "Tales from the Vienna Woods" and "Roses from the South," both of which he sings in German on *Parlophone* RO 20432.

In the 12in. "Classic" series Lina Pagliughi, soprano, sings "Lakmé" (two parts) on *Parlophone* 11396, whilst the Vienna State Opera Orchestra have recorded "If I Were King" overture (two parts) on *Parlophone* 11399. Another interesting orchestral recording is supplied by the Royal Opera House Orchestra, Stockholm, with "King Christian Suite" and "Berceuse" on *Parlophone* £ 11400.

The Orchestra Mascotte appears in the 10in. "Classic" series with a recording of "Third Waltz Medley" (two parts) on *Parlophone* R 2628. Other orchestral recordings are supplied in this series by George Boulanger and his Orchestra, with "By the Black Sea" and "My Dream Tango" on *Parlophone* R 2629, and Frederick Hippmann and his Orchestra go rather sentimental with "Kiss Serenade" and "Kisses in the Dark" on *Parlophone* R 2630.

The Boswell Sisters are together on *Parlophone* R 2631 with "Rock and Roll" and "Don't Let Your Love Go Wrong."

The organ and piano combine well on *Parlophone* F 1371 with a recording of a selection from "Magyar Melody," and also from "Paris Honeymoon." The piano is played by Patricia Rossborough and the organ by H. Robinson Cleaver. This famous organist also records on his own on *Parlophone* F 1366. He introduces a number of popular melodies in "Cleaver Hits No. 1."

**Popular Tunes**

DANCE music is supplied by Harry Roy and his Orchestra with three new records of popular tunes. His first is "Did You Go Down Lambeth Way," coupled with "You Must Have Been a Beautiful Baby"—*Parlophone* F 1349—followed by "Deep in a Dream" and "Nice People," *Parlophone* F 1350, and finally "Tears on My Pillow" and "I Shall Always Remember You Smiling" on *Parlophone* F 1351, with Harry Roy singing the vocals.

Ivor Moreton and Dave Kaye introduce another batch of latest hits in "Tin Pan Alley Medley No. 15" on *Parlophone* F 1360, whilst we have Victor Silvester's Harmony Music playing "The Skaters' Waltz" and "In the Shadows" on *Parlophone* F 1363.

Nat Gonella's latest record has been specially recorded in New York. The tunes are "I Must See Annie To-night" and "You Must Have Been a Beautiful Baby," *Parlophone* F 1353. Both of these tunes are from the film "Hard to Get."

Leslie A. Hutchinson (Hutch) has two new records this month and for the first one he has chosen two tunes from the film

"Paris Honeymoon." They are "Grandma Said" and "I Have Eyes," on *Parlophone* F 1361. On *Parlophone* F 1362 he sings "Romany" and "You Go to My Head."

That popular combination "The Organ, the Dance Band and Me" have recorded "I Have Eyes" and "You're a Sweet Little Headache," both from the film "Paris Honeymoon," on *Parlophone* F 1355. Billy Thorburn is at the piano and H. Robinson Cleaver the organist. Billy Thorburn has also made a piano medley of popular tunes on *Parlophone* F 1359.

Swing music is supplied by Eddie Carroll and his Swingphonic Orchestra with "One O'clock Jump" and "Lullaby in Rhythm" on *Parlophone* R 2579, Joe Venuti's Blue Four with "Four String Joe" and "A Mug of Ale" on *Parlophone* R 2581, and Teddy Wilson and his Orchestra have recorded "A-Tisket A-Tasket" and "Now It Can be Told" on *Parlophone* R 2582.

In strict dance tempo with no vocals we have Victor Silvester and his Ballroom Orchestra playing the new sequence dance, "Park Parade," coupled with "Tears on My Pillow" on *Parlophone* F 1372. Other recordings by this band are "Did You Go Down Lambeth Way" (quick-step), and "I Shall Always Remember You Smiling" (waltz), on *Parlophone* F 1357. and a quick-step medley called "Dance Time No. 3" on *Parlophone* F 1356. Victor Silvester has also recorded the popular number "The Umbrella Man," on *Parlophone* F 1358. It is played as a Viennese waltz and the coupling is "Grandma Said."

**Brunswick**

BING CROSBY has two splendid records this month of numbers from his new film "Paris Honeymoon," "I Have Eyes" and "The Funny Old Hills" on *Brunswick* 02713, and "You're a Sweet Little Headache," coupled with "Joobalai" on *Brunswick* 02714. Perhaps the most striking tune is "Joobalai," of which Crosby gives a particularly fine performance.

Shirley Ross and Bob Hope, the original stars in the film "Thanks for the Memory," give an excellent record of two of the principal songs in the film—"Two Sleepy People" and "Thanks for the Memory"—*Brunswick* 02697.

Deanna Durbin, the popular young film star, who has been termed "The Golden Voice of the Screen," has recorded "My Own," from her film "That Certain Age," on *Brunswick* 02705. On the reverse side she sings "The Maids of Cadiz."

**Decca**

Reginald Foort is at the organ on *Decca* F 6969 playing "A Perfect Day" and "When Day is Done." "Hot" music is supplied by "The Bugle Call Ringers," with renderings of "Alexander's got a Swing Band Now" and "Sha Sha" on *Decca* F 6967.



April 1st, 1939.

Vol. 4.

No. 145.

**Television in Germany**

THE considerable amount of attention which has been given to television recently in the Press has been instrumental in starting a campaign in the North of England for the provision of television facilities. The Postmaster-General is to be asked if he is aware of the public desire within a fifty mile radius of Manchester for a television service, and an effort will be made to secure some definite information on the prospects of the construction of a station on a site capable of meeting the needs of the population in that area. It is claimed that nearly ten million people reside within that potential service area, and support for the campaign has been forthcoming from both the cinema and radio industries, as well as from the public themselves. It is further claimed that the anticipated market provided is sufficient to warrant an immediate action, and it is also stressed that the people in those localities are keener to purchase sets than those in the south because there are fewer alternative attractions. Even in the early low-definition television days it was evident that the Midlands, and the North, were keener on receiving the radiated signals than the more favourably situated Southerners, and it is felt that a failure to understand the true position is liable to retard development very considerably.

**A Northern Campaign**

IT seems rather strange that Germany, the first nation to radiate an experimental high-definition television service on 180 lines, is not yet providing an extensive public service of signals with home receivers on sale. At present films, light music and dancing, with an occasional play, are radiated every evening except Sunday, but the general public can only see these at twelve viewing rooms—eleven in Berlin and one in Potsdam. Some time ago it was mentioned in these columns that the transmitting aerial on the roof of Amerika House lacked height because the Germans felt that any increase in elevation would be more than counteracted by losses in the feeder cable. It is now admitted, however, that the present arrangement does not even give a complete coverage of Berlin and although denied in official quarters, there has been a proposal for moving the aerial to the Witzleben Tower. In any case, both the Brocken and Grosser Feldberg transmitters have started their signal radiation, and it

enable the received picture to be thrown on to a remote screen, and be enlarged so that a cinema audience can watch the results in comfort. Direct projection from the surface of the fluorescent screen through a wide aperture lens is familiar, and this method so far has achieved the greatest measure of success. There is an interesting suggestion from Germany, however, which aims at electronically adjusting the transparency of a screen so that a separate beam of light is controlled in light and shade values in accordance with the received signal. For this purpose an external light source has its beam focused on to an inclined mirror mounted inside the tube which reflects it so as to cover the side of the screen which is being scanned electronically. The outside of this screen is capped with an objective lens, while a second lens collects the light passing through, and focuses it on to an external screen. The screen itself is said to comprise a hollow casing inside which is smoke or other fine particles. These deposit themselves on to the glass wall of the



Owners of television sets were able to follow life and work on a farm when the television cameras visited Bull Cross Farm, near Enfield, recently. During the relay it was announced that regular television broadcasts are to be made from the farm during the year. Our illustration shows a Clydesdale mare being led up to the television camera.

is felt that before long the Germans will be in full swing with their long promised service.

**A Projection Tube**

AT this juncture of television's development a considerable amount of attention and research work is being directed towards methods which will

casing in direct proportion to the electron intensity of the scanning beam which, of course, in turn is governed by the incoming television signal. In this way it is claimed that the particles give to each elemental area a required degree of transparency which permits the passage of light right through it. The tube therefore becomes a light relay.

# 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 "Simplest Short-wave Two": Correspondent Wanted**

SIR,—I wish to express my thanks for the reply to my recent query. I tested the eliminator as you suggested the fault might be in that, and found that the voltage dropped gradually from 150 to below 90. I also noticed that the rectifier got very hot, so I substituted it for one I had on hand, and I am now getting excellent results again. The set I am now using for short-waves is the "Simplest Short-wave Two," but I am now going to add a one-valve pre R.F. amplifier, as described in September 17th, 1938, issue of PRACTICAL AND AMATEUR WIRELESS. I enclose a photo of my den, where the short-wave set in question is seen on the extreme left. I would very much like to get in touch with another amateur, preferably living in or near Watford.—R. PROCTOR (8, Chileott Road, Watford, Herts).

**A D.X. Log from Bournemouth**

SIR,—I hope this S.W. log will be of interest to other readers. The stations were all heard between February 10th and March 10th: ZBIL, ZB1E, UK8AH, UK3BW, FA3FB, FA3JY, FA8QC, CN8BA, CN8MT, CN8MB, CN8MI, PY8AD, PY2JC, SU1RA, SU1MW, SU1DM, VS7RA VK3DG, VK4JP, and 26 other countries. The receiver used was a 7-valver with indoor antenna.—J. DOUGLAS (Bournemouth).

**Wind-driven Charging Plant**

SIR,—Referring to Mr. J. P. Cook's letter on the above subject, and your request for other readers' opinions interested in this type of apparatus, I should be glad of information on wind-chargers.

As your correspondent believes, I, too, understand there are a great number on the U.S.A. market. I am specially interested in a small type such as I understand is used there for charging batteries on trailer-caravans for wireless and lighting.

I know that Messrs. Lucas make a 12-volt set here, but as a tower, etc., has to be built up for it, it isn't suitable for my purpose. As a matter of fact, I live in a trailer-caravan, and I am often many miles from a charging plant. I use large car-starter type accumulators for running my set's H.T. (I made up the mains-less Unit described in PRACTICAL AND AMATEUR WIRELESS), and 120 ampere 2-volt accumulators for L.T. and they're rather weighty affairs. I would very much appreciate the publication of details of an economical self-regulating wind-generator for charging.

T. W. BRETT (Plymouth).

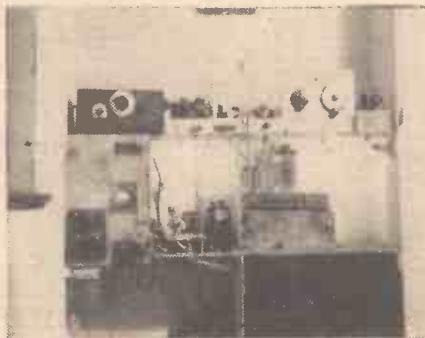
**Correspondents Wanted**

SIR,—As a regular reader of PRACTICAL AND AMATEUR WIRELESS, I should be grateful if you could put me in touch with an experimenter living in England or abroad. I am eighteen years old, and am interested in amateur short-wave trans-

mission and reception.—CLEMENT F. PHILLIPS (46, Grosvenor Road, Harborne, Birmingham, 17).

SIR,—I would be very glad if some of the younger readers of PRACTICAL AND AMATEUR WIRELESS, interested in long-wave and mid-wave radio, would correspond with me.—A. F. STEPHENSON (14, Morley Road, Southport, Lancs).

SIR,—I am a beginner in set building, and would be pleased if some of your readers in England would correspond with



A corner of Mr. R. Proctor's wireless den.

me. I am interested in short-wave work and experimenting.—R. BLAKE (97, Clark Road, Durban, South Africa).

SIR,—As a regular reader of your fine wireless paper, I should like to correspond with any reader residing in the United States of America who is interested in short-wave reception.—GEORGE FOX (50, Curzon Street, Long Eaton, Nr. Nottingham, England).

**Station W6IKQ**

SIR,—I have been asked by W6IKQ to let British S.W.L.'s know that he cannot reply unless postage or an I.R.C. is enclosed.—J. POCOCK (Horsley).

**U.S.W. Adapter for Television Sound**

SIR,—I am glad to see that other readers are interested in my suggestion. There is one point, however, which I would like to mention. Mr. G. Hargreaves wants an adapter for 5 and 10-metres, but may I suggest that it is not possible to design a unit which would be satisfactory for both purposes.

To receive amateur transmissions requires a certain amount of sensitivity, and this will lead to distortion, and the quality of the television sound will be lost.

He would want a sensitive receiver where quality is not the prime consideration, but I would require quality and a wide frequency response. In designing an adapter for the television programme, it would perhaps be necessary to have permanent coils so as to secure the optimum

L/C ratio, and a triode detector. Such a circuit would not, of course, be suitable for long-distance work, and I hope, therefore, that you will not give us a compromise, but an adapter which will give the best results on television. —W. W. LLEWELLYN (London, S.W.).

**Logged on a Two-valver**

SIR,—I have read Mr. M. Parke's letter concerning the stations he has logged on his 2-valver, and I thought probably he and other readers might like to know what I have logged on my 2-valve short-wave set. I have received the following stations: Schenectady (19.56 m.), Boundbrook (16.87 m.), Oslo (25.56 m.), Prague, OLR5A (19.70 m.) and OLR4B (21.51 m.), Wayne (19.64 m.), Pittsburgh (19.72 m.), Bandoeng, PMN (29.24 m.), Delhi, VUD3 (31.28 m.), Ankara, TAQ (19.74 m.), Bandoeng, YDC (19.80 m.), and Nairobi, VQTLO (49.33 m.).

The above are a few of what I think are the more difficult stations to get, especially on an O.V.1. I have also logged a large number of amateurs, both abroad and at home. I have sent off about thirty reports in the last few weeks, and have received nine verifications in reply.—NORMAN B. ROBERTS (Moseley, Birmingham).

**That Elusive Friendly Spirit!**

SIR,—I certainly agree with our fellow enthusiast, "Old Timer," regarding the lack of friendly spirit shown by wireless amateurs, and would very much like to draw readers' attention to the cheerful and companionable air predominating at the present National Service lectures.

In my opinion, it is the duty of every club officer to welcome each member with a cheery word or two of greeting. If possible, some kind of roll-call should be made, thus getting everyone concerned familiar with each other's names.—ERIC L. ADLEM (Notting Hill).

CUT THIS OUT EACH WEEK.

## Do you know

—THAT some output tetrodes are suitable for use as triodes, by strapping auxiliary grid and anode.

—THAT an increase in gain may be obtained in a push-pull stage by using what is known as "low-loading" circuits.

—THAT a frequency-changing stage may often be adjusted more accurately by inserting a milliammeter in the oscillator grid circuit.

—THAT when constructing metal chassis, a burr left on fixing holes assists in ensuring sound contact.

—THAT noisy friction contacts may often be cured by coating with colloidal graphite.

—THAT oil or petroleum jelly should not be used unless it is certain that electrical contact is not obtained through the joint.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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# 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.

## THE CROYDON RADIO SOCIETY

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

MR. S. F. WEBSTER was the fourth member in recent weeks demonstrating quality reproduction when he exhibited his apparatus to the Croydon Radio Society in St. Peter's Hall on Tuesday, March 14th. He soon showed that he was no believer in stereotyped design as for instance, there was his all wood baseboard in L.F. stages. Metal, he pointed out, would tend to give rise to eddy currents. The amplifier's three stages were resistance coupled, the output consisting of two A.C. Q valves fed in class A.B. Twenty-five watts fed the Rola G.12 loudspeaker. Mr. Webster, it was seen, was an enthusiastic advocate of negative feed back, and he described how he had arranged for 15 per cent. of this. Nor was his 3-gang permeability tuner of less interest, and it had one H.F. Pentode, followed by an Infinite Impedance Detector. Here the Technical Adviser did corroborate Mr. Webster, in that this detector gave three times the output of a Diode. Considering that the Technical Adviser had spent, as he said, three days solid on the topic, members agreed with him! The demonstration was particularly interesting, with radio and records, and a Telefunken pick-up for the latter. Next Tuesday, April 4th, the vice-president, Mr. H. G. Salter, concludes this session with one of his musical programmes on records. Readers are welcome.

## SLOUGH AND DISTRICT SHORT-WAVE CLUB

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

AT the last meeting the chief interest was provided by a talk by G3XH on microphones and amplifiers. The speaker dealt with all the various uses to which microphones and amplifiers could be put, and in addition outlined the history of the microphone. The speaker was asked many questions about operation and construction of the various instruments which he had described, all of which he was very willing to explain. The meeting was then adjourned for a television demonstration by Messrs. Hickie and Hickie of Slough.

The agenda for the next meeting includes a talk by Mr. F. J. Tuckfield on "The Short-Wave Receiver." Also, there will be the usual Morse practice, and items of interest to all those whose hobby is radio. New members will be welcomed both at Headquarters or at members' houses.

## EDGWARE SHORT-WAVE SOCIETY

Headquarters : Constitutional Club, Edgware.  
Secretary : F. Bell, 118, Colin Crescent, Hendon, N.W.9.

TEN new members have joined up to date this year, bringing the membership up to 50. The club has now 14 fully licensed members and 10 A.A. On March 1st, Mr. Forsyth, G0ZO, visited the club and described his 5-metre equipment, and DX. Mr. Moxon and Mr. Adams of Messrs. Murphy's visited the club on March 9th, and gave an outline of their receiver problems.

A round table discussion on the licensed members' transmitters was held on March 16th, including G3HT new aerial system, and G2QY 5-metre tests. The club's library has now 12 technical books for use of its members, including two volumes of Radio and an Admiralty Book.

## THE EXETER AND DISTRICT WIRELESS SOCIETY

Headquarters : Y.W.C.A., 3, Dix's Field, Southernhay, Exeter.  
Meetings : Mondays at 8 p.m.  
Hon. Sec. : Mr. W. J. Ching, 9, Sivell Place, Heavitree, Exeter.

AT the meeting of the society held on Monday, March 13th, a lecture was given by Mr. W. S. Pyrah, entitled "The Manufacture of Starter Batteries."

There was an excellent attendance, and Mr. Pyrah not only described in detail the manufacture and use of the modern lead battery, but went very fully into the manufacture and use of the alkaline battery. An excellent film followed, lasting practically an hour and a half, the film being a tour around the works of Messrs. Joseph Lucas Limited, and included both the battery and ignition factories. Mr. Pyrah was heartily thanked for the excellent talk he gave and it is to be hoped he will be persuaded to come along at another date in the near future.

All interested readers are invited to get in touch with the secretary, at the above address.

## THE SURREY RADIO CONTACT CLUB

Headquarters : 14, Lytton Gardens, Wallington.  
Secretary : A. B. Willsher (G3IG), 14, Lytton Gardens, Wallington.

THE above club held its annual general meeting on the 14th instant, at the club's new headquarters in Croydon. The secretary stated that the past year had been quite a favourable one, and that meetings had been well supported. The important event of the year was undoubtedly the annual dinner, which was held in December. Owing to the increase in expenses, the club's subscription has had to be raised, much to the regret of the committee, but they felt confident that this would not affect the membership, as the subscription could be paid in two half-yearly instalments.

Officers and committee were duly elected for the coming year, and all looked forward to it with the utmost confidence.

At the conclusion of the business side of the meeting, Mr. Billingshurst, a member of the club, gave a very interesting talk on portable midget receivers which he has used in the past whilst on hiking tours in various parts of the country. He then went on to describe a receiver he is experimenting with which could be carried by swimmers as an aid to direction finding in cases of rescue work in the sea. This apparatus has already been demonstrated, and has proved quite a success, although there are still a few handicaps to be overcome.

## ASHTON-UNDER-LYNE AND DISTRICT AMATEUR RADIO SOCIETY

Headquarters : Commercial Hotel, 86, Old Street, Ashton-under-Lyne.  
Secretary : K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

THE date for the "Hamfest" has now been fixed for Sunday evening, April 2nd, and will be held at the George Café, George Street, Ashton-under-Lyne. All amateurs are welcome, whether members of the society or not. Reservations are 3s. 6d. each. A good programme has been arranged, amateurs from neighbouring towns have promised their support, and it is hoped that a really enjoyable evening will ensue.

All members report active, several having applied for A.A. licences. The following have recently licensed :—S. Wild (2BBV), R. Warhurst (2FQL), F. P. Hallsworth (2FRN), and J. Andrew (2FSZ). 2FOS has applied for his full ticket, and we wish him luck. The Morse classes are being well attended, and G3EF as instructor is being kept very busy on the key. As a change he is working most of his DX now on 'phone. G5PX, G6TL, and G3BY are very busy on 56mc. work every Sunday, and would appreciate reports.

## DURHAM AND DISTRICT SHORT-WAVE CLUB (Proposed)

WILL any readers genuinely interested in the formation of the above club please communicate with either Mr. D. F. Chatter, 23, North View, Sherburn Hill, Co. Durham, or Mr. R. Bowes (2DTA), 10, Blackgate, Coxhoe, Ferryhill, Co. Durham.

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# LATEST PATENT NEWS

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

## ADJUSTING WIRELESS APPARATUS; INDICATING-APPARATUS.—Birdseye, L. F. No. 495879.

An indicator particularly for a radio-receiver, comprises a pointer 9, Fig. 1, for example a metal strip, bent to provide a plurality of facets, and rotatably mounted about its longitudinal axis so that in each

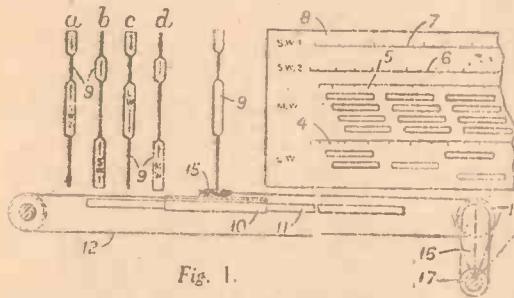


Fig. 1.

of the positions shown, for example, at *a*, *b*, *c*, *d*, a different edge of one of the various facets co-operates with a respective scale 4, 5, 6, 7, 8, 9, 10, 11, 12 on a dial 8 which may be illuminated by rear or edge lighting in known manner. The operative facet edge may be distinctively coloured similarly to its respective scale and indicia marked on the visible facets, as shown, to indicate the operative edge. The pointer is rotatably mounted on a carriage 10 moved, in known manner, along a guide 11 by a cord 12 during tuning of the receiver. The cord is anchored at one end to the carriage and at the other end is wound round a pulley 15 rigid with the pointer. The cord also passes round a pulley 14 on an arm 16 rocked when the wave range change switch 17 is operated to vary the effective length of the cord and thereby rotate the pointer to the appropriate position against the action of a spring acting on the pointer. The number of scales may vary and they may be arcuate in which case the pointer describes an arc when traversing them.

## MAKING VARIABLE RESISTANCES.—Steatit-Magnesia Akt.-Ges. No. 497187.

A variable resistor or potentiometer is provided with a die-cast part *a*, Fig. 2, that has one or more stops *b* for the contact arm and also a bearing sleeve *c* for the rotatable spindle, the sleeve being provided with a screw-thread *d* on its exterior for securing the resistor to a baseplate. Holes *e* are provided in the part *a* for securing the casing *m*. A recess *f* accommodates a hairpin spring *n* engaging a groove in the spindle *h*, the recess being covered by the usual insulating plates. A further recess *p* in the part *a* locates the resistor in position on the baseplate.

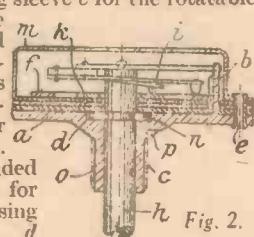


Fig. 2.

## ADJUSTING WIRELESS APPARATUS.—General Electric Co., Ltd., Gosden, R., Hunter, S. G., and Mercer, E. L. No. 496874.

The moving element of a tuning indicator for a wireless receiver carries a member

6 moved by rack-and-pinion means relatively to the moving element so as to indicate small adjustments.

A carriage 1 carrying a pointer 2 slides along a straight bar 3 so as to carry the pointer 2 over a scale 4.

A pinion 5, Fig. 3, attached to a disc 6 is mounted on a spindle 7 carried by the carriage 1 so that the pinion 5 meshes with a rack 8. The edge of the disc 6 is calibrated and is adjacent to a mark 9 on the carriage 1. In a modification, Fig. 3, backlash is eliminated by means of a thread, thin string, piano wire, etc., 14 attached to and wound on to the spindle 7 carrying the disc 6; the free end being held under tension by a

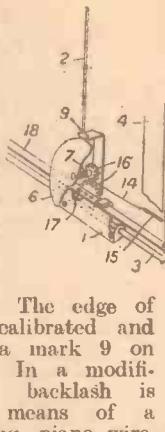
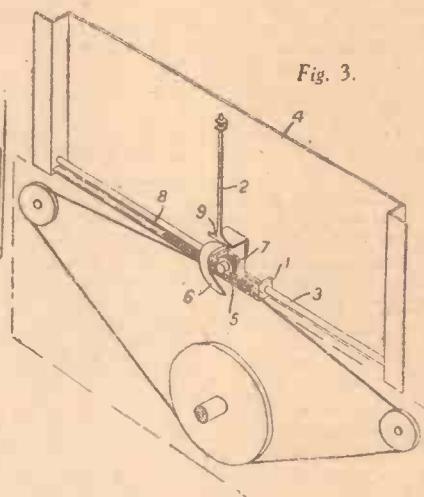


Fig. 3.

spring 15. The spindle 7 is driven through gearing 16 by means of a spur-wheel 17 engaging a perforated strip 18. The rate of revolution of the spindle 7 and its circumference are such that the rate of winding or unwinding of the thread 14 is equal to the rate of travel of the carriage 1, so as to maintain a constant tension on the thread.



## NEW PATENTS

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

### Latest Patent Applications.

7233.—Blue, A. H., and Wood, R. D.—Television, etc., apparatus. March 6th.

7234.—Blue, A. H., and Wood, R. D.—Transmitting electric power. March 6th.

7361.—Faudell, C. L.—Television transmitting, etc., systems. March 7th.

7086.—Kolster-Brandes, Ltd., and Smyth, C. N.—Radio, etc., receivers. March 3rd.

7087.—Kolster-Brandes, Ltd., and Smyth, C. N.—Synchronised time base circuits. March 3rd.

7085.—Kolster-Brandes, Ltd., Prichard, R. E., and Smyth, C. N.—Television receivers. March 3rd.

7455.—Kramolin, L. L. de.—Radio apparatus, etc. March 7th.

7173.—Mayo, C. G., and Ellis, H. D. M.—Thermionic valve circuits. March 4th.

7550.—Monge, G. de.—Elimination, etc., of disturbing noises in the reception of radio transmissions. March 8th.

7178.—Morgan Crucible Co., Ltd., Dixon, D. L., and Miller, L. W.—Radio interference suppressors. March 4th.

7230.—Scophony, Ltd., and Rosenthal, A. H.—Secret transmission of television, etc. March 6th.

### Specifications Published.

501515.—Robinson, E. Y., and Metropolitan-Vickers Electrical Co., Ltd.—Thermionic valves. (Cognate Application, 15599/37).

501639.—Bull, C. S.—Thermionic valves.

501446.—Marconi's Wireless Telegraph Co., Ltd.—Radio receivers.

501644.—Marconi's Wireless Telegraph Co., Ltd. (Radio Corporation of America.)—Radio receivers.

501520.—Midgley, A. H., and Midgley, A. M.—Electrical production of musical tones.

501802.—Lorenz Akt.-Ges., C.—Television transmitter.

501529.—Standard Telephones and Cables, Ltd., Barnard, R. M., and Kram, W.—Superheterodyne receivers.

501532.—Telefunken Ges. Fur Drahtlose Telegraphie.—Television receivers.

501535.—Baird Television, Ltd., and Nuttall, T. C.—Television and like systems.

501753.—Baird Television, Ltd., and Merdler, L. R.—Television and like receivers.

501760.—Marconi's Wireless Telegraph Co., Ltd., Keall, O. E., and Rust, N. M.—Radio and like receivers.

501608.—Radioakt.-Ges. D. S. Loewe.—Apparatus for the manufacture of scanning discs for television apparatus.

501556.—Plessey Co., Ltd., and Gillard, F. G.—Multiway electric switches for use in radio and like circuits.

501685.—Selmer and Co., Ltd., H., and Davis, B.—Electrical musical instruments.

501692.—Brown, W. J.—Radio receiving-apparatus.

501708.—Groves, W. W. (Cinaudograph Corporation).—Magnet structure.

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

## PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM

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



# QUERIES and ENQUIRIES

## Unit S.W. Receiver

"In a recent article you described a unit detector stage, and subsequently an H.F. stage for use with it. You specified a 6-pin coil for both, and in the diagram of the H.F. unit showed a 4-pin holder. Could you explain exactly what type of coil to use in each stage as I have been using a similar detector stage and should like to add the H.F. stage? Also what should be the windings of the H.F. stage to work in conjunction with the detector stage?"—R. W. W. (Leigh-on-Sea).

**A**S mentioned in the article a 6-pin coil is desirable in the detector stage to enable aerial coupling and reaction coils to be employed. When used after an H.F. stage the 6-pin coil enables an H.F. transformer coupling to be used. In the aerial circuit of the H.F. unit only two windings are needed—grid and aerial coils, and therefore the specification should be a 4-pin coil for this stage. Coils designed for the required wavelength are obtainable in both 4- and 6-pin types and, therefore, you should obtain these for the wavelengths needed. The grid windings on both types are identical in inductance value.

## 2½-Watt Transmitter

"I have a copy of 'Wireless Transmission for Amateurs,' and intend applying for an A.A. licence. I would like to know the best position for a key for C.W. in the 2½-watt transmitter. Can you help me, please?"—W. G. B. (Liverpool).

**K**EYING is fully dealt with in Chapter VII, and as shown on page 62, there are several positions for the key. In a simple circuit of the type used in the 2½-watt transmitter the most suitable position is in the H.T. negative lead, as shown in Fig. 55.

## Colour Codes

"Looking through one of your back numbers I see a reader has made inquiries about colour codes, and in your reply you say you issued a book dated June 11th, dealing with the subject. Can you tell me the cost of this book, and where to get it? Also can you tell me if the 'Service Manual' is for sale, as I was impressed by another reader's letter who has had the good fortune to obtain one? How much is it?"—G. R. B. (Middlesbrough).

**T**HE book first referred to is a back number of this paper and you can obtain it from this office, price 4d., post paid. The Service Manual is also obtainable from this office and the price is 5s. 6d. It may also be obtained from your local newsagent for 5s.

## 1937 Crystal Set

"I was interested in the pages illustrating the 1937 Crystal Set, and have decided to assemble it. I would be pleased if you would kindly give me an estimate for the complete set of parts excluding earphones."—B. V. D. (R.N.H., Chatham).

**K**IT A for this receiver is sold by Messrs. Peto-Scott, at 22s. The coil, of course, has to be made up, but the kit includes wire, former, etc.

## Record Valve Details

"I have a Record valve, reference AC/NHL, and I should be glad if you could give me details of this particular component, and let me know for what stage it is most useful."—L. W. (Sideup).

**T**HE valve is an A.C. (indirectly-heated) triode, with an impedance of 11,000 ohms. It is, therefore, in the class of valves generally referred to as General Purpose triodes, and is suitable for detector, or L.F. stages. The amplification factor is 40, and the heater is of the 4-volt, 0.65 amp type.

## RULES

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

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

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

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

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

## Pick-up Amplifier

"I should like to build a battery amplifier, preferably two-valve suitable for use with a pick-up. Something that will give purity on record playing. I have 1 power valve, 1 pentode, 1 transformer, and 1 R.C.C. unit."—A. M. (Cheam).

**I**F you need real purity of reproduction two simple stages would be hardly likely to satisfy you. A push-pull stage is desirable, and we recently described a small 2½-watt battery amplifier in which this feature was incorporated. The details will be found in our issue dated June 18th last, and we recommend that you obtain a back copy of this and consider building that particular amplifier.

## Adding a Pick-up

"I have a well-known Cossor receiver of the straight, all-wave type. I wish to add a record player to this receiver, but there are no pick-up sockets. I have tried a mike and transformer with one wire to the grid of the MS/PEN, and the other to earth. Can you please tell me which is the best way to connect up?"—J. F. (Manchester, 9).

**T**HE circuit is perfectly straightforward, but circuit modifications would be necessary in order to fit a pick-up, and we do not advise modification to commercial receivers. The detector stage is indirectly-heated, but there is no bias resistance in the cathode lead. The grid leak is returned direct to earth. Therefore, to include a pick-up in the usual position in the detector stage it would be necessary to insert a

bias resistance in the cathode lead, with a suitable condenser across it, and connect the grid leak direct to cathode. The pick-up would then be joined direct between grid and earth.



## Replies in Brief

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

**J. H. H. (Falkirk).** We think the receiver is now out of date and refer you to a later model. A list appears in each issue and we suggest you select from this or wait for our next design, which will be published in the early summer.

**W. J. P. I. (Horley).** No alteration to the set is required, and the eliminator is simply connected up in place of the H.T. battery. There is, of course, a mains version of this receiver.

**G. D. (Feltwell).** The makers supply a leaflet giving connections. We published them recently, but you do not state whether you have the plain or the Type A coils.

**F. A. (Dromard, Co. Sligo).** We regret that we have no details of the particular tester mentioned by you. The plates of an accumulator can become damaged and give rise to the trouble mentioned. Both over and under-charging can cause this trouble.

**D. B. (Stowmarket).** It would appear that the switch is faulty, and may need replacement if the spring contacts cannot be adjusted.

**A. J. K. (E.3).** The coil is a Lewcos Oscillator unit, and would not be suitable for the circuit mentioned by you. No set can be guaranteed to bring in America as so much depends upon conditions. A four is to be preferred to a three for reliability.

**W. Q. (Sheffield).** Queries are limited to 2 per reader. B.S.T. is British Summer Time as distinct from Greenwich Mean Time. There are no actual measurements of interference. A C.R. oscilloscope is necessary to measure the modulation factors mentioned.

**P. T. S. (Sherborne).** We cannot recommend any set other than the original mentioned by you.

**F. L. D. (Tolworth).** The short-circuit would probably have been from earth to one of the heater windings.

**W. H. (Liverpool 15).** As there are no pick-up terminals it would be unwise to try and use the mike, especially if the set is a Universal mains model. Write to the makers for instructions.

**L. M. (S.W.11).** We regret that we have no details of the coil now available. It appears to be a very old pattern and is, no doubt, unsuitable for modern conditions. A variable condenser (.0003 mfd. maximum) in the aerial circuit would probably help matters and give improved selectivity.

**W. G. W. (Cousland).** Resistors or condensers which are damaged can give rise to the noises and it would be desirable to make careful tests in each anode circuit in turn to ascertain what current is passing.

**J. B. (Manchester).** Without a circuit diagram we are unable to ascertain the cause of the fault mentioned.

**F. W. M. (Oldham).** Upon receipt of a stamped addressed envelope we shall be pleased to send you a list of the parts needed.

**C. W. McE. (Bexley).** It would be difficult to obtain satisfactory results from a one-valve A.C. mains set of the type mentioned. Apart from the difficulty of getting an effective arrangement it would be very difficult to remove hum as headphones would have to be worn to hear the signals.

**E. C. (Leigh-on-Sea).** We could not give constructional details, but anticipate publishing a complete constructional article in the near future.

**R. A. B. (Windsor).** See that adequate H.T. is applied to the detector, and if so, check that the H.F. choke is in order.

**J. R. P. (Sutton).** We do not issue blueprints of commercial receivers and you should communicate with the makers concerning a circuit and replacements.

**C. H. G. M. (N.W.7).** You have been correctly informed—the apparatus is of no use for the modern television transmissions.

**L. Y. G. (Bedford).** You can use the speaker, but will have to provide a separate energising source, consisting of transformer and rectifier designed to give the voltage and current needed for the field winding.

**J. W. (Bromsgrove).** The arrangement is known as "diversity reception" and was described in our issue dated December 21st last. The aerial must be correctly placed and there are other difficulties.

**J. A. R. (Penryn).** The valve in question costs 10s. 6d., and the valve-holders 1s. each. The condensers may be obtained from Jackson Bros.

**J. L. B. (Eccleshall).** We would recommend Blueprint No. PW93 and our issue dated August 27th last.

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

# Practical and Amateur Wireless BLUEPRINT SERVICE

## PRACTICAL WIRELESS Date of Issue. Blueprint CRYSTAL SETS.

Blueprints, 5d. each.  
1937 Crystal Receiver . . . . . PW71  
The "Junior" Crystal Set . . . . . 27.8.33

**STRAIGHT SETS.** Battery Operated.  
One-Valve : Blueprints, 1s. each.  
All-wave Unipent (Pentode) . . . . . PW31A  
Beginner's One-valver . . . . . 19.2.33 PW85

The "Pyramid" One-valver (HF Pen) . . . . . 27.8.33 PW93

Two-valve : Blueprints, 1s. each.  
Four-range Super Mag Two (D, Pen) . . . . . PW30B  
The Signet Two (D & LF) . . . . . 24.9.33 PW76

Three-valve : Blueprints, 1s. each.  
The Long-range Express Three (SG, D, Pen) . . . . . 24.4.37 PW2

Selectone Battery Three (D, 2 LF (Trans)) . . . . . — PW10

Sixty Shilling Three (D, 2 LF (RC & Trans)) . . . . . — PW31A

Leader Three (SG, D, Pow) . . . . . 22.5.37 PW35

Summit Three (HF Pen, D, Pen) . . . . . PW37

All Pentode Three (HF Pen, D (Pen), Pen) . . . . . 29.5.37 PW39

Hall-mark Three (SG, D, Pow) . . . . . 12.6.37 PW41

Hall-mark Cadet (D, LF, Pen (RC)) . . . . . 16.3.35 PW48

F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three) . . . . . 13.4.35 PW49

Genet Midget (D, 2 LF (Trans)) . . . . . June '35 PW51

Cainco Midget Three (D, 2 LF (Trans)) . . . . . 8.6.35 PW53

1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) . . . . . — PW55

Battery All-Wave Three (D, 2 LF (RC)) . . . . . — PW56

The Monitor (HF Pen, D, Pen) . . . . . — PW57

The Tutor Three (HF Pen, D, Pen) . . . . . 21.3.36 PW58

The Centaur Three (SG, D, P) . . . . . 14.8.37 PW60

F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) . . . . . 31.10.36 PW61

The "Colt" All-Wave Three (D, 2 LF (RC & Trans)) . . . . . 18.2.30 PW62

The "Rapide" Straight 3 (D, 2 LF (RC & Trans)) . . . . . 4.12.37 PW63

F. J. Camm's Oracle All-Wave Three (HF Det, Pen) . . . . . 28.8.37 PW64

1938 "Triband" All-Wave Three (HF Pen, D, Pen) . . . . . 22.1.38 PW65

F. J. Camm's "Sprite" Three (HF Pen, D, Tet) . . . . . — PW66

The "Hurricane" All-Wave Three (SG, D (Pen), Pen) . . . . . — PW67

F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet) . . . . . — PW68

Four-valve : Blueprints, 1s. each. Sonotone Four (SG, D, LF, P) . . . . . — PW69

Fury Four (2 SG, D, Pen) . . . . . — PW70

Beta Universal Four (SG, D, LF, Cl. B) . . . . . — PW71

Nucleon Class B Four (SG, D, (SG), LF, Cl. B) . . . . . — PW72

Fury Four Super (SG, SG, D, Pen) . . . . . — PW73

Battery Hall-Mark 4 (HF Pen, D, Push-Pull) . . . . . — PW74

F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) . . . . . 20.9.36 PW75

All-Wave "Corona" 4 (HF Pen, D, LF, Pow) . . . . . 9.10.37 PW76

"Acme" All-Wave 4 (HF Pen, D, Pen) . . . . . 12.2.38 PW77

The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) . . . . . 3.9.38 PW78

**Mains Operated.** Two-valve : Blueprints, 1s. each. A.C. Twin (D (Pen), Pen) . . . . . — PW79

A.C.-D.C. Two (SG, Pow) . . . . . — PW80

Selectone A.C. Radiogram Two (D, Pow) . . . . . — PW81

Three-valve : Blueprints, 1s. each. Double-Diode-Triode Three (HF Pen, DDT, Pen) . . . . . — PW82

D.C. Acc (SG, D, Pen) . . . . . — PW83

A.C. Thre (SG, D, Pen) . . . . . — PW84

A.C. Leader (HF Pen, D, Pow) . . . . . 31.3.34 PW85

D.C. Premier (HF Pen, D, Pen) . . . . . PW86

Ubique (HF Pen, D, Pen) . . . . . 28.7.34 PW87

Armada Mains Three (HF, Pen, D, Pen) . . . . . — PW88

F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) . . . . . 11.5.35 PW89

"All-Wave" A.C. Three (D, 2 LF (RC)) . . . . . — PW90

A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) . . . . . — PW91

Mains Record All-Wave 3 (HF Pen, D, Pen) . . . . . 5.12.36 PW92

All-World Acc (HF Pen, D, Pen) . . . . . 28.8.37 PW93

Four-valve : Blueprints, 1s. each. A.C. Fury Four (SG, SG, D, Pen) . . . . . — PW94

A.C. Fury Four Super (SG, SG, D, Pen) . . . . . — PW95

A.C. Hall-Mark (HF Pen, D, Push-Pull) . . . . . 24.7.37 PW96

Universal Hall-Mark (HF Pen, D, Push-Pull) . . . . . 9.2.35 PW97

A.C. All-Wave Corona Four . . . . . 6.11.37 PW98

## SUPERHETS.

Battery Sets : Blueprints, 1s. each.

£5 Superhet (Three-valve) . . . . . 5.6.37 PW40

F. J. Camm's 2-valve Superhet . . . . . 13.7.35 PW52

F. J. Camm's £4 Superhet . . . . . — PW58

F. J. Camm's "Vitesse" All-Waver (5-valver) . . . . . 27.2.37 PW75

Mains Sets : Blueprints, 1s. each.

A.C. £5 Superhet (Three-valve) . . . . . — PW43

D.C. £5 Superhet (Three-valve) . . . . . 1.12.34 PW42

Universal £5 Superhet (Three-valve) . . . . . — PW44

F. J. Camm's A.C. £4 Superhet . . . . . 81.7.37 PW59

F. J. Camm's Universal £4 Superhet 4 . . . . . — PW60

"Qualitone" Universal Four . . . . . 16.1.37 PW73

Four-valve : Double-sided Blueprint, 1s. 6d. PW93

Push-Button 4, Battery Model . . . . . 22.10.38 PW93

Push-Button 4, A.C. Mains Model . . . . . — PW93

These Blueprints are drawn full size.

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

Issues of Practical Wireless . . . . . 4d. Post Paid.  
Amateur Wireless . . . . . 4d. " "  
Practical Mechanics . . . . . 7d. " "  
Wireless Magazine . . . . . 1/3 " "

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

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

## Mains Operated.

Two-valve : Blueprints, 1s. each.

Consolectric Two (D, Pen) A.C. . . . . — AW403

Economy A.C. Two (D) Trans.A.C. . . . . — WM286

Unicorn A.C.-D.C. Two (D, Pen) . . . . . — WM394

Three-valve : Blueprints, 1s. each.

Home Lover's New All-electric Three (SG, D, Trans) A.C. . . . . — AW383

Mantova A.C. Three (HF Pen, D, Pen) . . . . . — WM374

£15 15s. 1938 A.C. Radiogram (HF, D, Pen) . . . . . Jan. '38 WM401

Four-valve : Blueprints, 1s. 6d. each.

All Metal Four (2 SG, D, Pen) . . . . . July '33 WM326

Harris' Jubilee Radiogram (HF Pen, D, LF, P) . . . . . May '35 WM386

## SUPERHETS.

Battery Sets : Blueprints, 1s. 6d. each.

Modern Super Senior . . . . . — WM875

Varsity Four . . . . . Oct. '35 WM305

The Request All-Waver . . . . . June '36 WM407

1935 Super Five Battery (Superhet) . . . . . — WM379

Mains Sets : Blueprints, 1s. 6d. each.

Heptode Super Three A.C. . . . . May '34 WM350

"W.M." Radiogram Super A.C. . . . . — WM306

## PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.

Holiday Portable (SG, D, LF, Class B) . . . . . — AW303

Family Portable (HF, D, RC, Trans) . . . . . — AW447

Two H.F. Portable (2 SG, D, QP21) . . . . . — WM303

Tyres Portable (SG, D, 2 Trans) . . . . . — WM367

## PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.

Holiday Portable (SG, D, LF, Class B) . . . . . — AW303

Family Portable (HF, D, RC, Trans) . . . . . — AW447

Two H.F. Portable (2 SG, D, RC, Trans) . . . . . — WM303

Tyres Portable (SG, D, 2 Trans) . . . . . — WM367

## SHORT-WAVE SETS—Battery Operated.

One-valve : Blueprints, 1s. each.

S.W. One-valver for America . . . . . 15.10.38 AW429

Rome Short-waver . . . . . — AW462

Two-valve : Blueprints, 1s. each.

Ultra-short Battery Two (SG det, Pen) . . . . . Feb. '30 WM402

Home-made Coil Two (D, Pen) . . . . . — AW440

Three-valve : Blueprints, 1s. each.

World-ranger Short-waver 3 (D, RC, Trans) . . . . . — AW355

Experimenter's 5-metre Set (D, Trans, Super-regen) . . . . . 30.6.34 AW433

Experimenter's Short-waver (SG, D, Pen) . . . . . Jan. 10. '35 AW463

The Carrier Short-waver (SG, D, P) July '35 WM390

Four-valve : Blueprints, 1s. 6d. each.

A.W. Short-wave World-Beater (HF Pen, D, R.C. Trans) . . . . . — AW436

Empire Short-waver (SG, D, RC, Trans) . . . . . — WM313

Standard Four-valver Short-waver (SG, D, LF, P) . . . . . Mar. '35 WM383

Superhet : Blueprint, 1s. 6d.

Simplified Short-wave Super . . . . . Nov. '35 WM307

## Mains Operated.

Two-valve : Blueprints, 1s. each.

Two-W.M. Malus Short-waver (D, Pen) A.C. . . . . — AW453

W.M.'s Band-spread Short-waver (D, Pen) A.C.-D.C. . . . . — WM368

W.M.'s Long-wave Converter . . . . . — WM380

Three-valve : Blueprint, 1s.

Emigrator (SG, D, Pen) A.C. . . . . — WM352

Four-valve : Blueprint, 1s. 6d.

Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) . . . Aug. '35 WM391

## MISCELLANEOUS.

S.W. One-valve Converter (Price 6d.) . . . . . — AW329

Enthusiast's Power Amplifier (1/6) . . . . . — WM387

Listener's 5-watt A.C. Amplifier (1/6) . . . . . — WM392

Radio Unit (2v.) for WM392 . . . . . Nov. '35 WM398

Harris' Electrogram (battery amplifier) (1/6) . . . . . — WM309

De Luxe Concert A.C. Electrogram . . . . . Mar. '36 WM403

New Style Short-wave Adapter (1/6) . . . . . — WM388

Trickle Charger (6d.) . . . . . Jan. 5, 35 AW482

Short-wave Adapter (1/6) . . . . . — AW456

Superhet Converter (1/6) . . . . . — AW457

B.L.D.L.C. Short-wave Converter (1/6) . . . . . — May '36 WM405

Wilson Tone Master (1/6) . . . . . June '36 WM406

The W.M. A.C. Short-wave Converter (1/6) . . . . . — WM408

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## RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance or Secondhand, etc.

**V**AUXHALL.—All goods previously advertised are still available; send now for latest price list, free.—Vauxhall Utilities, 163a, Strand, W.C.2.

**C**ONVERSION UNIT for operating D.C. Receivers from A.C. Mains, improved type, 120 watt output at £2/10/0. Send for our comprehensive list of speakers, resistances and other components.

**W**ARD, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

**V**ARIABLE Directional S.W. Aerials, 1½d. stamp, details.—A. W. Mann, 62, Costa Street, Middlesbrough.

**F**OR Sale, Varley Transformers 465 K/cs. and band-pass coils. Warburton, 41, Leith Walk, Edinburgh.

## NEW RECEIVERS, COMPONENTS AND ACCESSORIES

**C**ONDENSERS: British Manufacture, Metal case (Paper), 800-volt Wkg., 4 mfd., 4s.; 2 mfd., 2s. 6d.; 1 mfd., 1s. 9d. 500-volt Wkg., 4 mfd., 3s.; 2 mfd., 1s. 9d.; 1 mfd.; 1s. 3d. 400-volt Wkg., 4 mfd., 1s. 9d.; 2 mfd., 1s.; 1 mfd., 7d. **ELECTROLYTIC:** 500-volt pk., 4 mfd., 1s. 3d.; 8 mfd., 1s. 6d.; 8+4 mfd., 2s. 3d.; 8+8 mfd., 2s. 9d. Special offer, limited quantity. 1,000-volt Wkg., 4 mfd., 5s.; 2 mfd., 3s. (Metal case), 800-volt Wkg., Tubulars: 0.5 mfd., 9d.; 0.25 mfd., 4d.; 0.1 mfd., 1d.; 0.05 mfd., 3d. 400-volt Wkg., Tubulars: 1 mfd., 6d.; 0.5 mfd., 4d.; 0.25 mfd., 3d.; 0.05 mfd. and 0.01 mfd., 1s. 12d. Electrolytic Blocks, 500 p.v. 32+8 mfd., 3s. 9d. each; 32 mfd., 3s. 3d.; 16 mfd., 2s.; 8+8 mfd., 350 p.v., 1s. 6d. Tubulars: 50 mfd., 50 p.v., 1s. 3d. each; 25 mfd., 25 p.v., 9d. Aluminium Can, vertical, 8+8 mfd., 500 p.v., 4 leads, 2s. each. Post 6d. or C.O.D.—The Static Condenser Co., 387A, King Street, Hammersmith, London, W.6.

**B**ANKRUPT BARGAINS.—Brand new 1938 radio sets in makers' cartons with guarantees at less than half retail prices: send 1½d. stamp for list bargains.—261-3, Lichfield Road, Aston, Birmingham.

## LOUDSPEAKER REPAIRS

**R**EPAIRS in Moving Coil Speakers, Cones and Coils fitted and Rewound. Fields altered. Prices Quoted including Eliminators. Loudspeakers Repaired, 4/-; L.F. and Speech Transformers, 4/-, post free. Trade invited. Guaranteed. Satisfaction, Prompt Service, Estimates Free.—L.S. Repair Service, 5, Balham Grove, London, S.W.12. Battersea 1321.

## NEW RECEIVERS AND CHASSIS

**A**LL ARMSTRONG Radio chassis, including Press Button models, 9 latest models, can be seen and heard at our Showrooms. Demonstrations daily. Armstrong chassis are sent on 7 days' approval, carriage and packing free. Armstrong Company have fully illustrated technical catalogue describing all models.—Armstrong Company, 100, St. Pancras Way (formerly Kings Road), Camden Town, London, N.W.1. Gulliver 3105.

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Increased salaries and Pensions make Radio a profitable and interesting profession. We train students for all branches and guarantee appointments. Britain's leading Colleges. Boarders accepted. Write for free prospectus.—Wireless College, Colwyn Bay, or Wireless College, Calmire, Southampton.

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**T**ELEVISION.—All those who wish to enter this new profession should apply at once for free handbook to British Institute of Engineering Technology, 189, Stratford Place, London, W.1.

# PREMIER 1939 RADIO

**IMMERSION HEATERS**, 200-240 Mains. Will heat a glass of cold water in under 2 minutes, 4/6 each.

**PREMIER BATTERY CHARGERS**. Westinghouse Rectification. Complete. Ready for use. To charge 2 volts at ½ amp., 10/-; 6 volts at ½ amp., 16/-; 6 volts at 1 amp., 19/6; 12 volts at 1 amp., 21/-; 6 volts at 2 amps., 32/-.

**AUTO TRANSFORMERS**. Step up or down A.C. mains between 100-250 volts. 60 watts, 9/-; 100 watts, 11/6.

**Premier Transverse Current Microphone**, 20/- Microphone Transformer, 6/- Table Mike Stand, 7/6.

**BAKED METAL SCREENED WIRE** for mikes, pick-ups, etc. Single, 4d. yd.; Twin, 6d. yd.

**PREMIER U.S.A. QUARTZ TRANSMITTING CRYSTALS**, 7 mc., 10/- each. Enclosed holder and base, 3/-.

**TUBULAR CONDENSERS**, all values from .0001 to .5 mfd., 6d. each.

**U.S.A. VALVE HOLDERS**, 4, 5, 6 and 7 pin, 6d. each. Octals, 9d.

**CERAMIC U.S.A. VALVE HOLDERS**, all fittings 1/- each.

**PREMIER S.W. H.F. Chokes**, 10-100 metres, 9d. each. Pie-wound, 1/6 each. Screened, 1/6 each.

**SHORT-WAVE COILS**, 4- and 6-pin types, 13-26, 22-47, 41-94, 78-170 metres, 1/9 each, with circuit. Special set of 8.W. Coils, 14-150 metres, 4/- set, with circuit. Premier 3-band S.W. coil, 11-25, 19-43, 38-86 metres. Suitable any type circuit, 2/6.

**COIL FORMERS**, 4- or 6-pin low-loss, 1/- each.

**UTILITY Micro Cursor Dials**, Direct and 100 : 1 Ratios, 3/9.

**PREMIER Short-Wave Condensers**, all-brass construction, with Trolitof insulation. 15 mmf., 1/6; 25 mmf., 1/7; 40 mmf., 1/9; 100 mmf., 2/1; 160 mmf., 2/3; 250 mmf., 2/6.

**TROLITOF DOUBLE SPACED TRANSMITTING CONDENSERS**, 15 mmf., 2/9; 40 mmf., 3/6; 160 mmf., 4/6.

**AMERICAN VALVES**. We hold the largest stocks of U.S.A. tubes in this country and are sole British Distributors for TRIAD High-grade American Valves. All types in stock. Standard types, 5/6 each. All the new Octal Base tubes at 6/6 each, 210 and 250, 8/6 each.

**EUROPA MAINS VALVES**, 4v. A.C. Types, A.C.H.L., A.C.L., A.C.S.G., A.C./V.M.S.G., A.C.H.P., A.C.V.H.P., A.C.P., and 1 watt D.H. Pentodes, all 4/6 each. A.C./Pens., I.H., 5/6; A.C.P.X.4, 6/6; Oct. Freq. Changers, 8/6; Double Diode Triodes, 7/6; Triode Hex. Freq. Ch., 8/6; Tri. Grid Pen., 10/6; 3½-watt D.H. Triode, 7/6. 350 v. and 500 v. F.W. Rect., 5/6. 13 v. 2 a. pens Purpose Triodes, 5/6; H.F. Pens. and Var.-Mu. H.F. Pens. Double Diode Triodes, Oct. Freq. Changers, 7/6 each. Full-wave and Half-wave Rectifiers, 5/9 each.

## Premier Short-Wave Kits

Complete to the last detail including all Valves and coils, as well as theoretical and wiring diagrams and lucid instructions for building and working. Each kit is supplied with a steel Chassis and Panel and uses plug-in coils to tune from 13 to 170 metres.

1 Valve Short-Wave Receiver or Adapter Kit ... 17/6  
1 Valve Short-Wave Superhet Converter Kit ... 20/-  
1 Valve Short-W.A.C. Superhet Converter Kit ... 22/6  
2 Valve Short-Wave Receiver Kit ... 25/-  
3 Valve Short-Wave Screen Grid and Pentode Kit ... 35/6

**MATCHMAKER UNIVERSAL OUTPUT TRANSFORMERS**. Will match any output valves to any speaker impedance. 11 ratios from 13 : 1 to 80 : 1. 5-7 watts, 13/6; 10-15 watts, 17/6; 20-30 watts, 25/6. Send for full details.

## Premier Moving Coil Meters Guaranteed Accuracy within ± 2 per cent.

Model No. 21.	Model No. 311.
3 in. square case.	3½ in. diameter round case.
0-1 m/A. ...	18/6 0-1 m/A. ...
0-10 m/A. ...	17/8 0-1 m/A. ...
0-50 m/A. ...	17/8 0-50 m/A. ...
0-1 m/A. ...	17/8 0-100 m/A. ...
0-250 m/A. ...	17/8 0-250 m/A. ...
Model 311. 0-1 m/A. movement, with calibrated scale, volts-ohms-m/A., 25/-.	20/-

**VOLTAGE MULTIPLIER RESISTANCES**, guaranteed accuracy ± 2 per cent. All standard ranges, 1/3 each.

**TAPPED SHUNT** to provide readings of 5 m/A., 25 m/A., 250 m/A., and 1,000 m/A., 5/6.

**COSMOCORD A.C. GRAMO. UNIT**, 100-250 v. A.C., Bakelite unit plate fitted with induction motor, pick-up, vol.-control and needle cup, auto stop and start, 35/9. A.C./D.C. MODEL, 49/6.

Have you had our 1939 Catalogue, Handbook and Valve Manual? 90 pages of Radio Price 6d. Bargains and Interesting Data.

**ALL POST ORDERS TO**: Jubilee Works, 167, Lower Clapton Road, London, E.5. Amherst 4723. **CALLERS** to: Jubilee Works, or 169, Fleet Street, E.C.4. Central 2833, or 50, High Street, Clapham, S.W.4. Macaulay 2381.

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

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PUSH-BUTTON CONVERSION— See  
Page 84

# Practical and Amateur Wireless

Edited by F.J. CAMM

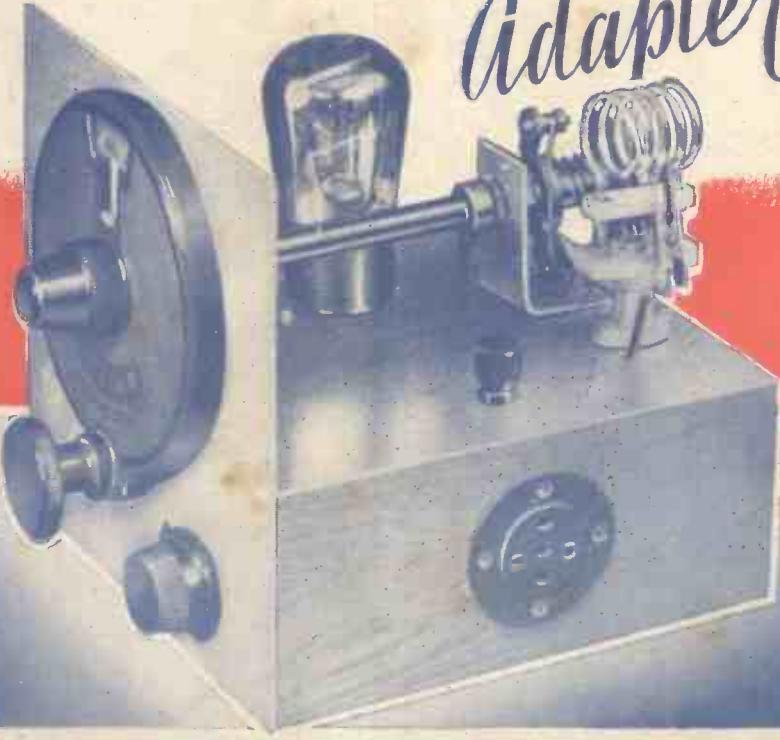
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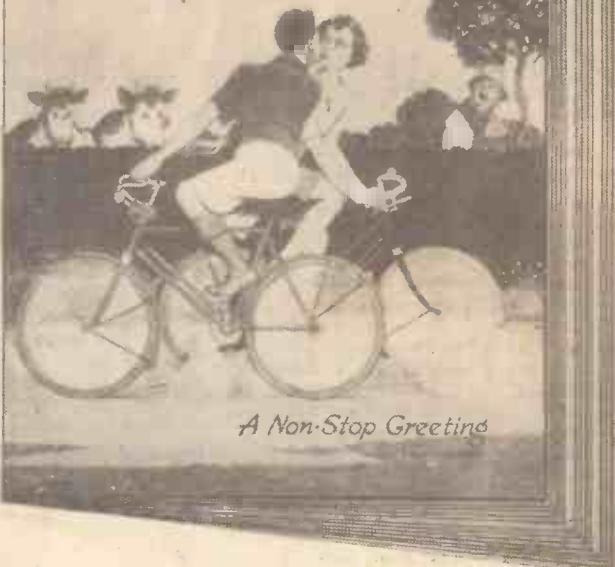
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# WHAT IS INTERFERENCE?— See Page 75

**Practical  
and Amateur  
Wireless**

Edited by F. J. CAMM

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

VOL. XIV. NO. 342. April 8th, 1939.

## ROUND the WORLD of WIRELESS

### An Ultra-S.W. Adapter

WE have received many requests for ultra-short-wave adapter or converter units which would enable the television sound signals to be heard and which would otherwise be useful for reception below 10 metres. In this issue we describe an adapter which makes use of interchangeable coils of the U.S.W. type, and it may therefore be used from 3 to 10 metres. A special type of circuit is employed and it should be found that a unit of this type may be employed to enable the sound television signals to be heard, provided that the Alexandra Palace station is within range. The unit may form the basis of interesting experiments with special aerial systems at places normally beyond the range of the television transmitter, with a view to picking up some kind of signal from that station. At the moment extraordinary results are being obtained in some parts of the country with special reflector type aerials, and a simple receiver with headphones may offer the most useful type of apparatus for use with these experimental aerial systems. This unit should, therefore, fulfil a long-felt want among experimenters for ultra-short-wave work.

### "My Lucky Break"

IN a programme bearing this title broadcast from WLW, the well-known American station, two inmates of the State Prison of Southern Michigan recently obtained distinction. They wrote a song, "In All My Dreams," and during the broadcast they listened to the number on headphones in their cells.

### New Radio Paris Transmitter

THE new station at Radio Paris will probably commence tests during the night beginning at the end of this month. The power rating of this station will be 450 kW.

### B.B.C. to Show America

MR. D. H. MUNRO, the B.B.C. Television Productions Manager, will leave England on May 4th to take up an appointment for a short period with the Columbia Broadcasting System. He will assist in the design and setting up of the studio organisation in New York, basing the arrangement on that used at Alexandra Palace.

### Interference Suppression

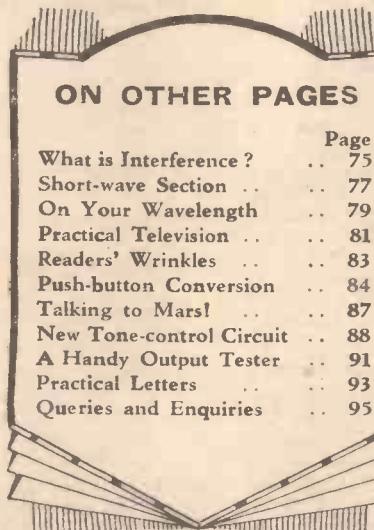
IN the House of Commons recently the Assistant Postmaster-General stated that the annual cost to the Post Office of assisting listeners to obtain reception free from interference is approximately £95,000.

### Royal Tuning Dial

WE understand that His Majesty King Farouk of Egypt recently obtained an 11-valve superhet in which the tuning dial incorporated a large-scale map of Europe. On this the positions of the various stations were marked and illuminated as the receiver was tuned. The set was

### ON OTHER PAGES

	Page
What is Interference?	75
Short-wave Section	77
On Your Wavelength	79
Practical Television	81
Readers' Wrinkles	83
Push-button Conversion	84
Talking to Mars!	87
New Tone-control Circuit	88
A Handy Output Tester	91
Practical Letters	93
Queries and Enquiries	95



presented to His Majesty by a Swedish firm—Aktiebolaget Gylling and Co., of Stockholm. He has placed an order for three similar receivers for installation at the Abdin Palace, Cairo.

### Call Signs on Cars

A RADIO amateur in the U.S.A. recently obtained permission to use his call sign in place of the registration number on his car, and the idea immediately caught on, with the result that now over 500 amateurs have adopted the call sign as a car registration number.

### "Swing" Orchestra

FOURTEEN of the best swing musicians in this country have formed a recording orchestra under Sid Philipps, the composer, and they will give their first broadcast on April 13th (National). Sid Philipps claims the unique distinction of being the only English dance music director who makes records in this country exclusively for the American market.

### Launch of Aircraft Carrier

BARROW-IN-FURNESS, on Lancashire's northern coast, will be the scene of an important launch on the morning of April 5th, when the new aircraft carrier, H.M.S. *Illustrious*, will go down the slipway. She will be the biggest ship launched at Barrow. Lady Henderson, wife of Vice-Admiral Sir Reginald Henderson, Third Sea Lord, and Controller of the Navy, is to perform the launching ceremony, and a description of this and of the whole scene will be broadcast by the B.B.C. in the Northern and Regional programmes by Thomas Woodroffe from Vickers-Armstrongs' Naval yard. Woodroffe and the microphone will go down to the water on board the vessel—so that an unusually interesting commentary seems assured.

### Theatre Variety

ON April 12th theatre variety will be broadcast from the New Hippodrome, Coventry, where there is an attractive bill. The first broadcast from the Coventry Hippodrome was in 1932. Last year the theatre was featured in the "Famous Music-Halls" series. Its orchestra is one of the best-known theatre orchestras on the air.

### Brass Band Concert

A BOLINGBROKE will conduct the New Haden Colliery Band on April 14th. This band had its first Midland broadcast in 1937, and had previously broadcast from the old Stoke station. It took second prize at Belle Vue in July, 1934.

### Light Music

THE Guildford Willington Sextet will play a popular programme of light music on April 13th. It has broadcast several times in the past year. Guildford Willington is Music Director at a Birmingham hotel.

# ROUND the WORLD of WIRELESS (Continued)

## The War of the Waves

ALTHOUGH the new plan for the allocation of channels to European broadcasting stations has not yet been published, it seems evident that whatever decisions may be taken at the Conference at Montreux (Switzerland), it will be no easy task to improve matters on the long waves. It must be recalled that the following countries refused to adopt the previous plan, namely, Holland, Luxembourg, Lithuania, Norway, Turkey and Iceland. On the medium waveband applications for channels amount to roughly two hundred, whereas barely half this number can be accommodated. France alone is claiming twenty-six wavelengths as against nineteen allocated to that country by the Lucerne Plan. In the course of six years the number of European stations has grown from 257 to 310, and it is therefore inevitable that some sacrifices will have to be made by almost every broadcasting system if listeners are to receive transmissions fairly free of interference. There is no longer any possibility of widening the separation between stations from nine to twelve kilocycles in order to assure better transmission quality. The problem of non-



Sir Allan Powell, the newly appointed chairman of the B.B.C.

interference has been intensified by the fact that the power of many stations has been considerably increased since the last plan was adopted.

## Crosley Will Have Own Building at New York World's Fair

THE Crosley Corporation is now building and will occupy exclusively its own building at the New York World's Fair.

The cost of the building, which is centrally located on the Avenue of Communications near the Trylon and Perisphere, will exceed 100,000 dollars. It will be a beautiful structure constructed along modernistic lines. In the building will be exhibited the complete line of Crosley products, including radio receivers and radio-phonograph combinations.

One of the outstanding exhibits will be the Crosley Reado, the radio facsimile printer introduced by the Crosley Corpora-

## INTERESTING and TOPICAL NEWS and NOTES

tion in January this year. This new product will be in operation so that people visiting the exhibit may see it receiving printed



*Yehudi Menuhin, the world-famous violinist, photographed with his wife at their hotel, Grosvenor House, Park Lane, London, W. He is to make a tour of Great Britain under the direction of Harold Holt, and will also play at the Royal Albert Hall.*

words and pictures by radio. A facsimile transmitting unit will also be installed so that people may see how visual broadcasts are made. Engineers will be in charge to explain to questioners the operation of this new radio instrument.

In addition to displaying the complete line of products made by the Crosley Corporation, the company will have a studio for broadcasts direct from the World's Fair Grounds. These broadcasts will be sent over WLW (Cincinnati), a Crosley-owned station, and many will be fed to the networks.

## Laelia Finneberg Recital

LAELIA FINNEBERG, the well-known Lancashire soprano, broadcasts on Sunday afternoon, April 9th, in the first of a new North Regional series of recitals by distinguished vocalists, each singer being accompanied by the B.B.C. Northern Orchestra.

## More Melodies

THOSE who like melody, whether classical or modern, will welcome another programme in the series entitled "Wanted—a Tune," to be broadcast on April 7th. In these programmes the B.B.C. Northern Ireland Orchestra, conducted by Arnold Perry, plays alternately with James Moody's Dance Band, each combination playing tuneful music most appropriate to it. The common denominator throughout is melody, whether written by Berlin or Brahms, Schubert or Gershwin.

## Easter Carols

THE B.B.C. Singers, conducted by Leslie Woodgate, will give a recital of Easter Carols on April 9th, including "This Joyful Eastertide" (arranged by Charles Wood) and "Easter Eggs" (arranged by Martin Shaw). This broadcast will be given in the National programme.

# SOLVE THIS!

## PROBLEM No. 342

Jackson built a simple three-valve battery receiver, using detector and two L.F. stages. This had been giving good results for some weeks, but one evening he wished to change over to the Regional transmitter and adjusted the tuning control without, however, obtaining any modification in the signal strength from the National. The pointer indicated that he had changed stations correctly. What was wrong? Three books will be awarded for the first three correct solutions opened. Entries should be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 342 in the top left-hand corner and must be posted to reach this office not later than the first post on Tuesday, April 11th, 1939.

## Solution to Problem No. 341

Although Boyce's tests indicated that the primary and secondary windings of the I.F. transformer were in order and that the correct current was being passed by all valves, the primary winding on the transformer in the frequency changing stage had become loose and had fallen, thus providing no coupling with the secondary winding. The following three readers successfully solved Problem No. 340 and books have accordingly been forwarded to them: A. E. Linton, 84, Eleanor Street, Grimsby, Lincs; C. Pierrepont, 13, Chorley New Road, Bolton, Lancs; B. Colston, 431, Stapleton Road, Eastville, Bristol, 5.

# What is Interference?

**E**LCTRICAL interference is generally observed in the form of crackling and hissing noises, although it sometimes takes the form of a buzz or low-pitched hum. In each case, the trouble is due to the transmission of electrical vibrations. This will perhaps be the more readily understood if reference is made to the old type spark transmitter, which is now obsolete. It was widely used until about twenty years ago, from which time it was gradually superseded by transmitters using valves.

## The Spark Transmitter

The fundamental circuit of a spark transmitter is shown in Fig. 1, from which it may be seen that a generator, spark gap, morse key and tuning coil are wired in series. Each time the contacts of the key are closed, a current flows through the coil and across the spark gap. Each time a spark is produced the oscillatory circuit (tuning circuit) is energised and the effect of the spark is transmitted through the aerial-earth system. This type of circuit had a wide range, but it suffered from the severe disadvantage that it could not be sharply tuned; in fact, a powerful 400-metre signal could often be heard between 300 and 500 metres on a receiver situated fairly close to the transmitter.

It should be noted in Fig. 1 that a fixed condenser is connected across the contacts of the morse key. This is to prevent, or at least to minimise, sparking between those contacts. If a similar condenser were wired between the two sides of the spark gap the transmitter would be almost inoperative; any signal that was transmitted would be of very low intensity.

## Electric-motor Circuits

If we now look at the circuit of an electric motor or of a dynamo—shown in incom-

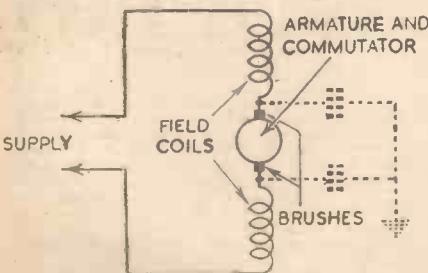


Fig. 2.—Typical diagram of a small electric motor. Suppressor condensers are shown by broken lines.

plete diagrammatic form in Fig. 2—we find that it is quite comparable to that of the spark transmitter. There is no actual spark gap, nor is there a morse key, but there are the brushes which make contact with metal segments on the commutator. Thus, any slightly irregular contact between the brushes and the commutator causes sparks to be produced. These result in the generation of a fluctuating current through the field windings—and it is not difficult to see how these coils can be the counterpart of the tuning circuit used in the transmitter.

Before Attempts are Made to Trace the Source of Electrical Interference and to Effect a Cure, it is Wise to Understand what Interference Is and How it is Caused. "The Experimenters" Here Give a Simple Explanation and Describe Some of the Most Effective Remedies

## Motor-car Ignition

The same kind of thing, only in still more obvious form, applies in the ignition circuit of a motor-car engine. In this case there is the secondary winding of the ignition coil in series with the distributor (comparable to the morse key) and the gaps of the sparking plugs. The latter are spark gaps

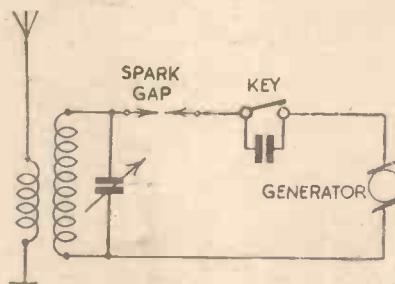


Fig. 1.—Representative diagram of a spark transmitter.

in every sense of the word. The wiring of the components can act as a reasonable aerial and so "transmit" the spark interference. Fig. 3 shows the circuit arrangement.

In both of the cases taken it will be seen that there is not a definite tuning circuit, but that the connecting wires can act as one. That helps to explain why the "wavelength" of the average ignition circuit "interference transmitter" is in the region of seven metres; the leads are only about three feet long altogether.

## Intermittent Contacts

Now let us turn to a simple electric-lighting circuit, such as that shown diagrammatically in Fig. 4. In this case, the only "intentional" contact-breaker is the switch. And due to this having a very quick action there is little chance of an appreciable spark being produced unless the switch is defective, so allowing a certain amount of arcing at the contacts. But if there were a bad contact in, say, the lamp holder, the current flowing through the circuit would be intermittent, and might be of a fairly high frequency if a short arc were taking place at the point of bad contact.

In the case of neon signs the discharge through the neon gas in the sealed tubes is comparable to a spark at a gap, but in this case there are certain power-factor condensers and chokes also included in the circuit. Nevertheless, unless special precautions are taken in designing and installing the sign, interference is probable.

We could go on reciting other examples, but it will be seen that all are of similar form when interference is due to radiation; that is, when it is not being carried directly by means of connecting wires

between the mains and the receiver. In other words, the interference in the case of a battery set is always of the radiated kind; that explains why it is not generally as severe as when a mains-operated receiver is used. It will be seen that if the receiver is fed from the same

supply leads as are used for the interference-producing apparatus, the interference may travel directly along the mains leads.

## Suppression Methods

How can the interference be overcome? There are many standard remedies, but in some cases experiments must first be carried out to determine the most suitable values of the necessary condensers and chokes. It will be evident that in the case of a motor or dynamo generator the interference should be prevented by connecting suitable condensers between the brushes, as indicated by the broken lines in Fig. 2. The method which is generally most successful is to connect two condensers in series (made as one unit with two red and one black leads) between the brushes, and to earth the series connection between them. This is done by joining it to the frame of the machine, and taking an earth lead from it, if that is not already provided.

For A.C. machines the condensers should have a value of between .1 and .5 mfd., according to the severity of the interference. For D.C., values between 2 and 4 mfd. are required. It will be appreciated that if the values mentioned for D.C. were used in an A.C. circuit the condensers would act as fairly low resistors across the supply—for A.C. will pass through a condenser. Another point to be borne in mind is that the con-

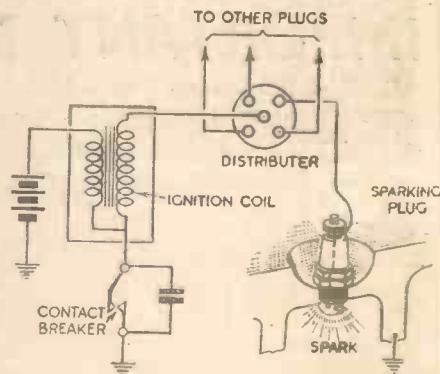


Fig. 3.—Simplified circuit of a car ignition system.

densers should be high-grade components with a safe working voltage of not less than double the supply voltage for A.C., and not less than one and a-half times the supply voltage on D.C. If there is any doubt concerning the safe working voltage, a fuse should be wired in series with each condenser.

This general method of suppression is applicable to nearly all types of motors and dynamos from small ones used in vacuum cleaners to the large ones used for industrial work. There is, however, another simpler

(Continued on next page)

## WHAT IS INTERFERENCE?

(Continued from previous page)

form of suppression which is generally fully effective on car dynamos, for example. This is to connect a .1 mfd. condenser between the unearthing terminal of the machine and the chassis earth. Special condensers in metal containers are available for this purpose, as well as for the other purposes mentioned. When two condensers are necessary, it is most convenient to use one of the many types of twin units supplied for the job, and provided with three leads: one from each condenser and one from the junction between them.

Despite the correct use of suppressor condensers it is important to make sure that all connections are sound and that the brushes and commutator are kept clean, so that the contact between them is as near perfect as possible.

## In the Receiver Leads

When easy access cannot be gained to the brush connections, mild forms of interference can be prevented by connecting a twin condenser between the supply leads and earthing the junction. If this cannot be attached to the machine itself it is often possible to obtain satisfactory suppression by fitting it to the mains leads to the receiver. Special condensers with plugs and sockets are made for this purpose, and one is shown in Fig. 5. The unit plugs into the power socket, and the plug attached to the receiver leads is fitted into sockets in top of the condenser unit. There is a terminal for earthing the centre point.

In the case of some devices, such as switches or contact breakers, the mere connection of a condenser between the contact points might even intensify the interference; that could easily be found by trial. Should it be found that the condenser alone is not effective it might be possible to suppress the interference by connecting a fixed resistor (non-inductive for preference) in series with the condenser. The value of the resistor is not usually critical, but should generally be

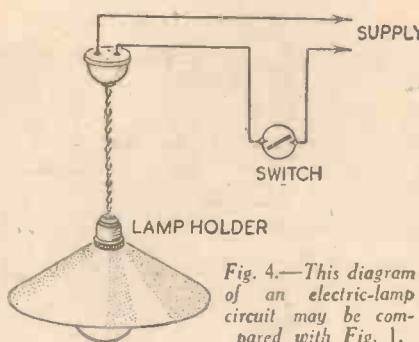


Fig. 4.—This diagram of an electric-lamp circuit may be compared with Fig. 1.

between about 250 and 1,000 ohms, when the condenser may have a value of about .2 mfd. So-called contact suppressors, comprising a condenser and resistor in series, can be bought ready for use. Separate components can be experimented with to find the most suitable values, when it might be possible to replace them by a single unit with similar component values.

## Resistor Suppressors

When dealing with motor-car interference the high-tension (sparking plug)

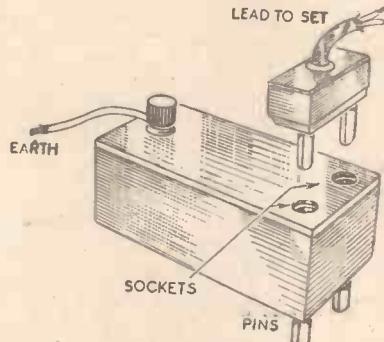


Fig. 5.—A convenient type of twin-condenser suppressor for connection in the mains supply to the set.

circuit is usually of first importance. Condensers obviously could not be wired across the plug points, because they would prevent the plugs from operating. The method which is generally most effective is to include a resistor of about 50,000 ohms in each plug lead and also in the H.T. lead to the centre of the distributor. These resistors sometimes impair the efficiency of the ignition system to a certain extent, and are not required when using a modern car-radio receiver unless it is wished to prevent the radiation of interference which affects television receivers as now made. When using older-type car-radio receivers, or when using an ordinary portable set in the car these suppressors, as well as the fitting of a condenser across the dynamo output, are essential. It is also sometimes necessary to connect a suppressor condenser across the ignition contact breaker.

## Built-in Suppressors

The reason for suppressors rarely being required with a modern car-radio receiver is that a series of small H.F. chokes is built into the supply leads inside the set; the design of these has reached a high degree of perfection. Low-inductance H.F. chokes can also be connected in series with the mains leads to a domestic receiver with satisfactory results to overcome many forms of mains-borne interference. In most cases they should be used in conjunction with the twin-condenser arrangement previously mentioned.

In the foregoing we do not claim to have dealt at all fully with the methods of suppressing interference, but we have tried to give a clear outline of the essentials. It should be remembered that even though the principles do not vary, the most suitable inductance, capacity and resistor values have often to be decided by test, since they vary with different apparatus. That explains why it is so much easier to include suppressors in a car-radio receiver than in a domestic model; in the former example the precise form of the interference likely to be expected is fairly well known; in the latter it can take one of many forms.

## IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, April 5th.—Concert Party Programme.

Thursday, April 6th.—Orchestral programme: Schumann.

Friday, April 7th.—The Dream of Gerontius, from the Queen's Hall, London.

Saturday, April 8th.—Music Hall.

## REGIONAL (342.1 m.)

Wednesday, April 5th.—General Release: Songs from the Current Films, from Midland.

Thursday, April 6th.—Darts Match: North v. South.

Friday, April 7th.—Winning Ways, a comedy of Welsh Small-town life, by E. Eynon Evans, from Welsh.

Saturday, April 8th.—Dance Band programme.

## MIDLAND (297.2 m.)

Wednesday, April 5th.—Sportsman's Diary.

Thursday, April 6th.—Midland Farmers' Club: Should we grow more apples?

Friday, April 7th.—Choral and organ programme from the Royal Institution for the Blind, Edgbaston, Birmingham.

Saturday, April 8th.—Songs by Easthope Martin: Recital.

## WEST OF ENGLAND (285.7 m.)

Wednesday, April 5th.—Concert from the Colston Hall.

Thursday, April 6th.—Gaffer and Gavotte—No. 24 in the series.

Friday, April 7th.—Choral programme.

Saturday, April 8th.—Sports Special: a feature for fans.

## WELSH (373.1 m.)

Wednesday, April 5th.—Famous Schools of Wales, a talk.

Thursday, April 6th.—Bach's St. Matthew Passion, from Gregynog Hall, Newtown, Montgomeryshire.

Friday, April 7th.—Winning Ways, a comedy of Welsh Small-town life, by E. Eynon Evans.

Saturday, April 8th.—A General Knowledge Competition between the Quarrymen of North Wales and the Miners of South Wales.

## NORTHERN (449.1 m.)

Wednesday, April 5th.—Northern Music Hall: Variety from the Winter Gardens, Morecambe.

Thursday, April 6th.—Northern Chamber Music—1.

Friday, April 7th.—Good Friday's Catch: a recorded story made on board a trawler.

Saturday, April 8th.—Football Bee.

## SCOTTISH (391.1 m.)

Wednesday, April 5th.—Tongue Twister Bee.

Thursday, April 6th.—Scots Songs.

Friday, April 7th.—Tunes for Everybody: orchestral programme.

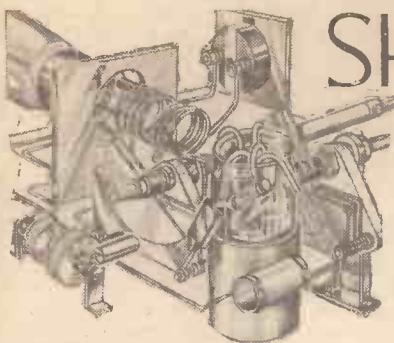
Saturday, April 8th.—Shinty; Camanachd Cup Final: A commentary on the second half of the match from Bucht Park, Inverness.

## NORTHERN IRELAND (307.1 m.)

Wednesday, April 5th.—The Bone was Broken, a radio tragicomedy by John Baile.

Thursday, April 6th.—Choral Festival from First Presbyterian Church Coleraine.

Friday, April 7th.—Wanted—a Tune: Schubert or Gershwin? Berlin or Brahms? Orchestral programme and dance music.



# SHORT-WAVE SECTION

## AN EXPERIMENTAL U.S.W. ADAPTER

**Constructional Details of an Efficient Unit Suitable for Long-range Reception on the Ultra-high Frequencies, and which has Advantages over the Conventional Superhet.**

THE problems of comparatively long distance reception on the ultra-short waves are many. There is still an enormous amount of data to be acquired both by amateur and professional alike. A superhet using acorn valves provides, at the present time, the most sensitive combination for receiving ultra-high frequency signals outside of the optical or quasi-optical limits. For obvious reasons the more ambitious type of receiver cannot always be used by the amateur, in which case a super-regenerative set using two or three valves is generally built.

The adapter might be termed "universal" in its application, since it can be used as a single-valve receiver or connected to the pick-up input of a set for audio amplification, or alternatively, used in front of a

The tuning condenser has a capacity of 20 micro-microfarads, and is used in conjunction with the Eddystone plug-in type ultra-short-wave coils.

### Constructional Details

The practical construction of the unit is kept essentially simple and compact, consisting of a small sub-chassis and panel each 6ins. square. A general idea of the layout can be obtained from the illustration on our cover this week. The small frequentite coil holder is mounted on a midget stand-off insulator, also made of the same material,

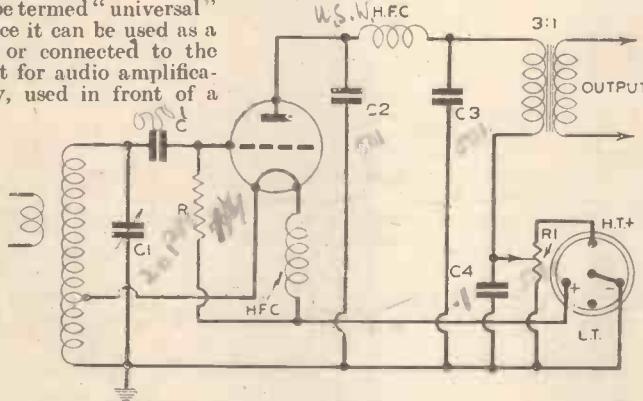


Fig. 1. — Theoretical circuit of the adapter as described on this page.

broadcast superhet, for supersonic amplification.

The first two methods of reception need no comment, but amplified supersonic reception for the ultra-high frequencies does not seem to be used a great deal in this country.

### Circuit Considerations

Although not apparent at first glance, the circuit is a super-regenerative one and might be called the critical factor type. Supersonic oscillation depends on the value of the feed back condenser C2, and grid-leak condenser combination, oscillation taking place when the H.T. voltage is raised above a certain critical value by means of the potentiometer R1. Signal frequency oscillation is obtained in the familiar electron coupled circuit by tapping one side of the filament up the grid coil and inserting an ultra-short-wave H.F. choke in the L.T. positive feed. Another ultra-short-wave H.F. choke feeds the anode of the valve, and is by-passed on each side by C2 and C3, both having a capacity of .001 mfd. Eddystone H.F. chokes are used, and it is important to note that the choke in series with the L.T. positive lead is the type with the lower D.C. resistance (type No. 1021), so that the drop in L.T. voltage will be slight.

The potentiometer R1 used was 50,000 ohms and is by-passed to earth via a .1 mfd. condenser C4, though there seems little reason why a high value potentiometer should not be used at R1 if so required.

the whole coil assembly being mounted close to the tuning condenser. A wire is brought through the chassis terminating in a clip for tapping the negative side of the filament along the coil.

A separate earth terminal is provided and is mounted directly over the five-pin valveholder. All the earth wiring from the by-pass condensers, and one side of the tuned circuit is taken direct to the earth terminal. It will be seen that a five-pin valveholder is used for providing an input from the H.T. and L.T. batteries, the centre pin of the valveholder being connected to earth, since it may be necessary to make a connection to the negative line of the receiver, when the unit is used under certain conditions, as will be seen later.

The two leads from the secondary of the 3 : 1 L.F. transformer are taken out from the back of the sub-chassis or at any convenient point. Need it be emphasised that all wiring should be short and direct? Certainly it should be seen that the coil makes a firm contact in the holder, also the connections to the tuning condenser and from the by-pass condensers to earth must be good. It is a point seldom appreciated by the amateur at the ultra-high frequencies, that contact resistance is extremely important. Erratic working of a receiver at 56 megacycles can often be traced to this, though superficially the connections may look all right.

The grid condenser and leak, C and R, have values of .0001 mfd. and 1 megohm, respectively. The value of these compo-

nents with C2 and C3 should be adhered to, otherwise it may not be possible to obtain supersonic oscillation. A medium-impedance valve should be used—that is, one with an anode impedance in the region of 12,000 ohms, though for operation above 45 megacycles it will be necessary to try several types to obtain consistent oscillation. The lowest measured wavelength with this circuit was 2.75 metres.

### Operating Details

In operation the adapter requires a 2-volt accumulator or dry cell and a 120 H.T. battery. It might be noted that below 75 volts (depending on the valve) it will not be possible to obtain supersonic oscillation. It is necessary to provide a variable coupling for the single-turn aerial coil; the simplest way is to push it between the first or second turns of the grid coil from the earth end. When the unit is functioning as a super-regenerative adapter the characteristic hiss will be heard; there should not be any squealing or whistle; if there is, adjustment to R1 and the aerial coupling will remove this.

The great advantage of this circuit over the conventional super-regenerative receiver is that it is sensitive to weak signals, and quite a small signal input will cut out the inherent hiss over several degrees of the dial. Perhaps the most unorthodox point so far presented is that of coupling the unit to a broadcast superhet for supersonic amplification. Here the secondary of the L.F. transformer is connected directly across the aerial input of the broadcast receiver, in which case one side of the secondary should be connected to the earth line of the adapter, already provided for (Fig. 2). The broadcast set must be tuned to the top of the long-wave band.

### Tuning Range

With the circuit constants given, a tuning range of 3 to 10 metres can be obtained. An 8-turn coil will cover the 10-metre band, and a 6-turn coil the television frequencies. In each case the tapping can be made at the centre of the coil, though on higher frequencies this will have to be found experimentally.

The unit may also be used as a straight electron-coupled circuit, merely by adjustment of R1; this is an advantage at 10 metres for telephony reception. Considering this, and the fact that the unit can be used for straight or amplified super-regenerative reception, this adapter appears unusually versatile for ultra-high-frequency

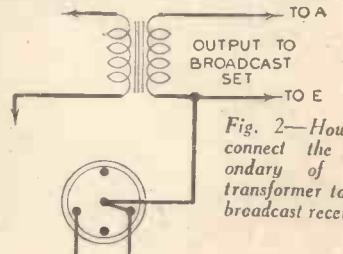


Fig. 2—How to connect the secondary of the transformer to the broadcast receiver.

work. It is impossible, of course, to give any idea of the results to be obtained at the ultra-high frequencies, but when testing out the adapter at a distance of just over 100 miles from Alexandra Palace, weak headphones signals were obtained from both sound and vision transmissions (depending on conditions) by connecting the headphones directly across the output of the transformer. With the amplified supersonic arrangement, strong loudspeaker reception was obtained with the same signals.

## Leaves from a Short-wave Log

### Interesting Signals on 9-Megacycle Band

**A**LTHOUGH this band is somewhat congested, on some evenings when conditions are favourable it is easy to secure excellent signals from such widely separated countries as Cuba, Costa Rica, Martinique, Argentine Republic, Malaya, Iraq and Guatemala, all on the condenser dial within a split hair of each other. COCQ, Havana (Cuba) on 30.9 m. (9.71 mc/s) is on the air continuously from G.M.T. 12.00-06.00, and it is no difficult matter to log a broadcast from this transmitter from G.M.T. 22.00 onwards. FZF6, Port de France (Martinique) on 30.93 m. (9.7 mc/s) should be tuned in towards G.M.T. 23.00, and TI4NRH, Heredia (Costa Rica) on 30.95 m. (9.69 mc/s) on Tuesdays, Thursdays and Saturdays between G.M.T. 02.00-03.00. On Sundays, ZHP, Singapore (Malaya), can be heard from G.M.T. 23.40 on 30.96 m. (9.66 mc/s), and on the same channel LRAI, Buenos Aires (Argentine Republic) can be received on almost any day (Monday-Thursday inclusive) between G.M.T. 23.00-02.00, or as early as G.M.T. 21.00 on Fridays, but on Saturdays and Sundays the station does not open until midnight. TGWA, Guatemala City, on 30.98 m. (9.68 mc/s), now a 10-kilowatter, is at its best between G.M.T. 01.00-02.00 (Monday morning). On this channel also towards G.M.T. 19.00 you should pick up the Baghdad (Iraq) experimental transmitter HNF, with an Arabic programme.



The Grand National crowds this year were controlled by mounted police equipped with radio. Messages were received from a central headquarters on an aerial, which is seen in the illustration, depending from the receiver, which is strapped to the saddle.

### Short-wave Direction Finding

**D**URING the recent transatlantic practice flights made by the French flying boat *Lieutenant de Vaisseau Paris*, direction finding was carried out successfully on 23 metres, as hitherto interference on longer channels led to a misunderstanding of the aircraft's position.

### Bulgarian Programmes

**L**ZA, Sofia, relaying the 100-kilowatt capital medium-wave transmitter (352.9 m.—850 kc/s), now enjoys a regular schedule of broadcasts. The times are: G.M.T. 10.00-12.00, and G.M.T. 15.00-22.00 (Monday, Wednesday, Friday, Saturday), whilst on Tuesday and Thursday in each week the transmission is made from G.M.T. 15.00-22.00. On Sundays programmes are radiated from G.M.T. 05.30-13.00, and from G.M.T. 15.00-21.30. The call is *Radio Sofia* (Soh-fee-ya), given out by a woman announcer, the channel being 35.44 m. (8.465 mc/s), and the power 1½ kilowatts. Address: 19, Strada Moskovska, Sofia (Bulgaria).

### Good Signals from Canada

**O**N 48.78 m. (6.15 mc/s) CJRO, the 2-kilowatt Winnipeg (Manitoba) station is now regularly logged after midnight. The studio opens at G.M.T. 23.00 daily, and the programme is a continuous one until G.M.T. 05.00. Most of the entertainment is relayed from the

Canadian Radio Corporation stations in other parts of the Dominion, but occasionally special feature broadcasts are taken from the N.B.C. (New York) network. The opening signal adopted is that used by all Canadian stations: *O Canada*. Transmissions are S.B. through CJRX on 25.6 m. (11.72 mc/s). Address: Stations CJRX and CJRO, 155, Royal Alexandra Hotel, Winnipeg (Manitoba), Canada.

### Abyssinia's Daily Short-wave Programme

**F**OLLOWING numerous tests, the temporary 1-kilowatt transmitter installed by the Italian authorities in the immediate neighbourhood of Addis Ababa is now broadcasting radio entertainments daily between G.M.T. 16.00-17.00 and 18.00-20.00



A new television mast 150 ft. in height is now being erected for the outside broadcasts of television. The existing aerial at Alexandra Palace interferes with other programmes. This one, on the top of Highgate Hill, will be well away from any interference.

on 31.09 m. (9.65 mc/s). Call sign: IABA.

### Tirane Calling

**A**LTHOUGH no definite decision has been taken in regard to the adoption of definite channels, ZAA, Tirane (Albania), now uses 38.22 m. (7.85 mc/s) daily between G.M.T. 11.30-12.20, with an extended programme to G.M.T. 13.30 on Sundays. From G.M.T. 17.00-18.00 the broadcasts are made on 49.3 m. (6.085 mc/s). On Fridays, between G.M.T. 11.40-11.50, the studio has initiated a feature which was made popular by Poland in the early days of radio, namely, a *Letter Box* transmission during which replies are given to correspondents abroad in the French language.

#### PATENTS AND TRADE MARKS

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

# ON YOUR WAVELENGTH

## Examination for Dealers

I AM very glad to see that Switzerland, that neutral country which knows how to keep out of other peoples' affairs, and believes in looking after its own, has introduced a system whereby a wireless dealer or his chief assistant must pass an examination to prove his technical knowledge of wireless. The examination itself is difficult, for each candidate must submit to written as well as oral test, and also undergo an examination in trouble tracking and cure. He must also be able to deliver a half-hour talk on his practical experience, write a paper on the same subject, and demonstrate his practical ability in a test which lasts for three hours. Furthermore, every candidate must have completed a term of training, and have been employed for two consecutive years in a wireless business. Each candidate must have a fixed business address and deposit a thousand francs as a guarantee of the technical quality of his work.

I am certain that a large number of wireless dealers in this country could not pass such a test, and I am equally positive that few of their assistants could. There are some associations in this country that anyone without technical knowledge can join upon payment of a few shillings. Thus, a wireless dealer is able to impress the public by writing after his name a few meaningless letters. I should welcome any move in this country to take the racket out of the radio dealer's business. My post is full of complaints from readers who have been charged for new parts (usually the most expensive parts such as valves or transformers), when the trouble has really been due to a broken connection.

## I Am Canonised

YES, I am canonised, and I have been sainted, by our old friend "Torch" in the following terms, whom, he says, I have basely accused of calligraphically eviscerating his opinions :

**A PRAYER TO SAINT THERMION**  
 Ruin, despair, defeat are mine,  
 I cannot find appropriate line,  
 My Muse knows no elation.  
 Thermion has rattled Reason's seat,  
 No rhythm she finds; no couplet neat.  
 For his "Evisceration"



By Thermion

Which, "calligraphical" or not,  
 Is always of the best I've got;  
 'Tis humble, but mine own.  
 Oh, Thermion! When did I abuse,  
 Or fail my tuneful songs to use  
 To drive your wisdom home?

When "Spirit-rapping" was your theme,  
 Or mad inventor's futile scheme,  
 Or "secret television";  
 To back you up I've always tried.  
 When bunk and hooey you deride,  
 Poetical derision  
 From "Torch" has always been on tap.  
 Such loyalty! To get the rap,  
 Ingratititude most cruel!  
 Still, let my flame illuminate  
 The common sense you always state,  
 My Inspiration's fuel.

And "On Your Wavelength's" weekly page,  
 At times let "Torch" declaim and rage  
 Against all tarradiddle.  
 When you, as leader, set the theme  
 Think not disciple "Torch" too mean  
 To play as second fiddle.  
 And when from "Bunk" the cloak you  
 strip,  
 Let "Torch" delight to sing and skip  
 And bet his boots upon  
 The fact that humbug fades away  
 With each wise thing you write and say.  
 Hear me, Saint Thermion. Amen.  
 "TORCH."

## An Epoque from the North

SOME of my northern readers are very disappointed that they are unable to enjoy as southerners do the television programmes, for the simple reason that they cannot receive them to enjoy them. The appended letter is typical, and it was received from Mr. T. T., of Bacup :

"After reading your article on television the other day, I felt I could not resist the urge to express the disgust of those of us in the north who, for years now, have bought all the literature on the subject we could lay our hands on, and who have waited for so long for our dream to materialise. The cry at the moment is money and still more money. Haven't the B.B.C. the sense to see that, to fetch television to the Mid-

lands and the North, money would come back a thousand-fold? Why in the pioneer days did they not allow us all to enjoy the gradual development of sight and sound? Instead, they keep on pouring thousands of pounds into improvements for ten thousand users, while ten million are kept in blindness. This unfair dealing has had its repercussion in many ways. I know scores of people who, for the last two years, have refused to buy a new set, because they were convinced that any moment we would be having television. Also as a service-man in a rather poor area, I have had to patch up sets which by rights ought to have been consigned to the dust-bin. 'Oh, no,' they say, 'we are waiting for television; we will make this set do till then.' This is bound to have its effect on the industry in general. Great Scott! have we, who sat for hours waiting to hear a few words from Two Emma Toc, and who helped to foster the spirit that brought the B.B.C. into being, to sit back and wait until the finished product is offered to us, when at long last the powers that be realise we actually exist? I'm afraid most of us will be old and our sight so dim that, when it does come, we shall have to have our grandchildren to explain it all to us. I for one should like in the near future to see your esteemed paper—'TELEVISION and PRACTICAL WIRELESS.' "

## Exit Jazz

MANY years ago I wrote that jazz was a passing phase and would not endure, although at the time I said it had yet to reach its climax. The apogee has been reached and jazz band leaders are finding it increasingly difficult to get bookings, and when they do they cannot command fancy prices. Apparently, those responsible for arranging the programmes have discovered that they can hire a couple of lunatics for a guinea or so, and get even better results. The bands were few in number a few years ago, but the members of those bands have become as cute as their leaders, and instead of working as a member of a band at a paltry thousand a year or so, have started their own bands. There are now so many of them that the law of supply and demand has brought band salaries down to the bone. We may

now look forward to an era of pleasant broadcasting, devoid of cat-calls, nigger music, gutter language, and snivelling crooning by people who do not possess voices. Most of the crooners should visit a hospital for throat diseases. Many of them are serpentine in their outlook, and I am glad that they will now have to turn to other means for a living. This inspires me to offer six books, one of which I will award to each of the senders of what I consider to be the best six essays entitled "What I Would Do With Crooners." Mark envelopes "Crooner" in the top left-hand corner, and address to Thermion, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2, to reach me not later than April 24th.

#### Rediffusion of Television Transmissions

I AM informed that much misleading publicity has followed the theatrical reproduction of the B.B.C. television transmission of the Boon-Danahar contest on February 23rd, and that the B.B.C. therefore wishes to make its own position clear.

Large-screen projection of television programmes is still regarded as experimental, and permission to use B.B.C. transmissions in this way will be subject to certain necessary restrictions. Experience of the results will afford guidance as to future policy, which is still under consideration by the Television Advisory Committee.

The B.B.C., although primarily concerned with the provision of a home service, does not oppose experiments in large-screen rediffusion of its programmes before paying audiences, when the programmes concerned are either of events of national importance and interest, independent of commercial promotion; or when the subject is a sports event, the rights in which are held by a promoter.

For the present, therefore, the B.B.C. will raise no objection to rediffusion of events in the latter category if agreement as to terms is reached between the redifuser and the promoter, subject to certain conditions. The conditions include an undertaking that no exclusive rights shall be given to any one group or system, and that all applicants shall be granted rights on equal terms, based approximately on the relative seating capacity of the theatres concerned. Should the promoter object, the B.B.C. will act

## Notes from the Test Bench

#### Mixing Speakers

**I**T is sometimes desired to connect two speakers to an output arrangement, but the speakers may be of different impedances—that is, one high-impedance and one low-impedance. It should be remembered that this can be done quite simply if matching transformers are available and the connections should be as follows: The ordinary low-impedance speakers should be joined in the usual manner, with the step-down transformer connected between anode and speaker. The high-impedance speaker is then fed from a step-up transformer, the primary of which should be joined across the low-impedance side of the first transformer. The speakers may be joined to the anode circuit of the output valve or to a normal filter-circuit in the usual manner.

#### Eliminating Scratch

**T**HE surface noise or scratch obtained when some records are being played is often of a high level and various ideas have been proposed to eliminate it. The simplest type of filter consists of a .3 henry choke in series with the pick-up and a .01 mfd. fixed condenser across the pick-up and choke. Increasing the capacity of the condenser will reduce the cut-off frequency, and vice versa. If a variable filter is desired so that the cut-off point can be shifted as desired, then the condenser value should be reduced to about .003 or .005 mfd. and a 50,000 ohm variable resistance should be joined in series with it.

#### Worn-out Valves

**S**Ome receivers give a poor performance on account of the fact that the valves are in need of replacement. It is a simple matter to ascertain whether or not a valve is in this condition and all that is necessary is to strap together all grids and plate and then connect a given filament and anode voltage supply source. If the maker's characteristic curves are studied the correct voltages will easily be found, and the anode current may be shown by a standard milliammeter connected between the strapped elements and the H.T. positive connection. If the current is lower than that given on the data sheet then the valve should be replaced. A small unit could be made up to provide this simple test so that various valves could be tested from time to time without difficulty.

**WIRELESS CONSTRUCTOR'S  
ENCYCLOPÆDIA**  
5/- or 5/6 by post from  
George Newnes, Ltd., Tower House, Southampton St.,  
Strand, London, W.C.2.

accordingly and withhold permission to reproduce.

As in the past, no objection will be raised by the B.B.C. to the use of its television transmissions for genuine trade demonstrations provided no charges are made.

#### New Broadcast Drama and Features

**I** UNDERSTAND that the B.B.C. has now completed its summer schedule of drama and feature programmes. Incorporated in this schedule are examples of the four chief types of programmes which will be broadcast throughout the year. The Director of Features and Drama has made arrangements for the broadcasting of twelve famous post-War plays, twelve classic plays, twelve radio plays from abroad, and several serials.

The series of post-War plays is designed to illustrate the history of the last two decades of the London Theatre; such plays as Noel Coward's "The Vortex," "Sheppey," by Somerset Maugham, "Dangerous Corner," "On the Spot" and "Richard of Bordeaux" will be included under this head. The first of the classic plays will be a new translation by Professor Gilbert Murray of "The Persians," by Aeschylus, and other dramatists whose work will be broadcast range from Thomas Hardy to Ibsen.

The radio plays from abroad will enable listeners to compare radio drama technique in France, Norway, and elsewhere with the type of production they are accustomed to hear in this country.

#### Serial Play

**T**HE next serial play will be Anthony Hope's "The Prisoner of Zenda," adapted for the microphone by Jack Inglis and with Robert Douglas, Milton Rosmer and Thea Holme in the chief rôles. Other plays will include "Behold the Judge," by John Brophy, Shakespeare's "King Lear," and Tchekov's "The Seagull."

Feature programmes have also been planned for a complete year ahead and the main theme upon which they will be based is "The Face of Britain." In this series there will be important contributions from all the Regions; the story of Welsh coal will be told, for example, a programme about Lundy Island from West Region, and "The Potato" from Northern Ireland being other contributions. Important developments in the field of feature programmes will include several broadcasts put together with the aid of the B.B.C. recording vans, which will be sent on journeys all over the Continent.



April 8th, 1939.

Vol. 4.

No. 146.

**An Aftermath**

AS a result of the recent successful televising of the Boon-Danahar fight, and its reproduction in home receiving sets, as well as three London cinema screens, the Boxing Board of Control are discussing television, broadcasting and film photography, and their relationship to the interests of professional boxing. This step was inevitable, for until the nature of the received results could be assessed in picture value and public response there was no point in investigating a position which only existed in theory. Quite naturally opinion is divided as to whether it is wise to sell concessions which will increase the number of people who can participate in the thrills of a first-class boxing match, but at the back of all sporting events there is the important item of finance. The more important the participants, no matter what form of sport is involved, the greater becomes the cash expenditure necessary to stage the whole affair. If the cinema interests are to be allowed to co-operate, the contribution they can make towards the cost will be considerable, and in return they are justified in expecting that the cinema patrons will be in a position to enjoy the event via a televised picture. There is no doubt that this will help the B.B.C., for with limited funds they cannot always provide for their home viewers just the type of outside broadcasts which they know they will enjoy. Thus the cinema, which depends on a public enjoying "mass entertainment," will assist the home viewer. Mr. Ostrer pointed out quite recently that Gaumont British and Baird Television had gone forward together on the assumption that, despite the continued obscurity of the B.B.C. position, television and big-screen television for the whole country were an essential factor in the life of the people of Britain. The erection of stations would provide work for a large section of the community and bring into being an industry of large dimensions. Now that other nations are tackling the question of television services there would be a good export market for British sets, thus reversing the position which has held for such a long time in ordinary radio.

### An Important Decision

THE Television Advisory Committee which meets shortly is faced with making a decision of far-reaching importance in connection with the rediffusion of television pictures to cinemas. Complicated

legal questions are involved, and the rights of all parties must necessarily be investigated; the three principal ones being the B.B.C., the copyright holders and promoters, and the artists. On the other hand, it is quite evident that cinema television does really offer a means of financing a very expensive service, and this could be carried out in quite an effective manner. As an alternative, Mr. Ostrer, who has been so much to the fore in this campaign, envisages the formation of a public corporation on the board of which could be represented the cinema and other entertainment trades, as well as Government nominees. This corporation could then take charge of commercial television without in any way interfering with the present B.B.C. service for home receiving sets. One paper which referred to the legal teleview says that the charging of a fee for an indoor or outdoor event where payment is made by the public is

mitting stations; extend the sales of home sets, maintain Britain's lead in the television industry, and perhaps bring about a valuable export trade. With these objects in view it is hoped that the Advisory Committee's decision, when made, will satisfy the multitudinous interests of all those who are anxious to see the establishment of a strong, progressive, and virile television industry.

### A Question of Brightness

THE recent demonstrations of big-screen television has brought to the front again the whole question of cathode-ray tube screen brightness in relation to the picture which is being shown. The observed quality of a reproduced picture is bound up with many inter-related factors, all of which must be considered if a true concept of performance is to be obtained. Among these mention can be made of the efficiency of the interlacing;



Deputy holiday television announcers, Miss Eileen Bennett (left), who will deputise for Miss Bligh, and Miss Olga Edwards, who will deputise for Miss Cowell.

simple enough, but the matter is different when the event is an open one. Is sight as much a matter of copyright in this case as the remarks of the commentator? In any case, it is necessary to take the long view and realise that additional income from a co-operative film industry would expedite the provision of other trans-

the size of the electron beam spot and whether it is affected very materially by modulation changes, focus, screen colour; the relationship between screen brilliance and beam current, and whether saturation is present or not. Closely allied with questions of brilliance is the important one of contrast.

# TELEVIEWS

## Sir Stephen Tallents on The Future of Television

**S**PEAKING to the Radio Manufacturers' Association at their luncheon at the Savoy Hotel recently, Sir Stephen Tallents, B.B.C. Controller of Public Relations, stated that "The future of the home television service is now assured, the pace of its establishment alone remains in doubt."

"Beyond that," continued Sir Stephen Tallents, "possibilities of great interest are being explored in public debate—the possibility in particular of the adoption of television in cinemas. Here the future is not yet clear. A great variety of legitimate interests are involved—the manufacturers of television equipment for places of public entertainment, the promoters of outstanding events, the film producers and distributors, the owners of cinemas, the artists and authors and performers among them. Some of these interests have hastened to express their hopes and views. Others, and those not the least important, are still silent.

"Not all the views which have been publicly expressed are in harmony; and, partly for that reason, not all the hopes which took the air so gaily in the first flush of the Boon-Danahar fight seem likely to land again safely. The B.B.C. believes that it is taking the wise and public-spirited course in concentrating on the development of that now certain success—home television—and at the same time co-operating, as real and promising opportunities occur, in experiments which may shed light on what is bound for some time yet to be a complex problem.

"I suppose that if the next 1,000 people that passed on the pavement outside this hotel were to be stopped and asked what they thought likely to prove the most memorable event of this eventful year, not one of them would mention television. Yet here we are watching the establishment in public use and favour of a process which the Secretary of the Royal Society himself has described as the most wonderful of all human inventions. And not only that. We are watching something that we don't see once in a decade—the safe delivery of a new and pioneer British industry, full of exciting and still unpredictable possibilities.

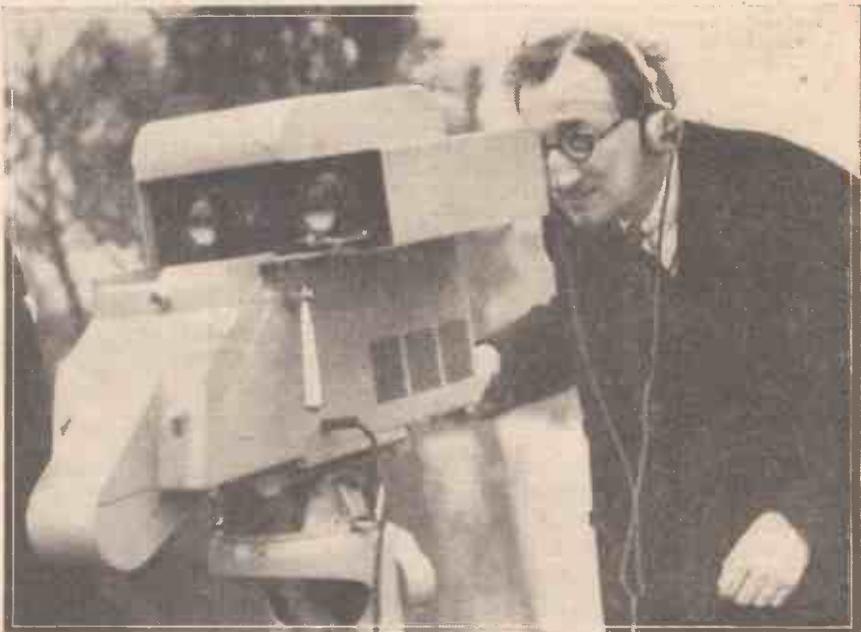
"At the back of this industry's development are such forces as the Television Advisory Committee, the Post Office, and the Government itself. You and the B.B.C. have been comrades in the front line. We have successfully established an admirable system of mutual help. This winter has brought the public into a real triple alliance with us. One has heard in these last few weeks of television sets being bought by doctors and dentists, by porters and bus-drivers, by mannequins and even agricultural labourers. Everyone in the range of Alexandra Palace who buys a set this year may know that he is not only procuring a source of great entertainment for himself and his household. He is also helping to win the wager to which Mr. Stanley committed your Association in his recent challenge to the television industry in New York. Best of all he is doing his patriotic bit in the establishment of a new British industry, and the winning for it of a world-wide lead."

## Thermion's Work

**T**HERRION is no doubt that once Thermion makes up his mind concerning a particular subject he wields the cudgels in no uncertain manner; a fact to which all readers can testify when they study those trenchant paragraphs in "On Your Wavelength." His sincerity and keenness for television has never been at issue, and the pages of PRACTICAL AND AMATEUR WIRELESS during the last few years bear ample testimony of the assurance that the industry is receiving every support. His campaign in connection with interference is already bearing fruit, and while opinions may differ as to the logical way of tackling this intricate problem, there is no doubt that the authorities are extending their investigations to cover the effects of other forms of electrical equipment, which up to the present have either been neglected, or failed to be so in-

## Television for All

**P**LANS are already afoot for providing the amenities of television, especially those associated with the broadcast of outside events, to an audience far outweighing any preconceived notions of numbers. The idea is to carry this into effect by the use of large television screens in cinemas, and perhaps the idea will extend to variety theatres as well. There is sure to be a measure of opposition in the early stages, due to either a misunderstanding or misrepresentation of what is required, but it seems certain that public demand will at last have its own way. This will in no way upset the sales of domestic receivers but rather the reverse, for cinema television will bring home to the masses the marvels and sustained entertainment value of the present service. More and more people will therefore acquire their own sets, but for important events there are many who prefer to enjoy them in a crowd, and catch the spirit of excitement which permeates an audience carried away with the tenseness and the glorious uncertainty



Mr. A. P. Herbert, M.P., is here seen manipulating the television camera when he acted as commentator recently when life on canals and waterways was televised.

sistent that their effects have not been appreciated. With the rapid rise in the number of sets now being installed in homes, it is realised that there are many forms of domestic apparatus which cause trouble to the received picture on the ultra-short wavelengths. Violet ray machines, toy buzzers, some types of vacuum cleaners, hair dryers, and so on, all provide radiating fields to a greater or less degree, and when trouble does come from these sources it is sustained interference, whereas the ignition system of a motor-car is a transient effect, unless the car is left running right outside the door. Diathermy is another difficulty, while in some districts amateur transmitters have been known to blot out a picture due to a third harmonic radiation. In nearly every case there are ways and means of eradicating or reducing the interference to a low level which can be tolerated, and if only for the reason that the whole question of interference is brought once more into the limelight, Thermion is to be congratulated, although the vigour of his pen may not always find response in the way that he requires.

of the final result; a condition impossible of duplication with a film record screened in a cinema after the result is known. The latter will help to recapture some of the atmosphere for those unable to see the event at the time it occurs, but this should not bar the enjoyment of those whose daily task gives them the time off to participate in an occurrence at the moment it happens. The British Boxing Board of Control have placed what is tantamount to a strict ban on the televising of fights, but this is not finding favour among many promoters. To circumvent this it has already been proposed that the B.B.C. should acquire a promoter's licence and stage their own events for television purposes, but it seems hardly likely that such a drastic step will become necessary. Some may regard the granting of permission to televise the Harvey-Gains fight as a straw indicating how the wind will blow, and negotiations were opened immediately with those cinema groups able to show the pictures in their theatres. No exclusive rights are asked for or expected.

## A PAGE OF PRACTICAL HINTS

SUBMIT  
YOUR  
IDEA

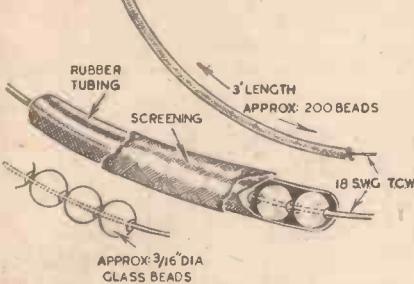
# READERS WRINKLES

THE  
HALF-GUINEA  
PAGE

## A Simple Makeshift Coaxial H.F. Cable

**R**EQUIRING a three-foot length of even capacity H.F. cabling, I hit upon the idea of using a number of glass beads closely threaded on to a length of 18 gauge t.c.w., and then worked into some

*A useful method of making coaxial cable.*



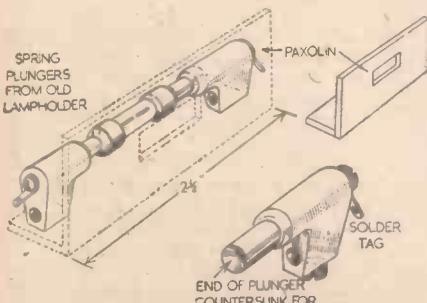
rubber tubing, as shown in the accompanying sketch, finally screening with some very wide (screened aerial lead) braiding.

The glass beads, whilst not being absolutely matched in diameter, served admirably, and approximately two hundred of these were used, allowing quite an appreciable "arc" to be easily formed, although in my case this was only gradual.

A blob of solder at the extremities of the wire and close to the beads kept them together, and facilitated the fitment of the tubing and screening braid, the ends of the braid being finally bound with insulation tape.—R. L. FELLOWS (East Grinstead).

## Spring Mounts for Small Components

**S**PRING mounts for small parts such as neon lamps in indicator lighting, etc., can be easily made up from the small spring plungers taken from disused or burnt-out lamp sockets. As shown in the sketches, the screw at the back end is fitted with a solder tag, while the one underneath is used for fixing to a base of Paxolin or other insulating material. The plungers are gripped in a vice and countersunk to fit the conical ends of the component in use.—G. A. PICKERING (Wolverhampton).



Spring plungers from disused lamp sockets were used for making these adjustable mounts for small components.

## THAT DODGE OF YOURS!

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

## SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page 87.

## A Novel Speaker Switching Indicator

I HAVE modified my local-distant speaker switching to a push-pull arrangement embodying in the movement a novel illuminated indicator made up from a tin matchbox holder, and some odd pieces of brass, as shown in the accompanying sketch.

To rotate the holder through an arc of 180 degrees, I provided a suitable clamping attachment by forming two "U" pieces from strips of brass of about 16 gauge, measuring  $2\frac{3}{4}$  in. by  $1\frac{1}{2}$  in. To facilitate assembly, these "U" pieces were fitted over the ends of the holder so as to allow sufficient space to fix lock-nuts. It was not necessary to solder these "U" pieces to the holder, as when bending these strips I allowed an appreciable amount of resilience so that they become clips.

By inserting a piece of wood into the holder, it was a simple matter to drill the hole for the bulb, and the two  $\frac{1}{8}$  in. holes for anchoring the pip connecting wire.

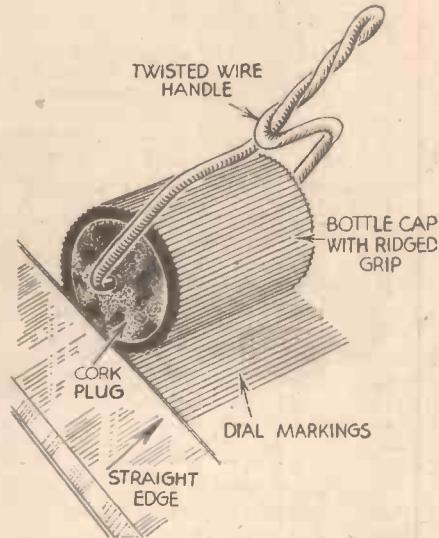
As one side of the bulb wiring is obtained through the medium of the bearing bracket, it was necessary to ensure continuity, electrically, by cleaning off the enamel finish between the "U" fitment and holder, also a pig-tail connection "P" was made between the "U" piece and bracket; this is clearly indicated.

A condenser vane "C" was used for the friction drive, and this was brought to bear lightly, but firmly, on to the rubber-covered rod of the switch control "R."

Strips of celluloid marked with Indian ink served well as indicator labels, and these were glued inside the holder behind each slot as depicted at "A." A "window" strip was also obtained from celluloid, this being glued to the back of the opening in the front panel "B." The relationship

of the matchbox holder to this window is clearly shown in the diagrammatical inset.

—J. L. WORTHING (Forest Gate).

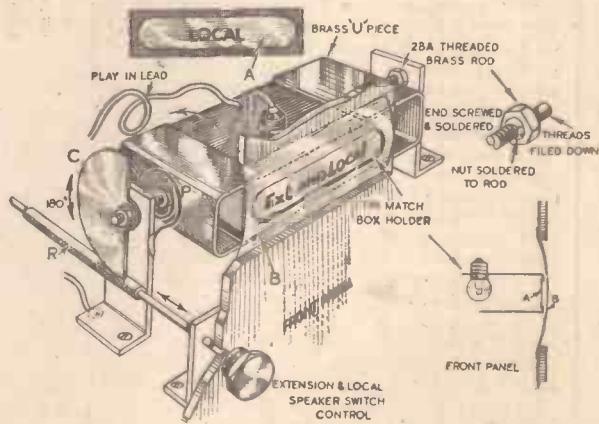


*A simple spacing device for station dials.*

## Spacing Device for Station Dials

A SIMPLE method of ensuring even spacing when marking degrees on station dials was devised in the following way.

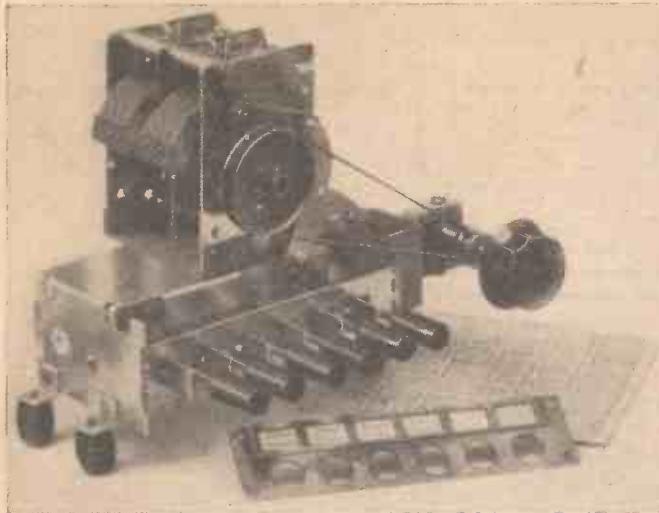
A bottle cap with a ridged grip was taken and plugged with a cork fitted tightly. A piece of fairly stiff wire was bent to form a holder, the centre being twisted



*This illuminated indicator is made chiefly from a match-box holder*

to form a handle. The whole is then inked by passing over an Indian-ink soaked pad, and rolled along a straight-edge. The impression is much better and more even than when done by ruler and pen.—FRANK CHAWLEY (Leeds).

THE most usual method of including push-button tuning in a receiver is to use pre-set condensers which are selected by means of a push-button mechanism, and from one to four circuits may be operated in this manner. This is an ideal plan when a new receiver is being built, and the necessary condensers may thus be properly selected and placed in the receiver. When it comes to the question of modifying an old receiver in order to use push-button tuning, however, it is not often



*Fig. 1.—The Complete Push-button Tuning Unit.*

found possible to find room for the additional components. In addition to these points, however, some constructors do not like to rely upon the pre-set condenser arrangement, in view of the risk of vibration upsetting the adjustments. This is, of course, a vital point, and there is little doubt that the ideal method of automatic tuning is that whereby the actual tuning condenser is moved from one station setting to another. This is usually effected by means of a motor which is ganged to the condenser and which is set in operation by means of the push buttons. Fairly elaborate apparatus is needed for this, however, and there is now an alternative scheme available which is becoming popular in certain commercial receivers, and which was used by us in our Push-button Four receivers. In this a series of cams operate a push-bar which is connected to the tuning condenser spindle through a drum and drive mechanism, and thus the only additional apparatus needed to convert an existing receiver is the button mechanism. This particular unit is now available separately for those constructors who wish to add this new form of tuning, and the following details will enable the working to be understood and the conversion to be easily made.

#### Space Required

As may be seen from Fig. 4, each button is provided with a two-edged blade which operates against two separate rocker bars. This blade is rigidly held on the push-button bars, and is serrated and riveted in position. If badly handled, however, the blade may be loosened, and the particulars given at a later stage should be rigidly noted. Each button bar is provided with a thread, by means of which the actual position of the operating blade may be pre-set so that it travels only a given distance. The rocker bars are connected

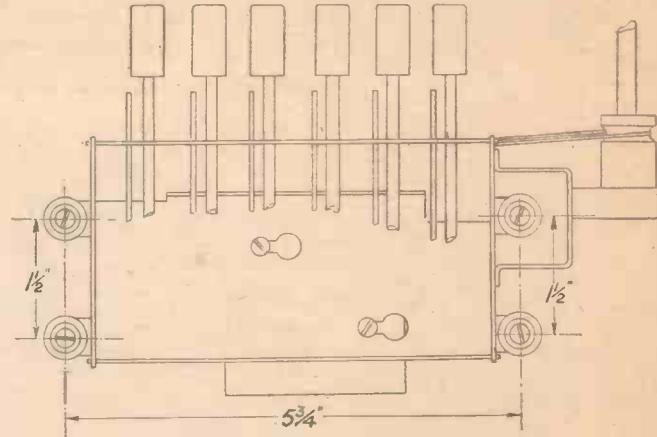
# PUSH-BUTTON

A Simple Method of Adding Push Call for Pre-set Condensers

through a pivoted arm to a driving drum, which is locked to the spindle as already mentioned, but to enable the condenser to be operated in the normal manner for manual tuning a cord is taken round the drum and also round a small spindle provided with an operating knob. The

When push-button tuning is required, therefore, the manual control is pushed over to the left, and is thus put out of gear, leaving the rocker bars free to turn the condenser. If this point is not attended to and an attempt is made to push the condenser round by means of the push buttons there is a risk of forcing the operating blades out of alignment and the mechanism will be damaged. Several push-button receivers which have been sent to us for servicing have been damaged in this way, and therefore it is absolutely necessary to remember this point.

The over-all size of the push-button unit



*Fig. 2.—Dimensions for Mounting the Unit.*

## ITEMS OF INTEREST

#### The Royal Quarters on H.M.S. *Repulse*.

WITH the approval of His Majesty the King, and the permission of the Admiralty, the public is to be given an opportunity to visit and inspect a full-sized reproduction of the quarters aboard H.M.S. *Repulse* which the King and Queen will occupy during their voyage to Canada and U.S.A. in May.

This great reproduction is now being constructed in London under the supervision of Admiralty officials. It will be set up and completely furnished at the *Daily Mail* Ideal Home Exhibition, at Earls Court, London, S.W., and will be open to all visitors from April 11th to May 6th.

#### Three Decks Shown

It will consist of the after-part of the fo'c'sle deck, shelter deck and flying deck, complete even to replicas of the two triple four-inch gun mountings, one on the

shelter deck (which forms the roof of the royal apartments) and the other on the flying deck above that. The section shown will be 72ft. long, nearly 36ft. wide, and 32ft. high.

The apartments through which the public will thus be enabled to pass, and inspect minutely, are:

The King's sleeping cabin; the Queen's sleeping cabin; the royal dining-room; the King's day cabin; and the Queen's day cabin.

These apartments will be furnished exactly as when their Majesties occupy them. Accurate reproductions of the furnishings and furniture are being made. This includes the 24 Hepplewhite chairs, upholstered in royal blue hide, which will be drawn from the royal yacht and installed in the dining-room on the *Repulse*. In the King's day cabin will be seen the writing table at which he will deal with State business during the voyage and on the table will be a telephone communicating with members of his personal staff, with

# CONVERSION

push-button Tuning, which Does Not  
By W. J. DELANEY

is shown in Fig. 3 and the drilling dimensions for the holding down bolts are also shown in Fig 2. In most existing receivers it will be found that there is room to include this, although in some cases it may be necessary to move one or more components. It should not, however, be found a difficult matter to arrange for this.

### Mounting the Unit

The existing ganged condenser should be unscrewed from the baseboard, and it may then be mounted on top of the push-button unit, and for this purpose a small mounting bracket may be called for. On top of the

unit are two fixing holes, positioned as shown in Fig. 2 and these may coincide with screw holes in some types of ganged condenser. If not, then a "U"-shaped bracket as shown in Fig. 1 may be made from aluminium and the condenser bolted to this. Messrs. Petosco can, however,

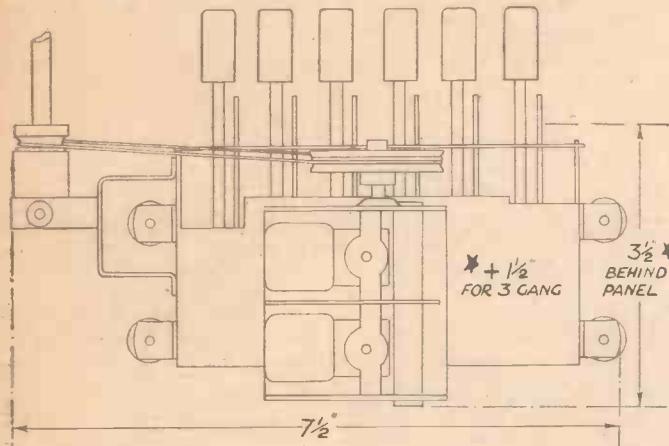


Fig. 3.—Over-all Clearance Dimensions.

other departments of the ship, and, if need be, by radio link with England.

### Walked into a Propeller—and Cut Off an Island from the World!

THE scene: Tristan da Cunha, loneliest island in the world. The time: a dark and windy night.

Inside the village hall, one of the three stone-and-mortar buildings in the island, a group of villagers sit listening to music that is being played 3,000 miles away, a radio programme chosen for them by the Chaplain, Father Harold Wilde. The radio set, Tristan's only link with the outside world, has kept the villagers rapt and enthralled since it arrived five months ago, a gift from E. K. Cole, Ltd.

Father Wilde has told them how he has spoken over the radio—yes, and how he took this very radio set to Alexandra Palace, in London, to be televised. How he showed people, miles from where he stood, the way in which he was going to keep the accumulators charged—with the windmill apparatus that now stands on the hill outside, whirling in the wind, storing up electricity in the spare accumulator.

It gives them something to look forward

to when their work is finished. To this fisherman, for instance, who trudges slowly up the hill, radio is an endless joy. Head down, battling against the gale, he forgets his scarred and salt-bitten hands, and thinks only of the music and gaiety that lie ahead.

*Suddenly he stops, throws up his hands for protection from this whirling thing that attacks him in the darkness. Then he staggers back, aghast at what he has done. The windmill is broken.*

It is a sad little group that follows Father Wilde out to the wreckage. The propeller, a slim, carefully-shaped slat of wood, is smashed beyond repair.

Even the radio operator on the mail-boat, when it arrives, can do little to help. And Tristan, as the accumulators slowly run down, hears the outside world fade away until at last the radio is silent.

The "loneliest island" is more lonely than ever.

\* \* \* \*

It may not be for long, though. One of the passengers on the mail-boat ("Viceroy of India") has brought back the news to England, and E. K. Cole, Ltd., are making a new propeller for the islanders. It will go out by the next boat.

provided on the holding-down bolts so that the condenser may be left "floating," and the usual connections to the condenser fixed vanes and to earth should be made in the ordinary way. It will obviously be necessary to lengthen the original wiring in order to reach up to the gang condenser, which is now a few inches above the chassis level, but this should not be found a difficult matter. The escutcheon may then be mounted on the panel, and station names cut from the small card supplied with the unit, selecting

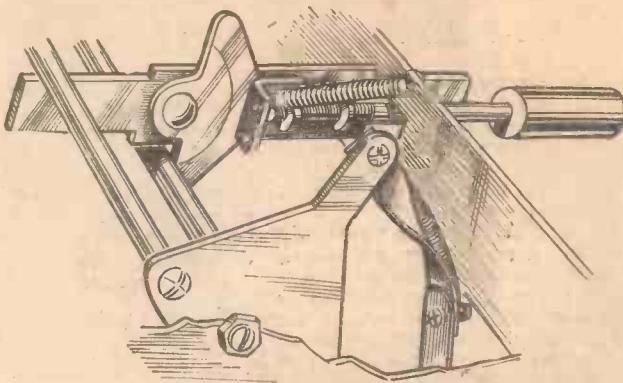


Fig. 4.—How the mechanism operates, one push bar only being shown for clarity.

supply this unit complete with a two-gang condenser of the modern bar type, ready mounted, and this will save any trouble in this connection. The condenser should be mounted on the unit before the latter is attached to the chassis, as otherwise the mounting holes will be inaccessible. Rubber grommets are

stations which are well within the range of the receiver.

### Setting the Buttons

It is now necessary to adjust each button so that it brings in the desired station, and this is carried out as follows:

The insulated knobs on the push-button mechanism may be pulled off, and this will expose a flattened spindle.

As this is turned anti-clockwise, the hard metal angle piece seen in Fig. 4 will be freed, the removal of pressure on the edge of the operating cams permitting these to fall loose, hingeing about the rivet already referred to (only two or three turns should be made). The condenser should now be turned by means of the operating control spindle to the station required on the particular push-button. When accurately tuned in, the rod from which the button was removed should be carefully pushed right in, the edges of the operating cam then coming into contact with the two rocker bars. Undue pressure is not needed, and the rod should only be pushed until both edges of the cam are in contact with both rods. When this has been done the flattened end of the spindle should again be gripped with the pliers and turned in a clockwise direction—for the same two or three turns. This pushes over the angle piece and again locks the operating cam. It will be appreciated that all that is necessary in setting the rods for each station is merely to free the cam and again lock it, and if excessive pressure is exerted there is a risk of distorting the operating rods and preventing the satisfactory working of the mechanism.

### Station Names

The appropriate station names may be cut from the sheet supplied with the unit and dropped behind the cut-out windows which are provided on the escutcheon, as shown in the half-tone illustration on this page. The price of the complete Unit is 14s. 6d., and if required it may be obtained with the 2-gang condenser ready mounted for £1.

# Alternating Current Considerations

Simple Methods of Calculating Capacitive Reactance, Impedance, and Resonant Frequency are Explained in this Article — By L. O. SPARKS

MOST constructors are familiar with Ohms Law and its numerous applications to circuits carrying direct currents, but when they come up against alternating currents they find that the Law does not hold good, and are at a loss as to how to proceed.

With D.C. circuits, there are three main factors which have to be considered, namely, voltage, current and resistance, and as these are so intimately related it is not a difficult matter to determine the unknown factor by simple calculations.

The opposition offered by a circuit to a direct current will depend on the material and the size of the conductor, and it can be expressed as being equal to the length of the conductor divided by its cross-sectional area, multiplied by what is known as the *specific resistance* of the material. A table of specific resistances for various materials will be found in most electrical text-books.

When dealing with circuits carrying alternating currents, however, matters become rather more complicated as other forms of opposition, apart from pure resistance, have to be considered, and as the resultant effect of all the various kinds of oppositions likely to be encountered in, say, a radio circuit cannot be determined by simple addition, it is advisable to consider each form individually.

Previous articles have explained the effect of inductance in an alternating current circuit, therefore, a brief reminder that any component possessing inductance will, by virtue of *self-induction*, tend to resist the flow of an alternating current. Although the word *resist* has been used, the opposition thus offered cannot be thought of as resistance in the same sense as when considering direct current circuits. As a matter of fact, the correct term is *reactance*, and as in this instance it is associated with inductance, it becomes *inductive reactance*.

As the letter R is used to denote resistance, the letters  $X_L$  are used to indicate inductive reactance and the formula for determining the value present in any circuit is:  $X_L = 6.28 \times f \times L$ , where  $X_L$  is expressed in apparent ohms, f is the frequency of the current flowing in cycles per second, and L is the inductance in henries.

It will be seen from the above that inductive reactance is directly proportional to the frequency and the inductance, or, in other words, the reactance increases as the frequency increases, and in view of this, it is considered, conventionally, as being positive. The object of this will be more apparent later on.

## Capacitive Reactance

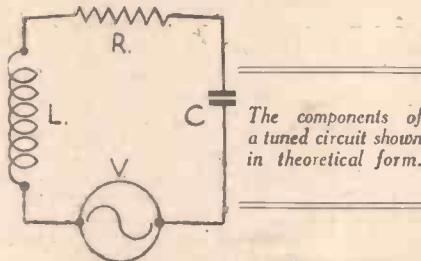
Although a condenser will prevent the flow of direct current, it will, owing to its plates becoming alternately charged positive and negative when connected in an A.C.

circuit, allow an alternating current to flow from one part of a circuit to another. In spite of it acting, as one might say, as a conductor, it still offers a certain opposition to the A.C., and as in the case of the inductance, the opposition is not classified as resistance but, once again, as reactance, only in this instance, as it is associated with capacitance, it is called *capacitive reactance*.

The symbol used to denote this property

is  $X_C$  and the formula is:  $X_C = \frac{1}{6.28 \times f \times C}$

where  $X_C$  is expressed in apparent ohms, f the frequency, and C the capacity in farads. As it is more usual to be dealing



with microfarads in radio circuits, the formula can be rewritten thus:

$$X_C = \frac{1,000,000}{6.28 \times f \times C} \text{ in microfarads.}$$

Unlike inductive reactance,  $X_C$  is inversely proportional to the frequency and the capacitance, i.e., the reactance decreases as the frequency increases. It is usual to think of it in the negative sense.

One rather important difference between these reactances and pure resistance should be noted, and that is while they both tend to limit or regulate the current flowing in their respective circuits, the former do not dissipate energy as do resistances.

## Impedance

It is possible, and not at all unusual, to have all three properties in a circuit, namely, resistance, inductive reactance and capacitive reactance. It is when these conditions exist that we realise that Ohms Law does not hold good for A.C. circuits unless certain modifications are made. For example, think of the simple D.C.

formula  $I = \frac{E}{R}$  and let us see what happens under the new conditions. If we think of the reactance of a coil as representing its apparent resistance, it would seem feasible to say that the current in an A.C. circuit embodying the coil would be

$I = \frac{E}{X_L + R}$ . Well, that is the first slip. If it were possible to make a coil which possessed inductance only all would be well, but, unfortunately, all coils possess also a certain resistance and it is this combination of resistance and reactance which upsets matters.

There is a name for this combination, it does not matter whether the reactance is inductive or capacitive, and that is *impedance*, which is denoted by the letter Z. The formula for calculating Z is:

$$Z = \sqrt{R^2 + Z^2} \text{ all values being in Ohms.}$$

As this new value includes the resultant effect of the resistance and reactance in the circuit, taking our first example above, the D.C. Law can be written thus for A.C. circuits:

$$I = \frac{E}{Z}, E = I \times Z, \text{ and } Z = \frac{E}{I}$$

Supposing that a circuit contains resistance, inductive reactance and capacitive reactance, how is the total impedance of the circuit then calculated?

Bearing in mind the remarks concerning inductive reactance being considered as positive and capacitive reactance as negative, the total reactance of the circuit will be equal to the difference between these two or expressed in figures, the total

$$X = 6.28 \times f \times L \text{ minus } \frac{1,000,000}{6.28 \times f \times C}$$

in microfarads. In view of this, the formula for Z, when applied to such conditions, has to be rewritten in the following manner:

$$Z = \sqrt{R^2 + (6.28 fL - \frac{1,000,000}{6.28 fC})^2}$$

## Resonance

Consider once again the opposite characteristics of the two forms of reactance we have been discussing. It will be obvious that if capacitive reactance is placed in series with inductive reactance the resultant effect will be to reduce the latter, due to their negative and positive qualities.

From the modified Ohms Law it was seen that the current in an A.C. circuit depended on E so when  $X_L$  and  $X_C$  are

equal, that is, total X is zero, maximum current will flow. From this it is possible to express the conditions required for maximum current in another way, namely: Maximum current flows when

$$6.28fL = \frac{1,000,000}{6.28fC}$$

When this condition exists, the circuit is stated to be in *resonance* with the frequency under consideration or tuned to the *resonant frequency* of the circuit.

If the above formula is examined, it will be seen that three of the factors can be varied, the frequency, the capacity and the inductance, but assuming the last two are predetermined by existing conditions or calculations, then it is possible to determine the frequency at which resonance will be produced by the formula:

$$\text{Resonant frequency} = \frac{1,000,000}{6.28 \times \sqrt{LC}}$$

# Talking to Mars!

By Major R. RAVEN-HART

**L**ET'S suppose . . . Let's suppose that one day you are at your amateur telegraph transmitter and send a general call; and when you switch over you hear it repeated back to you, just as you sent it. "Funny," you think, and send it again; and again it comes back just as you sent it, even to a badly-formed C which you noticed at the time. "Someone trying to be clever," you think; and then the mad idea comes to you—is it just conceivable that someone—or something—is trying to get into communication with you, but knows neither your Morse nor your language?

What would you do? I suggest that you send that general call again, but follow it (and throughout this article I will use "e" for dot, and "t" for dash, to simplify printing), by "ee eee eeee," and "e ee eee" and "ee ee eeee." You see the idea? They are addition sums; and at first they will come back to you as you sent them. And then one day—it is the moment that will be quoted in all the history books of the future—to your "e ee eeee" you get the reply "ee eeee eeeee," proving that it is not mere monkey-imitation at the far end, but someone—something—that can reason.

Signs for "plus" and "equals" should follow next. I think, say "ee eee eeee" and such sums, until you get a different one to show that they have grasped the meaning of the signs.

"Minus" (perhaps "tet"): it would be logical to use the reversal of the "Plus") and "Multiplied by" (say "tect") and "Divided by" (say "ette") would be easy. And then?

## A Step Forward

Then, I think, a real step forward, signs for two words (or for two conceptions, rather), "Correct" and "Incorrect," "Yes" and "No": they might be Morse "Y" and "L" (its reversal) for instance. You see the idea, I suppose? "ee + eee = eeee y, ee + eee = eeee l," and so on.

By now, of course, you would have been famous: notice the *past tense*—there would have been a moment when you were the best-known person in the civilised world, but by now the whole thing would have got away from you. Your house (since obviously there must be something unique about its situation) would be a seething wriggle of professors and engineers and astronomers ("just in case") and cranks: seventeen people who have claimed priority in the discovery; the world in general would have exclaimed, "Lord, what *will* they do next?" and then forgotten all about it and you.

Still, for simplicity's sake we can still say "you": maybe the "experts" would let you have a look at your own key once in a while. And, also for simplicity's sake, let us assume that your end, "Earth," takes always the initiative in the forming of new symbols.

Next of them must be, I think, the decimal point, and with it the decimal system, fairly easily: first of all "ee × eee = eeeeeeee = e.ee" and so on; and then the vitally important sign for "zero," let us say a long dash and write it as "T," with "ee × eeee = eeeeeeee = e.T"; and finally the decimal point itself and the figures beyond it, with "eeeeee ÷ eeee =

e.ee" and so on. (We might use the regular Morse signs for comma and full stop, or invent new ones; or possibly a pause might replace the comma.)

## Constants

Then, I think, should come one of the most important things, the establishing that we on Earth know of certain constants,  $\Pi$  and  $\Sigma$ : we should transmit (Hello, "we"? It looks as if I had got into that gang which has elbowed you out of the way) a few decimal places for each, and then a few more for each, and hope that "they" would reply with closer approximations—they might even go on for twenty-four hours or so with them, and end with a purr of very rapid dots to show that they also realise that there is no end, that the constants cannot be exactly expressed.

And another reply, a really exciting one, would be for "them" to send a constant which means nothing to us: you are to imagine the frenzied hunt in all the science faculties of the world as to *what* this constant can possibly stand for, obviously something of vital importance since "they" rank it with  $\Pi$  and  $\Sigma$ .

## Time Unit

Can we get any further? Yes, I think there would be a sporting chance of establishing our time-unit by transmitting the ticking of a clock; and presumably "they" would tick their unit back to us. Probably also, with elaborated telegraphic notation, we could manage powers and indices, and probably also logarithms; and, with even greater difficulty, we might even arrive at the general statements of algebra—it would take too long to go into this here.

And have we really got anywhere at all? We don't even know for certain who "they" are; of course, radio-goniometry would have given a fair idea (and definitely got rid of the suspicion of a fake), and probably variations in transmission when (for instance) the sun was between them and us, would help; but we should not have had any real statement from them. It might be possible to obtain such a statement by transmitting a series of numbers, proportional to the successive mean distances of the planets from the sun, or to their "year" periods, and as it were underlining our own number when we reached it by repeating it five or six times, of course with the hope that "they" would similarly stress their number in the series.

But even so, how ridiculously little we have told them or learnt from them by comparison with all that we want to know, about language and physical form and political organisation, and art, and music, and science, and literature, and history, and a million other things! For my part, I can see little further real progress, little hopes of getting away from mathematical statements. Perhaps you can suggest some device; and perhaps sooner than we anticipate we may need such devices . . .

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# NEW TONE - CONTROL CIRCUIT

IT is usual to employ resistances, capacity and inductance, in combination in tone-controlling circuits for the purpose of attenuating high- or low-frequency notes or for producing a desired balance between them. It is desirable in the case of tone-control circuits intended to effect a cut-off in the region of a given high or low frequency, that the design of the circuit should be such that the transmission of frequencies respectively below or above the given frequency should not be detrimentally affected. The slope of the cut-off of any such device approaches a straight line in the case of curves showing attenuation in decibels plotted against a logarithmic frequency scale. The final slope may therefore be expressed by the increase in attenuation in decibels when the frequency is doubled; for example, a single section of a tone-controlling circuit may produce 6 decibels increase in attenuation at a frequency of

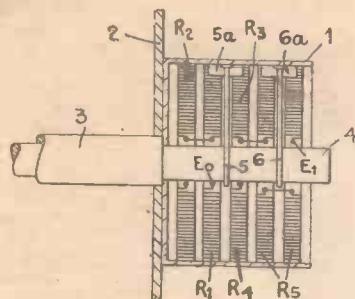


Fig. 1.—Elements mounted on a single control as suggested in this article.

6,000 c.p.s. compared with a frequency of 3,000 c.p.s. or at a frequency of 10,000 c.p.s. compared with a frequency of 5,000 c.p.s.

The steepness of the final slope obtained depends entirely on the number of reactances employed in the tone-controlling circuit. In view of the fact that reactances are expensive, it is desirable that all reactances should be arranged so as to contribute most effectively to the sharpness of the cut-off, at least in the maximum position of the adjusting knob of the tone-controlling circuit. Even in this case each reactance in a tone-controlling circuit of the low-pass filter type will only produce 6 decibels attenuation for a change in frequency in the ratio 2:1. Thus, a filter having 5 reactances will produce an attenuation of 30 decibels between 2,500 and 5,000 cycles per second or between 5,000 and 10,000 cycles per second. A steep slope of the cut-off is thus obtained only at the expense of a large number of reactances. Adjustable filters can, however, be designed using reactances of fixed value, and resistances the value of which can be varied.

## Combined Components

One way of doing this is to provide a variable resistance component for a circuit employing a number of resistances, the value of which can be adjusted simultaneously. Another method is to provide a tone-controlling circuit which enables variation of the steepness of the frequency of cut-off to be effected without substantial variation in the gain of the circuit. We can do this by having a variable resistance comprising a support for a plurality of resistances, wound substantially in strip fashion, and contact members which serve

## A Novel Suggestion for Improved Tone Control

to short-circuit portions of the separate resistances and which are adjustable simultaneously. In one form the strip resistances are mounted at the surface of a cylindrical support and a central rotatable spindle carries contacts which engage the surface of the resistances.

A feature to bear in mind is that in a tone-controlling circuit, so far as the steepness of the final cut-off slope is concerned, the reactance employed may be constituted equally well by a capacity or an inductance. Therefore, a tone-controlling circuit comprises at least two sections, each including a resistance and a capacity, the values of the resistances in these sections being capable of simultaneous variation in order to enable selection of the frequency in the region of which attenuation shall occur, to be effected. One of

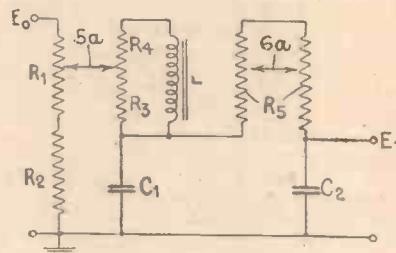


Fig. 2.—The theoretical circuit of the tone control arrangement. Values are given on facing page.

these resistances may be shunted by an inductance and the input to the resistance/capacity sections may be derived from a potentiometer which serves to compensate an apparent volume of the sounds reproduced.

In order that the nature of this idea (suggested by E.M.I.) may be clearly understood a variable resistance device constructed in accordance therewith, and a tone-controlling circuit employing the device will now be described in greater detail, with reference to the accompanying illustration: Fig. 1, which shows such a variable resistance device; Fig. 2, which shows one form of tone-controlling circuit; Fig. 3, which shows an alternative form of

tone-controlling circuit; and Fig. 4, which shows curves obtained with the circuit of Fig. 2.

## One Control

Referring to Fig. 1, the variable resistance device comprises a drum member 1 mounted upon a chassis 2 and a sleeve 3 through which passes a spindle 4. The spindle 4 carries two insulating arms 5 and 6, provided with slideable contacts 5a and 6a which engage the surfaces of strip resistances R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub>. These resistances are accommodated at the inside surface of the drum 1 and adjustment of the resistances is effected by rotation of the spindle 4.

A tone-controlling circuit, in connection with which a device shown in Fig. 1 may conveniently be used, is shown in Fig. 2, the particular circuit shown being designed to produce attenuation above a certain high frequency. Two resistances R<sub>1</sub> and R<sub>2</sub> are shown connected in series in potentiometer fashion across the input terminals E<sub>0</sub> and a tapping is made in the resistance R<sub>1</sub> to control the volume of the sounds reproduced. The potentiometer is followed by two sections of resistance/capacity coupling, the first section being composed of resistance R<sub>3</sub> and capacity C<sub>1</sub> and the second section being composed of resistances R<sub>4</sub> and capacity C<sub>2</sub>. In Fig. 2 the sliding contacts 5a and 6a are represented by arrows and adjustment of these contacts determines the position and steepness of the cut-off.

In order to render the cut-off sharp at the corner, an inductance L is connected across the resistances R<sub>3</sub> and R<sub>4</sub>. In selecting the value of the inductance L it has to be borne in mind that the peaking effect of the coil must remain of the right value for each setting of the tone control. Again, the peaking effect must be produced with a sufficiently highly-damped circuit so that "ringing" cannot occur, and in the actual arrangement shown in Fig. 2 damping is effected by the series resistance R<sub>4</sub> at the intermediate adjustment of the circuit. The value of the resistances R<sub>1</sub> and R<sub>2</sub> constituting the potentiometer across the input terminals must be high enough to be ineffective upon the following sections, and while adjustment of the tapping point in resistance R<sub>1</sub> can be effected, the resistance R<sub>2</sub> is fixed and its value is selected to produce a desired lift

(Continued on facing page)

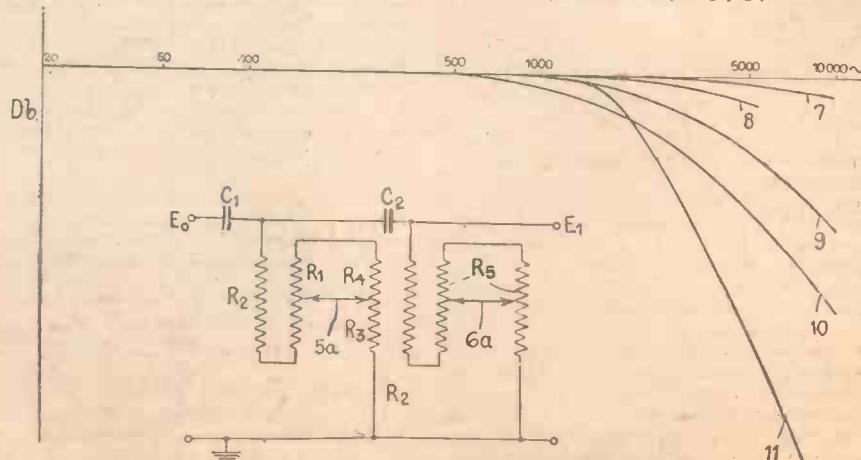


Fig. 3.—A bass cut filter made up on the same lines, and Fig. 4.—Curves, showing the effect of the tone-control circuit referred to.

# Television Features

## LORD SAMUEL TO BE TELEVISED

THE Rt. Hon. Viscount Samuel, G.C.B., G.B.E., is the next celebrity in television's "Speaking Personally" series. He will appear in the evening programme on April 5th.

The "Speaking Personally" programmes give viewers a unique opportunity of meeting distinguished people in all walks of life and hearing their views, delivered in an intimate and informal fashion, on subjects about which they feel deeply. Recent contributors have included Wickham Steed, Philip Noel Baker, Laurence Housman, General Ian Hay Beith ("Ian Hay") and Lord Dunsany.

## "SOMEONE AT THE DOOR"

JACK MELFORD and Nancy O'Neill will play in the comedy thriller, "Someone at the Door," by Dorothy and Campbell Christie, which will be televised again in the afternoon programme on April 8th. "Ronnie" (Jack Melford) is an impetuous young man who has lost money on horse-racing and rabbit farming and tries unsuccessfully to earn a living as a journalist. He conceives the idea of hiding his sister Sally, pretending that he has murdered her, and letting her make a triumphal re-appearance at the conclusion of the trial. From this he imagines he will make £30,000 writing up the story for the papers. When the plan is set into operation, however, real criminals come into the picture and a real murder is committed and, from being the tale of a prank, the story becomes one of thrilling adventure. The cast includes William Fox, Frank Thornton-Bassett, Mark Daly, Harry Hutchinson and Clifford Buckton.

"Someone at the Door," which is produced by Eric Crozier, was first televised on March 31st.

## NEW TONE-CONTROL CIRCUIT

(Continued from opposite page)

of the response curve in the region preceding cut-off, which will tend to balance the reproduction by compensating for the loss of the higher frequencies.

Practical values for the components are as follows:

The resistances  $R_1$  and  $R_2$  connected across the input terminals  $E_0$  may be 10,000 ohms, assuming that the input terminals are connected to the output of a standard valve. The resistances  $R_3$ ,  $R_4$  added and  $R_5$  may be of 50,000 ohms, and the condensers  $C_1$  and  $C_2$  may be of .004 mfd. and .002 mfd. respectively. The value of the inductance  $L$  may be 1 henry.

## Results Obtained

In Fig. 4 are shown curves representing various settings of the adjusting contacts 5<sup>a</sup> and 6<sup>a</sup>, the attenuation increasing progressively from curve 7 to curve 11. It will be seen from these curves that the peaking effect of the coil  $L$  is kept well under control, and is hardly noticeable except in curve 11. Wide tolerances in the values of all the components are allowable and, for example, increase of the value of inductance  $L$  from 1 henry to 1.4 henry changes the response curve 11 to the form 12 without noticeably modifying the form of the remaining curves. The reason for this is that the coil  $L$  is soon damped out by the resistance  $R_4$  and finally effectively short-circuited by the resistance  $R_5$ . The raising of the flat portion of the curve is not shown, but can be determined by choice

## "THE TAMING OF THE SHREW"

DAVID GARICK, the actor, prepared an acting version of "The Taming of the Shrew" which might almost have been devised for television for, without discarding the essentials of the play, it includes all the best speeches, all the best "business," but eliminates some of the scenes which tend towards anti-climax. Garrick's version is to be used for a television production in the evening programme on April 12th, with Austin Trevor as Petruchio and Margaretta Scott as Katherine the Shrew. It has been adapted and edited by Stuart Latham, who takes the part of Biondello.

Incidental music has been composed for the occasion by James Hartley, who is assistant to Hyam Greenbaum, Television Music Director. Dallás Bower will produce the play, which will be repeated in the afternoon programme on April 22nd.

## VARNISHING DAY AT THE ROYAL ACADEMY

VIEWERS are to have their own private view of this year's Royal Academy Exhibition. On April 24th—"Varnishing Day"—television cameras will be installed at Burlington House while Edward Halliday, an artist already well known to viewers, will act as guide, talking to the successful artists who are there to see their treasures prepared for exhibition and hung. The "Private View," one of the important social events of the London season, will take place a day or two later, so owners of television sets will have an important "pre-view."

A fortnight before the transmission, films will be taken at Burlington House showing the candidates for academic honours bringing their pictures for submission to the Hanging Committee. This film will be incorporated in the programme on April 24th.

of the value of the resistance  $R_2$  as previously stated. The final slope of the whole filter will be 18 decibels for a change in frequency in the ratio 2 : 1. The slope can be increased by adding one or two more resistance/capacity sections and increasing the value of coil  $L$ . The resistances for such additional sections may be accommodated upon a supporting drum longer than that illustrated in Fig. 1 of the drawings. When additional sections are employed, it may not be necessary to add further inductances because, by proper choice of values, the existing inductance may be made to maintain a sharp cut-off without impairing the transient response to a noticeable extent.

The device shown in Fig. 1 may also be employed in the bass cut filter circuit shown in Fig. 3, in which it will be seen that the resistances are connected in shunt to the line while condensers are connected in series.

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# NOTES from the TRADE

## Tungsram Valve List

A NEW edition of the useful little Tungsram booklet is now available, and may be obtained free on application to Siemens Electric Lamps and Supplies, Ltd., of 38-39, Upper Thames Street, London, E.C.4. This gives prices and complete data of all of the Tungsram valves, and is a handy pocket-size edition.

## New Osram Octal Valves

THREE new A.C. mains valves are announced in the Osram "Octal" range. These valves are of particular interest as they permit a considerable increase in stage gain to be obtained. The valves are as follows:

**TYPE KTW61.**—This is a variable-mu H.F. tetrode with pentode characteristics. It has high slope, low inter-electrode capacity, linear grid control and low noise-to-signal ratio.

**TYPE DL63.**—This is a double-diode-triode. It has a low-impedance triode section and fully screened diodes.

**TYPE KT61.**—This is a high slope high-power output tetrode. It has a high value of mutual conductance (10 mA per volt), a high power output (4.6 watts), and enables a good speaker signal to be obtained without resorting to high voltages. The valves all have 6.3 volt heaters and are designed for a maximum H.T. of 250 volts.

## Milnes Unit Service Company

THE London service department of the Milnes Unit company announce a change of address, the new premises being at 5, Tanner's Hill, Deptford Broadway, London, S.E.8. The 'phone number is TIDeway 2732.

## Peto-Scott Replacement Chassis

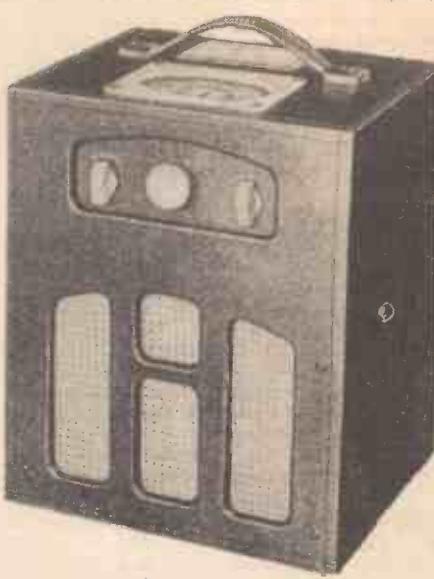
MANY listeners have old type receivers housed in a cabinet, and hesitate to change to a modern receiver owing to the fact that the cabinet forms some particular part of the domestic furnishing or that they do not wish to part with it. In such cases a chassis only is needed, and hitherto it has not been an easy matter to obtain, ready-made, a chassis wired ready for use, other than in the form of a powerful superhet. Messrs. Peto-Scott issue a list showing a number of different types of unit ranging from a simple three-valver at £3 12s. 6d. to a "communications" 8 at 12 guineas.

## New Cossor Receivers

INCLUDED in the new Cossor receivers just announced is a portable of novel design, utilising an indirectly-heated battery detector valve. The receiver is of neat design, as may be gathered from the accompanying illustration, and employs 4 valves in a straight circuit combination. The coils are of a special highly-selective design and tuning is effected by a single knob with a two-colour full-vision dial. There is a combined volume control and reaction knob together with a combined wave-change and on/off switch. Automatic grid bias is provided, and there is a switch-plug for extension speaker or phones. The detector stage, as already mentioned, employs an indirectly-heated valve of the pentode type, and this gives very high sensitivity in this stage. A 120-volt H.T. battery is required, and the accumulator is easily removable through a side panel (seen in the illustration) which is opened by means of a simple turnbutton. The price is £6 15s., and the cabinet is finished in blue leatherette with knobs and escutcheon in grey.

## Mazda Valve Manual

SERVICE-MEN and other technicians will be interested in the latest edition of the Mazda Radio Valve manual, which is in the form of a handy loose-leaf binder measuring 9in. by 7in. This contains a classified index and separate sheets for all standard Mazda valves now available, and in certain cases the data given includes circuit applications of the particular valves. The price of this handy



The new Cossor portable.

manual is 3s. 6d., and this includes a free issue of new sheets as they become available. In this way the manual will always be right up to date. Further details may be obtained on application to the Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2.

## LISTENERS'

## CHOICE OF PROGRAMMES

The voting showed very little difference in the tastes of men and women listeners. The one exception was the Running Commentaries on Cricket, which was fifth in the list for men and fifteenth for women.

### Varying Tastes

Age makes a great difference in taste. Here is the order in which the twenty-one types were placed by listeners between sixteen and twenty—and by listeners over seventy:

- | Under Twenty Years.                  | Over Seventy Years.                  |
|--------------------------------------|--------------------------------------|
| 1. Variety.                          | 1. Military Bands.                   |
| 2. Theatre and Cinema Organs.        | 2. Variety.                          |
| 3. Military Bands.                   | 3. Brass Bands.                      |
| 4. Musical Comedies.                 | 4. Talks.                            |
| 5. Dance Music.                      | 5. Theatre and Cinema Organs.        |
| 6. Plays.                            | 6. Discussions.                      |
| 7. Light Music.                      | 7. Orchestral Music.                 |
| 8. Orchestral Music.                 | 8. Plays.                            |
| 9. Brass Bands.                      | 9. Musical Comedies.                 |
| 10. Talks.                           | 10. Recitals—Singers.                |
| 11. Discussions.                     | 11. Light Music.                     |
| 12. Running Commentaries on Cricket. | 12. Violin Recitals.                 |
| 13. Serial Readings.                 | 13. Running Commentaries on Cricket. |
| 14. Light Opera and Operettas.       | 14. Light Opera.                     |
| 15. Recitals—Singers.                | 15. Serial Plays.                    |
| 16. Running Commentaries on Tennis.  | 16. Dance Music.                     |
| 17. Piano Recitals.                  | 17. Grand Opera.                     |
| 18. Grand Opera.                     |                                      |
| 19. Violin Recitals.                 |                                      |
| 20. Serial Readings.                 |                                      |
| 21. Chamber Music.                   |                                      |

- |                       |                                     |
|-----------------------|-------------------------------------|
| 16. Recitals—Singers. | 18. Piano Recitals.                 |
| 17. Serial Readings.  | 19. Chamber Music.                  |
| 18. Piano Recitals.   | 20. Serial Readings.                |
| 19. Serial Readings.  | 21. Running Commentaries on Tennis. |
| 20. Violin Recitals.  | 21. Chamber Music.                  |

The most striking differences are Dance Music, which is third in the "under twenty" list and sixteenth in the "over seventy" list, and Talks, which are placed fourteenth by the young people but fourth by the elderly listeners.

Other facts which emerge are that:

Nearly three out of every four families now have wireless sets. These families include 32,000,000 people of whom 7,500,000 are children under the age of sixteen.

More sets are switched on between 8.0 and 9.0 in the evening than at any other time of the day. From 11.0 to 12 noon is the time when fewest sets are turned on. Yet even at that time the audience usually numbers over 4,000,000.

About one listener in four listens at midday. But the North Region stands alone among the seven Regions in listening more between 12.0 and 1.0 p.m. than between 1.0 and 2.0 p.m.

Eight thousand schools take school broadcasts and nearly 4,000,000 children listen to the Children's Hour.

Three out of four grown-ups who are

(Continued on page 92.)

# A Handy Output Tester

Constructional Details of a Serviceable Unit Suitable for Muting, Circuit Interruption, and Impedance Matching

**I**N this simple unit the circuit is confined to series anode and choke filter output only, although a similar type of unit could be designed for push-pull output if desired, but it is doubtful if its utility would warrant its construction. The full circuit, showing all details, is given in Fig. 1, and a practical layout in Fig. 2.

The inductance of the L.F. choke should lie between .30 and .50 henries for average purposes, and provide for a reasonable number of tapping ratios, whilst the D.C. resistance should be of as low an order as possible; in quality products this will be in the neighbourhood of 400 to 500 ohms for the above inductances.

There is no critical positioning to consider in either the component assembly or wiring, and the choke illustrated in Fig. 3 is typical of the uncased type, whilst, of course, any other type will serve as well, and this is not, therefore, specifically quoted.

## Screening

In view of the possible use of this unit in short-wave work, the fitment of the components and shrouding should be rigidly assured electrically and mechanically, otherwise crackling and such disturbing effects may considerably influence the performance of the chassis, more especially on the ultra-high frequencies.

Adequate screening is provided by the design of shrouding, and a terminal is provided in the back for earthing purposes.

A Clix loudspeaker control panel was found particularly suitable for the muting and interrupter circuit, and this should, from the point of view of the finished appearance of the unit, be mounted behind the front panel, a wide plug shank clearance slot being drilled and filed as shown in Fig. 2.

A rotary switch was chosen from the Bulgin range, and although four tappings are shown, chokes having five or more tappings can similarly be accommodated with a larger switch.

The six insulated sockets provide for the following: Sockets 1 and 2 are for separate speaker, No. 3 is for the H.T. positive supply, and No. 4 is for the output valve anode connection (this may, for

1 and 2 can be used for the 'phones, disregarding the muting circuit).

The wiring of the change-over switch is shown as required for the Bulgin type S81, and although this appears at first glance to be a d.p.c.o. switch, the function is for a s.p.c.o. switch owing to the strapping of two of the contacts, as illustrated.

The muting or load resistance "R" can be of 4,000 ohms with a rating of 1 watt for most requirements, and serves the purpose of ensuring the maintenance of the output valve anode to H.T. load when the 'phone plug is withdrawn from the control panel, this being brought about by the restoring of the wiper contact on the panel as will be noticed on examining the component, or circuit given in Fig. 1. In this way the circuit is completed for the resistance "R" through also the c.o. switch.

## Interrupted Circuit Tests

Now with regard to interrupted circuit tests without the removal of the control panel plug, this is done simply by turning the plug slightly in the panel slot. The parallel resistance load acts as a volume control muting the signal for passages which would otherwise be most unpleasantly loud when the 'phones are being used.

It may be that certain doubts arise as to the strength of output being sufficient to drive a particular type of speaker, so by plugging in the 'phones via the muting circuit, and connecting up the speaker to sockets 1 and 2, the use of the change-over switch will determine this point very definitely, quickly, and at a minimum of inconvenience.

(Continued on next page)

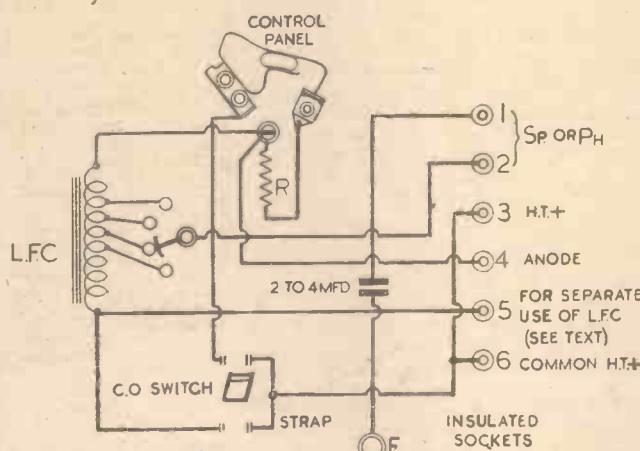


Fig. 1.—Circuit diagram of the output tester described in the text.

example, be taken from a valveholder socket or the speaker socket on the chassis). No. 5 is provided for the use of the choke separately, the other side of the choke or the tappings being taken from sockets 4 and 2 respectively.

To act as a reminder, the circuit diagram is drawn with the sequence of sockets in the same order as that of the pictorial diagram in Fig. 3.

A single pole change-over switch adjusts the circuit for speaker or 'phones, but if desired, say, to obtain better matching, the speaker sockets Nos.

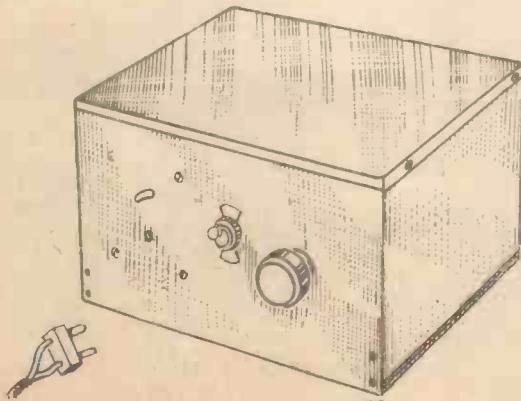


Fig. 2.—The finished tester.

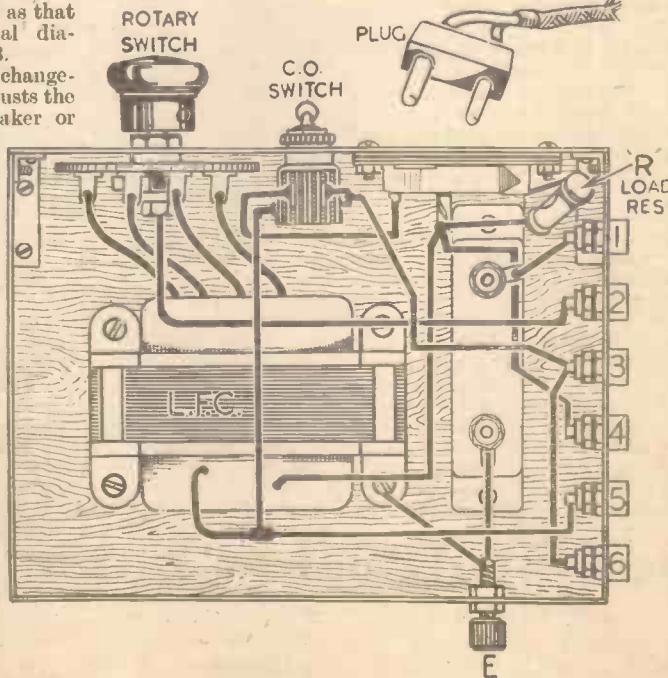


Fig. 3.—Wiring diagram.

April 8th, 1939

**A HANDY OUTPUT TESTER**

(Continued from previous page)

Now with regard to the H.T. supply. Sockets 3 and 6 are, it will be noticed, connected together, thus when wiring up this unit for a conventional output circuit, the H.T. positive connection can be taken to either 3 or 6, the remaining socket being used for continuing the H.T. positive line to the chassis for the other valve feeds; invariably the supply being at maximum potential.

**Constructional Details**

The pictorial assembly details given in Fig. 4 depict the method adopted by the writer, and little need be added here except that a plain 1 in. thick plywood baseboard was used, necessitating a connection being made between the earth terminal and the frame of the L.F. choke,

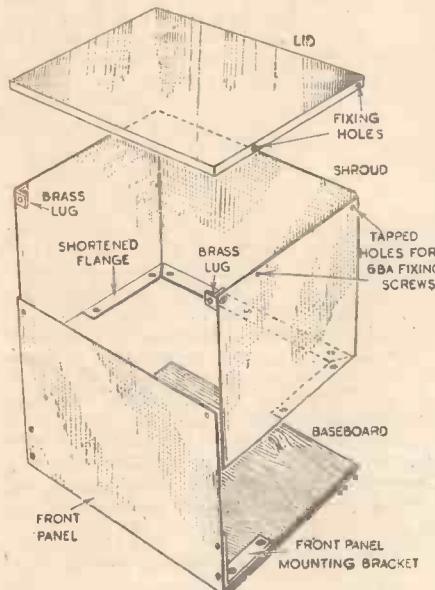


Fig. 4.—Details of the baseboard, panel, and screen-casing assembly.

but for preference, a metallised type of baseboard is recommended for complete screening.

The shroud or screen casing was shaped from a sheet of 18 S.W.G. aluminium, as also the front panel, and the brass fixing lugs were cut from a length of angle strip; these lugs were then simply drilled and tapped for 6 BA fixing screws. It will be noticed that the two side fixing flanges are cut short, this being to clear the front panel mounting brackets.

The lid was cut and bent from a sheet of lighter gauge aluminium which happened to be handy, 20 S.W.G. to be exact, this lid being finally secured by two 6 BA bolts let into tapped holes suitably aligned in the sides of the shroud, as shown.

The wiring requires to be well insulated, and if convenient, ordinary lighting flex can be used, although for preference, bare tinned copper wire should be employed with sleeving worked right up to each soldered connection. A good clearance between the wiring and the screening is advisable, and the shorter the connections the better.

## PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM

6/- or 6/6 by post from George Newnes, Ltd.,  
Tower House, Southampton Street, W.C.2.

# RADIO CLUBS & SOCIETIES

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

**THE CROYDON RADIO SOCIETY**

Headquarters : St. Peter's Hall, Ledbury Road, S. Croydon.

Meetings : Tuesdays at 8 p.m.

Hon. Pub. Sec. : Mr. E. L. Cumbers, 14, Campden Road, S. Croydon.

**A**t the meeting of this society in St. Peter's Hall, on Tuesday, March 21st, members heard a lecture on "Applications of the Cathode-ray Tube," by Mr. Humphreys, of A. C. Cossor, Ltd. The Chairman was Mr. P. G. Clarke. The lecturer first described the details of both gas-filled and high vacuum types of tube, noting the relative merits of each. Then there was new oscillograph having dual beams which certainly merited Mr. Humphreys' detailed examination. With this type, two phenomena could be observed at once, and he proceeded to demonstrate it in many ways. For instance, the response curve of a receiver was measured, the wave-form being provided by a frequency modulated oscillator. By the addition of a bridge circuit, he explained, accurate measurements of inductance, capacity, and resistance could be effected.

Medical applications of these cathode-ray tubes formed a most interesting part of the evening. The minute pulses of human heart-beats could now be amplified a millionfold and results shown on the screen. Thus any obvious irregularities in the patient's circulation could be revealed. Even faulty brain impulses need not escape detection, and one member wondered what impulses or lack of them would be revealed from the brain of a crooner making his accustomed noises!

**THE EXETER AND DISTRICT WIRELESS SOCIETY.**

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

Meetings : Mondays at 8 p.m.

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

**A**t the meeting of this society held on Monday, March 20th, a lecture and demonstration was given by Dr. C. Wroth, the Exeter radiologist, and the lecture took place at the Royal Devon and Exeter Hospital.

Dr. Wroth primarily spoke of the X-ray and gamma-ray, and some magnificent slides were shown on the screen, and interesting demonstrations were given.

Members of the Radio Society of Great Britain also attended, and it was voted one of the finest evenings the society had had.

**INTERNATIONAL SHORT-WAVE CLUB (LONDON).**

Headquarters : R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8.

European and Colonial Representative : Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

**A** VERY interested audience attended the first of a series of regular television demonstrations, which was held at the London Chapter of this organisation on Friday evening, March 24th, at the R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8. Mr. C. Tibbs described the technical features of the new Ultra television receiver, model T.22, and answered many questions regarding the cathode-ray tube, and

**LISTENERS' CHOICE OF PROGRAMMES**

(Continued from page 90)

able to hear school broadcasts enjoy listening to them, and four out of five of those who are at home between 5.0 and 6.0 p.m. enjoy listening to the Children's Hour—particularly if they are over thirty years of age.

The six o'clock News is the most popular News broadcast. It has nearly twice as many listeners as any other News.

One listener in four listens regularly to two News broadcasts each night. The most popular "pair" is the six o'clock and the nine o'clock News.

American Commentary by Raymond Gram Swing, which is broadcast every Saturday night at 9.20 p.m., is listened to regularly in over 1,000,000 homes.

**Summer and Winter Listening**

How much does listening diminish in the summer? Sixty per cent. of listeners do

valve line-up. The receiver was then demonstrated by Mr. D. B. Hall. The picture was rock steady, the receiver excelling for brilliancy and quality of output. Passers by the R.A.C.S. Hall will notice the tall pylon that has been constructed on the roof, which carries the television aerial and which will later carry the Club's transmitting aerials. All interested readers are invited to come along to the Friday evening meetings. No. 77 bus from Charing Cross passes the door.

**RADIO, PHYSICAL AND TELEVISION SOCIETY**

Headquarters : 72A, North End Road, West Kensington, W.14.

Meetings : Friday evenings at 8.15 p.m.

Hon. Sec. : C. W. Edmans, 15, Cambridge Road, North Harrow, Middlesex.

**O**n Friday, March 24th, Mr. Harley Carter, of the British Thermostat Company, delivered an interesting lantern lecture on "Thermostats." Particular attention was paid to thermostats for the control of refrigerating plant. On Saturday the 11th ult., a party of members and friends visited the printing works of the *Sunday Graphic*. Most members being amateur telegraph-operators, the wire-room was of particular interest, and members were shown the apparatus for the transmission and reception of photographs by wire.

Meetings of the society are held every Friday evening at 72A, North End Road, West Kensington, London, W.14. Privileges of membership include Morse instruction, an instrument calibration service and a technical translation service, all of which are free to members. Further particulars may be obtained from the hon. secretary, C. W. Edmans, at the society's headquarters.

**KILMARNOCK AND DISTRICT SHORT-WAVE SOCIETY.**

Headquarters : Wardnèuk Receiving Station, Glasgow Road, Kilmarnock.

Hon. Sec. : R. Mitchell, 151, Bonnyton Road, Kilmarnock.

**W**E have now erected at above address two aerial masts supporting a "Windom" antenna, which has been tried out, using various receivers, to study and eliminate interference from passing cars. We find that owing to the height, and to the aerial being at right angles to the road, the interference is almost negligible.

A very enthusiastic class has been formed for Morse instruction under the able and competent instruction of Mr. Whittaker and Mr. Herring. A series of lectures will be given by our president, A. Herring (GM3PB) entitled, "Short-wave Receiving and Transmitting for Beginners." Most members have been very helpful in bringing along their surplus gear, out of which a club receiver and several Morse oscillators are being constructed.

**WATFORD AND DISTRICT RADIO AND TELEVISION SOCIETY.**

Hon. Sec. : R. T. Sharp, 11, Nightingale Road, Bushey, Herts.

**A**t a recent meeting of local enthusiasts, it was decided to form a Radio Society in Watford under the above name.

Officers nominated were as follows: hon. sec., Peter G. Spencer (G8MH); assistant secretary, W. J. Allen; hon. treasurer and technical advisor, J. C. Warren; publicity sec., R. T. Sharp. Will prospective members please communicate with the hon. sec. at the above address when further particulars will gladly be forwarded.

**WIRRAL AMATEUR TRANSMITTING AND SHORT-WAVE CLUB**

Hon. Sec. : J. R. Williamson, 13, Harrow Grove, Bromborough.

Meetings : Last Wednesday each month at 7.30 p.m. at H.Q., Beeclerk Settlement, Birkenhead.

**A**t the conclusion of the last committee meeting, a field day suggestion was made which will be discussed by club members.

Proposed subject for April meeting : discussion on antennae.

just as much listening between 6.0 and 8.0 p.m. in the summer as they do in the winter during the same period. Seventy-five per cent. do just as much listening after 8.0 p.m. in the summer as they do after 8.0 p.m. in the winter evenings.

Listeners switch off their sets last thing at night at much the same time summer and winter. Between Monday and Friday two out of three listeners finish listening at or before 10.30 p.m. On Saturday they listen about half an hour longer. Sunday is the night for turning in early—nine sets out of ten are switched off before 10.30.

The average time for switching off in the country is always about half an hour earlier than in the town.

The average listener in the London and West Regions does not listen as late as those in the rest of the British Isles.

Among people with incomes of £4 a week and less, three times as many listen up to 11.0 p.m. on Saturdays as on other nights of the week.



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

### Audible Radiations

SIR,—I have just read with great interest the letter from Mr. D'Arcy Ford on the above subject which appeared in a recent issue. He draws attention to the letter from G. J. D., of York, who received a number of stations simultaneously from an amplifier on the loudspeaker, and who suggests it came from the power supply through his eliminator.

Mr. D'Arcy Ford states that if the signals can be picked up on an amplifier and loudspeaker they should be picked up on a pair of headphones, provided the signals were strong enough.

About two years ago, when I was making a crystal set I accidentally connected the aerial and earth leads directly to the headphones, and could hear the National and the Stagshaw programmes. It makes no difference if the mains superhet is disconnected or working. After reading about the amplifier I took the aerial and earth plugs from the superhet and plugged them into the P.U. sockets and turned the radio on to "Gram." The Regional and National programmes came out on the loudspeaker, thus proving, I think, that they were not radiations picked up from another set.—DENIS PALLISTER (Whitley Bay).

SIR,—I have read with interest the letters from readers about "Audible Radiations." I remember a few years ago when I had a crystal set and amplifier that I noticed a similar effect. In my case I heard the local station (Burghead), which is about twenty-seven miles away, when the cat's-whisker made contact with the crystal holder. The holder was a small cup soldered to a strip of metal.

My explanation was that the holder had been covered with crystal dust and this rectified the R.F. oscillations. However, I think I will build another crystal set and see if I can find out if my belief is right or wrong.

Your articles about building receivers from "junk" are greatly appreciated. My RX just now is an o.v.i. During the last few days I have logged HI3N, FB8AH, W1—ME, BLO, IPT, W2EV, AZM, W4ELH, DRZ, and many Canadian and European amateurs. All logged on 20 metres.—WM. FORSYTH (Avoch, Ross-shire).

### Thermion's Old Hands Club!

SIR,—I wish to thank you for the book, "Wireless Coils, Chokes and Transformers," awarded to me for solving Problem No. 338.

I must confess I was not, until lately, a regular reader of PRACTICAL AND AMATEUR WIRELESS, but I have been interested in wireless for a long time.

I wonder if I would qualify as a member of "Thermion's Old Hands Club"? I

remember making a "transmitter and receiver" about 1913 or 1914. I don't remember much about it, except that the aerials consisted of similar squares of zinc or copper, about a foot square, two each to the receiver and transmitter. It didn't work—partly, I think, owing to lack of funds forcing me to construct my own telephone earpiece from a boot-polish tin, a screw, and a few yards of D.C.C. wire.

After the War shortage of cash plus dearth of parts kept me out of the practical side of the game till about 1921, when a friend and I pooled our resources and built a crystal set. This was before Belfast station opened, and we used to get Glasgow and sometimes Bournemouth on it. By the time Belfast was well under way we had a two valve and crystal reflex going strong. I think I learnt more about the practical side of radio keeping that reflex going than any other set I ever worked on.

It had a nasty habit of "packing up" about an hour before someone was due in to hear it. Of course, most sets had this fault in those days, but this one was particularly bad. The nights we spent listening for America and our joy on one night actually hearing a "Yankee" for about an hour. The good old days, the last of the bright emitters, the early D.E.R.s, the "hooded" Cossors, filament rheostats and variable grid leaks, the kindly firms who, for a consideration, replaced your filaments when you got the H.T. across them, the memory of a boastful friend who got "wonderful reception" with four 3-volt .06's run full out from a 4-volt battery, and what he said when their emission went after a week or so, the Armstrong super-regenerative set which had a perfectly lovely whistle, but little else.

Enough of memories—we are now down to factory-produced sets of fairly reliable performance(?) and one wireless paper after the army of those years. Locally, there are very few constructors—in fact, very few people interested in the practical side of radio at all.

Every success to the last of the radio papers.—W. G. (Larne, Co. Antrim).

### "The Spider and the Fly"

SIR,—Here is an imaginary conversation which may interest readers.

*Spokesman for Cinema Industry to B.B.C., in a hearty, genial manner:* "Too bad, brothers, that you can't get on with this television for lack of sufficient money. Now, how would it be if you let us give you a hand—say, £5,000,000? Would that be any use to you?"

*B.B.C. in genuine B.B.C. accents:* "We are not interested."

*S. for C.I.:* "Say, now, don't get peeved! What's the matter with us coming in with you? All friends here, aren't we? Course, if we came in you'd have to do

like we said and not object to a spot of advertising in the programmes; an' let us tell ya what kinda pictures would suit us best. But shucks! That ain't nothin'! Five million pounds make a lot of noise, don't they? Got a right to say sumpin, ain't they? Sure, they have. An' you ain't goin' to try an' stop them. Hey, c'mon, let's get on the jab! Kaint have the public sittin' around in their own little shacks lookin' at television 'stead of goin' to the talkies. Not on your lives, brothers. Well, say sumpin'! Is it a deal?"

*B.B.C., with carefully-concealed itch to get hold of so much as £5,000,000 and in even more frigidly B.B.C. accents:* "We are not amused. You are correct in supposing that such a sum would be fairly useful to us, and if you care to hand it over to us unconditionally we might consider accepting as a favour to you, somewhat on the same lines as we accept listeners' licence fees from them. We must be left entirely free to decide what we give in return for anyone's money. We have our status to consider. Now, how does that strike you?"

*S. for C.I.:* "Brothers, it don't simply strike me. It knocks me flat. We gotta have control, or nothin' doing."

*Eavesdropping Licence Holder:* "Well, let's hope it stops at that. I'd much rather pay fifteen shillings a year for my licence, if it included television, than let those tough guys get a finger in this pie. We licence-holders have got a sort of remote fragmentary control over the B.B.C. Our middle name would soon be 'Mud' if we let the cinema industry hold the whip over both the B.B.C. and ourselves. The development of television should be the business of the B.B.C. exclusively. If necessary, let them raise the licence fee and get on with it!"—"TORCH."

CUT THIS OUT EACH WEEK.

## Do you know

—THAT the ordinary mains leads in the house may be used to couple some forms of remote control to a receiver.

—THAT telephone wires may be used with some types of Interhouse communication apparatus.

—THAT ordinary H.F. chokes are definitely unsuitable for inclusion in D.C. mains leads for interference suppression purposes.

—THAT a fuse in the H.T. negative lead does not offer complete filament protection in a battery receiver.

—THAT the grid bias circuit can be the cause of a burnt out filament circuit if a fuse is not included in the G.B. positive lead.

—THAT volume controls and variable resistors are not the only components which must be examined for "live" spindles when using an earthed metal panel.

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

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

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# LATEST PATENT NEWS

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

**TELEVISION.** Naamlooze Vennootschap Philips' Gloeilampenfabrieken. No. 497,116.

The amplification of an additional high or intermediate-frequency amplifier 2, Fig. 1, the rectified output of which controls the scanning, is so regulated by the instantane-

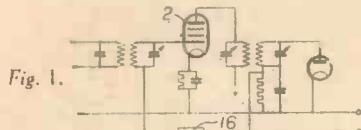


Fig. 1.

ous value of the modulation that, during the picture signals, the amplification decreases with increasing amplitude of the signals and, during the oppositely modulated synchronizing signals, the amplification is equal to that of the unmodulated carrier. The synchronizing signals decrease the amplitude of the carrier. The rectified output voltage is supplied to the controlling-grid of the valve 2, the normal bias of which is so adjusted that, at the minimum instantaneous value of the picture signals, the valve operates at a point of its characteristic between a substantially straight portion and a highly curved portion. This additional varying bias is supplied through a filter 16, which removes high or intermediate frequencies. According to a modification, the varying bias is obtained from an additional rectifier with a delay voltage

equal to the amplitude of the unmodulated carrier.

Reference has been directed by the Comptroller to Specification 451,042.

**VALVE AMPLIFYING CIRCUITS.**—Fayers, A. A. No. 497,819.

Variation of gain in a thermionic amplifier is accompanied by variation in negative feed-back from the output to the input circuit. The input volume to the triode V1 Fig. 2, is controlled by a potentiometer R7, which forms one arm of a feed-back bridge circuit, the other arms being R5 and R6, R3 and R4, and the two diagonals the secondary of T1, and the grid-cathode circuit of V1. Positive feed-back is obtained

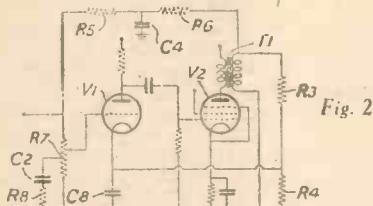


Fig. 2.

over R5, R6 and negative reaction from R4 which is common to the output of V2 and the biasing circuit of V1. C8 is provided for "high-note lift." At maximum gain the bridge is balanced and thereafter negative feed-back increases with decreasing gain. C2, R8 is a "bass-lift" network

## NEW PATENTS

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

### Latest Patent Applications.

8335.—Baird Television, Ltd., and Baird, J. L.—Methods of projecting stereoscopic images. March 15th.

8272.—Baird Television, Ltd., and Palmer, E. A. Rea.—Methods of terminating transmitting lines. March 15th.

8273.—Baird Television, Ltd., and Sommer, A.—Manufacture of secondary emitting electrodes. March 15th.

8042.—Baird Television, Ltd., Denissoff, A. K., and Speirs, J. M. S.—Luminescent screens, etc. March 14th.

7578.—Hardwick, J.—Thermionic valve circuit arrangements.

8175.—Kolster-Brandes, Ltd., Smyth, C. N., and Prichard, R. E.—Television receivers. March 14th.

7949.—Marconi's Wireless Telegraph Co., Ltd., and Goodenough, E. F.—Automatic selectivity devices for tuned circuits. March 11th.

8205.—Marconi's Wireless Telegraph Co., Ltd., Cockerell, C. S., and Parker, G. P.—Radio direction-finders. March 14th.

8224.—Mullard Radio Valve Co., Ltd., and Eaglesfield, C. C.—Magnetic focusing systems for cathode-ray tubes. March 14th.

7666.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Television receiving systems. March 9th.

8352.—Naamlooze Vennootschap Philips'

and C4 balances the bridge. In a modification there is no positive feed-back and negative feed-back is taken from R4 to a tapping on R7 through a condenser and discriminating filter; here R4 is not the biasing resistance of V1, a separate resistor being provided for that purpose.

Reference has been directed by the Comptroller to Specifications 472,256 and 476,877.

**AERIALS.** Sharp, M. No. 497,466.

A motor-car aerial comprising a hollow or solid rod A, Fig. 3, is shaped to lie within

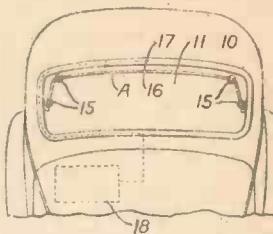


Fig. 3.

the confines of the area of a window, e.g., windscreen 11, of the vehicle and is spaced from the window by supporting posts which are attached to it by rubber suction cups 15. The lead-in wire 17 runs from the mid-point 16 of the aerial round the periphery of the windscreen to the receiver 18.

## AMERICA DISCUSSES TELEVISION BARRIERS

THE continent of America is now passing through all the exciting phases of pre-television service problems prior to the opening of the World's Fair, and in doing so is repeating what happened in this country nearly three years ago. First of all, propaganda is being released to explain to the public why the service range of signals is limited to certain densely populated areas, and not covered by a nation wide network, as is the case with sound radio. The high aerials necessary to give the best coverage are provided by the top of the Empire State building for the National Broadcasting Co., the top of the Chrysler building for the Columbia Broadcasting System; while the General Electric Company at Schenectady solves the problem by erecting its transmitter on a mountain 1,500 feet high, and in this way hopes to embrace a wider area than that of the Empire State Building station. In this respect the Americans have a distinct advantage, for whereas in this country only the Alexandra Palace is operating, in spite of a national public appeal for increased television facilities, the United States is making a start with at least three transmitters. They feel that, initially, it is better to concentrate their efforts on a few markets until television has proved itself to the public, and then the duplication of areas will be undertaken quickly, for income will then be available for development. It is also apparent that quite early in the art the necessity for a close co-operation between the film and television industries is manifested. The experience and finance of both sides will be joined to bring about a rapid development of programmes, and in this way both sides will gain, and bring about the smallest amount of displacement to individual interests. As an example of this, Paramount has bought an interest in the Du Mont laboratories, a company which manufactures high-quality television receivers as well as having a transmitting system of its own which differs materially from the one which has come to be generally accepted by the others.

Gloeilampenfabrieken.—Radio-receiving apparatus. March 15th.

8166.—Roberts, E. H.—Radio receiving, etc., apparatus. March 14th.

8171.—Semper, A. E.—Wireless, etc., aerials. March 14th.

7814.—Standard Telephones and Cables, Ltd.—Methods, etc., for television communication. March 10th.

8178, 8180.—Standard Telephones and Cables, Ltd. (Dumont).—Methods, etc., for television communications. March 14th.

### Specifications Published.

501,966.—Blunlein, A. D., and Spencer, R. E.—Television systems.

501,920.—Scophony, Ltd., and Barasch, H. P.—Luminous electric discharge tubes.

501,918.—Etablissements B. Roux.—Amplifier arrangements such as are used in wireless installations, sound recording, or reproducing apparatus and so on.

502,024.—Heimann, W.—Mosaic electrodes for electronic scanning devices.

502,098.—Standard Telephones and Cables, Ltd., and Terry, V. J.—Picture transmission television and like.

501,934.—Cele, Ltd., E. K., and Martin, A. W.—Automatic tuning in radio receivers. March 13th.

501,994.—Daniel, K.—Diaphragms for the light valves of optical sound-recording apparatus, and apparatus incorporating them.

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



# QUERIES and ENQUIRIES

## Local-station Difficulties

"As you see from my address I am very near Brookmans Park and I have tried many sets but cannot bring in the foreign stations except after the B.B.C. has closed down. I do not want to go to the expense of building a superhet, and on the other hand I get no fun from a factory-made set. I wonder if you could assist me?"—S. G. S. (New Barnet).

If you do not want a multi-valve set such as a superhet, or a two H.F. receiver, the only remaining plan is to make up a really good wave-trap. By using a modern iron-core coil you will obtain a sharply tuned trap and this should prove all that is necessary. Any modern standard coil would be suitable, although special components are available. A standard tuning condenser should be connected across the coil and the two then joined in series with the aerial lead. This should effectively cut out the local stations, and if you find that you need to cut out both, then two such traps may be used in series.

## Using a Mike

"I recently made up a neat two-valve battery amplifier which has given very successful results with a pick-up for record reproduction. I want to use a microphone and have bought a small model which I am told is in perfect condition. However, when connected in place of the pick-up I can only just hear signals very faintly, and I should like to know why this is."—J. R. (N.1).

THE output from the microphone is no doubt very much less than the pick-up and therefore all that is needed is an additional stage of amplification for the mike. We presume, of course, that the instrument is connected to the amplifier through the usual transformer which is of the correct type to match the microphone to the valve. A circuit showing the scheme was given in the article on home-recording in our issue dated February 18th last.

## Frequency Drift

"I have noted in one or two sets advertised in the papers recently that they claim freedom from frequency drift. I wonder if you could explain to me exactly what that means, in non-technical language. I find that on my set I often have to re-tune during the reception of a distant station and wonder if this is the same trouble."—F. G. T. (Andover).

THE term is generally applied to the particular fault which renders it necessary to re-tune the receiver from time to time and can be caused by change in trimmer-capacity values in the frequency-changing stage; by change in the emission of the frequency-changing valve; by general instability, and by several other faults. It is sometimes wrongly applied to the fault properly known as "frequency locking" in which a strong local signal will act in such a manner that it overcomes the characteristics of the oscillator circuits

causing these to oscillate at the signal frequency. This causes the receiver to appear "dead" over a certain part of the scale.

## Voltage Divider Fault

"I have an American set in which there is a large tapped wire-wound resistor of large dimensions across the H.T. output. Tappings are taken from this by means of clips to various stages, and the set recently went dead. After one or two tests I have discovered that the wire in the third section of this resistance has broken and the component is thus open-circuited. Could I obtain a replacement, or would you advise soldering (or attempting to solder) the broken ends, after unwinding one turn in order to obtain sufficient overlap of the ends of the break?"—J. F. (Harrow).

ALTHOUGH no doubt the ends could be satisfactorily soldered, we think the most effective plan in such a case is to bridge the defective section with another resistance having the same value as the

## RULES

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

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

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

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

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

section. Measure, therefore, the resistance between the clips on each side of the break and obtain a wire-wound resistance of similar value, or one of adjustable value so that the correct resistance may be obtained, and connect this across the two clips. This is quite a satisfactory repair and will avoid the expense of a new resistor.

## Tuned Hum Filter

"I have an A.C. set in which I have found it almost impossible to overcome the hum. I have tried larger condensers and decoupling without success and a friend has told me that I should try a tuned hum filter. I did not like to ask what this was, but perhaps you would tell me and how to fit it to this set so as to obtain quiet background free from hum."—L. W. (Penge).

THE usual scheme is to connect a condenser across the smoothing choke, or to connect an air-core choke in series with a condenser across the output from the rectifier. In each case the tuned circuit must resonate at the hum frequency and therefore the condenser value has to be

chosen in conjunction with the choke value, the formula being

$$f = \frac{1}{2\pi \sqrt{LC}}$$

## Testing an Electrolytic Condenser

"I have two or three large electrolytics in my set and I believe one of them has broken down and is shorting. Unfortunately I have no elaborate testing gear and my only apparatus consists of an ohmmeter and my range voltmeter. Can you tell me the way of testing these condensers with my apparatus?"—C. R. (Huddersfield).

WE suggest you test the condensers with the ohmmeter, connecting the condensers to it with the correct polarity observed—that is, the positive terminal of the condenser must be joined to the positive terminal of the ohmmeter. When first connected the meter will show a low value for a short period of time and the pointer will then gradually fall back to a high-resistance reading. If the condenser is shorted it will be indicated by the pointer remaining at the low reading. If it is open-circuited, due either to a broken lead or to evaporation or other fault which has caused the electrolyte to dry out, there will be no needle indication, or at least only a very slight one.

## D.C. Charging

"I wish to charge an accumulator at 5 amps. and we have D.C. mains here, 200 volts. Could you tell me what type of lamp I should include in series with the accumulator to get the right charging rate?"—L. R. T. (Launceston).

FOR the mains voltage in question you should use a 100-watt lamp. A 40-watt lamp on the 200-volt supply will pass a current of .2 amps., a 60-watt lamp a current of .3 amps., and a 75-watt lamp a current of .35 amps. Other rates are in the same proportion.

## A Licence Problem

"Is it necessary to take out a wireless licence for each set I maintain, or does one licence cover all the sets in the same house?"—R. S. B. (Willesden).

THE standard licence covers one fixed receiver and one portable. Any additional receivers (including car radio apparatus) call for a fresh licence.

## REPLIES IN BRIEF

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

A. E. J. (Sutton-in-Ashfield). We do not supply blueprints of commercial receivers, and you should, therefore, communicate with the makers in this case.

D. W. (S.E.12). The remarks only apply to the ordinary type of balanced armature of ordinary speaker—not to the moving-coil type.

J. J. D. (Morecambe). All the issues dated back to the period mentioned are now out of print. We regret that we are now not able to supply you with any details concerning this particular set.

G. R. D. (E.6). We have published several articles on the subject and suggest that you write to the V.G. Manufacturing Company, of Gorst Road, Park Royal, London, N.W.10, for a copy of their interesting booklet on the subject.

D. M. (Manchester). We regret that we have no details which would be of use to you in the case mentioned.

J. T. (Newcastle-on-Tyne). We cannot supply details of the coil in question which was, we believe, designed for a special circuit described in a contemporary not now on the market.

The coupon on page 87 must be attached to every query.

# Practical and Amateur Wireless BLUEPRINT SERVICE

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

**STRAIGHT SETS.** Battery Operated.

One-Valve : Blueprints, 1s. each.	
All-wave Unipent (Pentode)	— PW31A
Beginner's One-valver	19.2.38 PW85
The "Pyramid" One-valver (HF Pen)	27.8.38 PW93
Two-valve : Blueprints, 1s. each.	
Four-range Super Mag Two (D, Pen)	— PW36B
The Signt Two (D & LF)	24.9.38 PW76
Three-valve : Blueprints, 1s. each.	
The Long-range Express Three (SG, D, Pen)	24.4.37 PW2
Selectone Battery Three (D, 2 LF (Trans))	— PW10
Sixty Shilling Three (D, 2 LF (RC & Trans))	— PW34A
Leader Three (SG, D, Pow)	22.5.37 PW35
Summit Three (HF Pen, D, Pen)	— PW37
All Pentode Three (HF Pen, D (Pen), Pen)	20.5.37 PW39
Hall-mark Three (SG, D, Pow)	12.6.37 PW41
Hall-mark Cadet (D, LF, Pen (RC))	16.3.35 PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three)	13.4.35 PW49
Genet Midget (D, 2 LF (Trans)) June '35	PM1
Cameo Midget Three (D, 2 LF (Trans))	8.6.35 PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, HF Pen, Westector, Pen)	— PW53
Battery All-Wave Three (D, 2 LF (RC))	— PW55
The Monitor (HF Pen, D, Pen)	— PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36 PW62
The Centaur Three (SG, D, P.)	14.8.37 PW64
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36 PW69
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	18.2.39 PW72
The "Rapide" Straight 3 (D, 2 LF (RC & Trans))	4.12.37 PW82
F. J. Camm's Oracle All-Wave Three (HF Pen, Det, Pen)	28.8.37 PW78
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.38 PW81
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.38 PW87
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.38 PW89
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	3.9.38 PW92
Four-valve : Blueprints, 1s. each.	
Sonotone Four (SG, D, LF, P)	1.5.37 PW4
Fury Four (2 SG, D, Pen)	8.5.37 PW11
Beta Universal Four (SG, D, LF, Cl. B.)	— PW17
Nucleon Class B Four (SG, D, (SG), LF, Cl. B.)	6.1.31 PW31B
Fury Four Super (SG, SG, D, Pen)	— PW31C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	— PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.0.36 PW67
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37 PW79
"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B.)	12.2.38 PW83
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	3.9.38 PW90

**Mains Operated.**

Two-valve : Blueprints, 1s. each.	
A.C. Twin (D (Pen), Pen)	— PW18
A.C.-D.C. Two (SG, Pow.)	— PW31
Selectone A.C. Radiogram Two (D, Pow.)	— PW19
Three-valve : Blueprints, 1s. each.	
Double-Diode-Triode Three (HF Pen, DDT, Pen)	— PW23
D.C. Ace (SG, D, Pen)	— PW25
A.C. Three (SG, D, Pen)	— PW29
A.C. Leader (HF Pen, D, Pow)	31.3.34 PW35C
D.C. Promier (HF Pen, D, Pen)	28.7.34 PW35B
Ubique (HF Pen, D (Pen), Pen)	— PW36A
Armada Mains Three (HF Pen, D, Pen)	— PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.33 PW50
"All-Wave" A.C. Three (D, 2 LF (RC))	— PW51
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	— PW53
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36 PW70
All-World Ace (HF Pen, D, Pen)	28.8.37 PW80
Four-valve : Blueprints, 1s. each.	
A.C. Fury Four (SG, SG, D, Pen)	— PW20
A.C. Fury Four Super (SG, SG, D, Pen)	— PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37 PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	0.2.35 PW47
A.C. All-Wave Corona Four	6.11.37 PW81

**SUPERHETS.**

Battery Sets : Blueprints, 1s. each.	
£5 Superhet (Three-valve)	5.6.37 PW40
F. J. Camm's 2-valve Superhet	13.7.35 PW52
F. J. Camm's £4 Superhet	— PW58
F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37 PW75
Mains Sets : Blueprints, 1s. each.	
A.C. £5 Superhet (Three-valve)	— PW43
Universal £5 Superhet (Three-valve)	1.12.34 PW42
F. J. Camm's £4 Superhet 4	31.7.37 PW44
F. J. Camm's Universal £4 Superhet 4	— PW59

**SHORT-WAVE SETS.**

One-valve : Blueprint, 1s.	
Simple S.W. One-valver	0.4.38 PW88
Two-valve : Blueprints, 1s. each.	
Midget Short-wave Two (D, Pen)	— PW38A
The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.38 PW91
Three-valve : Blueprints, 1s. each.	
Experimenter's Short-wave Three (SG, D, Pow)	30.7.38 PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	7.8.37 PW63
The Band-Spread S.W. Three (HF, Pen, D (Pen), Pen)	1.10.38 PW63

**PORTABLES.**

Three-valve : Blueprints, 1s. each.	
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	— PW65
Parvo Flyweight Midget Portable (SG, D, Pen)	10.6.37 PW77
Four-valve : Blueprint, 1s.	
"Imp" Portable 4 (D, LF, LF, Pen)	10.8.38 PW86

**MISCELLANEOUS.**

S.W. Converter-Adapter (1 valve)	— PW48A
AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.	
Blueprints, 6d. each.	
Four-station Crystal Set	23.7.38 AW427
1934 Crystal Set	— AW444
150-mile Crystal Set	— AW450

**STRAIGHT SETS.** Battery Operated.

One-valve : Blueprints, 1s. each.	
B.B.C. Special One-valver	— AW387
Twenty-station Loudspeaker One-valver (Class B)	— AW449
Two-valve : Blueprints, 1s. each.	
Melody Ranger Two (D, Trans)	— AW388
Full-volume Two (SG det, Pen)	— AW392
Lucerne Minor (D, Pen)	— AW426
A Modern Two-valver	— WM409
Three-valve : Blueprints, 1s. each.	
Class B Three (D, Trans, Class B)	— AW383
Fan and Family Three (D, Trans, Class B)	— AW410
£5 5s. S.G. 3 (SG, D, Trans)	25.11.33 AW412
£5 5s. Three (SG, D, Trans)	— AW422
£5 5s. Three: De Luxe Version (SG, D, Trans)	10.5.34 AW435
Lucerne Straight Three (D, RC, Trans)	— AW437
Transportable Three (SG, D, Pen)	— WM271
Simple-Tune Three (SG, D, Pen)	June '33 WM327
Economy-Pentode Three (SG, D, Pen)	Oct. '33 WM337
"W.M." 1934 Standard Three (SG, D, Pen)	— WM351
£3 3s. Three (SG, D, Trans)	Mar. '34 WM354
1935 £6 6s. Battery Three (SG, D, Pen)	— WM371
FTP Three (Pen, D, Pen)	— WM389
Certainty Three (SG, D, Pen)	— WM393
Minutiae Three (SG, D, Trans)	Oct. '35 WM396
All-Wave Winning Three (SG, D, Pen)	— WM400
Four-valve : Blueprints, 1s. 6d. each.	
£6s. Four (SG, D, RC, Trans)	— AW370
2HF Four (2 SG, D, Pen)	— AW421
Self-contained Four (SG, D, LF, Class B)	— WM331
Lucerne Straight Four (SG, D, LF, Trans)	— WM350
£5 5s. Battery Four (HF, D, 2 LF)	Feb. '35 WM381
The H.K. Four (SG, SG, D, Pen)	Mar. '35 WM384
The Auto Straight Four (HF Pen, D, DDT, Pen)	— WM404
Five-valve : Blueprints, 1s. 6d. each.	
Super-quality Five (2 HF, D, RC, Trans)	— WM320
Class B Quadradyne (2 SG, D, LF, Class B)	— WM344
New Class B Five (2 SG, D, LF, Class B)	— WM340

These Blueprints are drawn full size.

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

Issues of Practical Wireless .. 4d. Post Paid.  
Amateur Wireless .. 4d.  
Practical Mechanics .. 7d.  
Wireless Magazine .. 1/3.

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

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

**Mains Operated.**

Two-valve : Blueprints, 1s. each.	
Conselectric Two (D, Pen) A.C.	— AW403
Economy A.C. Two (D, Trans) A.C.	— WM280
Unicorn A.C.-D.C. Two (D, Pen) A.C.	— WM304
Three-valve : Blueprints, 1s. each.	
Homo Lover's New All-electric Three (SG, D, Trans) A.C.	— AW383
Mantovani A.C. Three (HF Pen, D, Pen)	— WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	— WM401
Four-valve : Blueprints, 1s. 6d. each.	
All Metal Four (2 SG, D, Pen)	— WM326
Harris' Jubilee Radiogram (HF Pen, D, LF, P)	May '35 WM386
Two-valve : Blueprints, 1s. each.	
Modern Super Senior	— WM375
Varsity Four	Oct. '35 WM395
The Request All-Waver	June '36 WM407
1935 Super Five Battery (Superhet)	— WM379
Mains Sets : Blueprints, 1s. 6d. each.	
Hippolyte Super Three A.C.	May '34 WM359
"W.M." Radiogram Super A.C.,	— WM366

**SUPERHETS.**

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

**PORTABLES.**

Four-valve : Blueprints, 1s. 6d. each.	
Holiday Portable (SG, D, LF, Class B)	— AW393
Family Portable (HF, D, RC, Trans)	— AW417
Two H.F. Portable (2 SG, D, Q.P.21)	— WM363
Tyres Portable (SG, D, 2 Trans)	— WM367
Short-wave Sets—Battery Operated.	
One-valve : Blueprints, 1s. each.	
S.W. One-valver for America	15.10.33 AW429
Rome Short-waver	— AW452
Two-valve : Blueprints, 1s. each.	
Ultra-short Battery Two (SG, D, Pen)	Feb. '30 WM402
Home-made Coil Two (D, Pen)	— AW410
Three-valve : Blueprints, 1s. each.	
World-ranger Short-wave 3 (D, RC, Trans)	— AW455
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34 AW433
Experimenter's Short-waver (SG, D, Pen)	Jan. 19. '35 AW463
The Carrier Short-waver (SG, D, P.)	July '35 WM393
Four-valve : Blueprints, 1s. 6d. each.	
A.W. Short-wave World-Beater (HF Pen, D, RC, Trans)	— AW436
Empire Short-waver (SG, D, RC, Trans)	— WM313
Standard Four-valver Short-waver (SG, D, LF, P)	Mar. '35 WM333
Superhet : Blueprint, 1s. 6d.	
Simplified Short-wave Super	Nov. '33 WM397
Mains Operated.	
Two-valve : Blueprints, 1s. each.	
Two-valve Mains Short-waver (D, Pen) A.C.	— AW453
"W.M." Band-spread Short-waver (D, Pen) A.C.-D.C.	— WM388
"W.M." Long-wave Converter	— WM330
Three-valve : Blueprint, 1s.	
Emigrator (SG, D, Pen) A.C. +	— WM352
Four-valve : Blueprint, 1s. 6d.	
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35 WM391
MISCELLANEOUS.	
S.W. One-valve Converter (Price 6d.)	— AW329
Enthusiast's Power Amplifier (1/6)	— WM337
Listener's 5-watt A.C. Amplifier (1/6)	— AW452
Radio Unit (2v.) for WM392	Nov. '35 WM393
Harris Electrogram (battery amplifier) (1/-)	— WM399
De Luxe Concert A.C. Electrogram	— WM403
New Style Short-wave Adapter (1/-)	Mar. '36 WM403
Triode Charger (6d.)	— WM388
Short-wave Adapter (1/-)	Jan. 5. '35 WM456
Super-convertor (1/-)	— AW457
B.L.D.L.C. Short-wave Converter (1/-)	— WM388
Wilson Tone Master (1/-)	May '36 WM405
The W.M. A.C. Short-wave Converter (1/-)	June '36 WM406

**Miscellaneous Advertisements**

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

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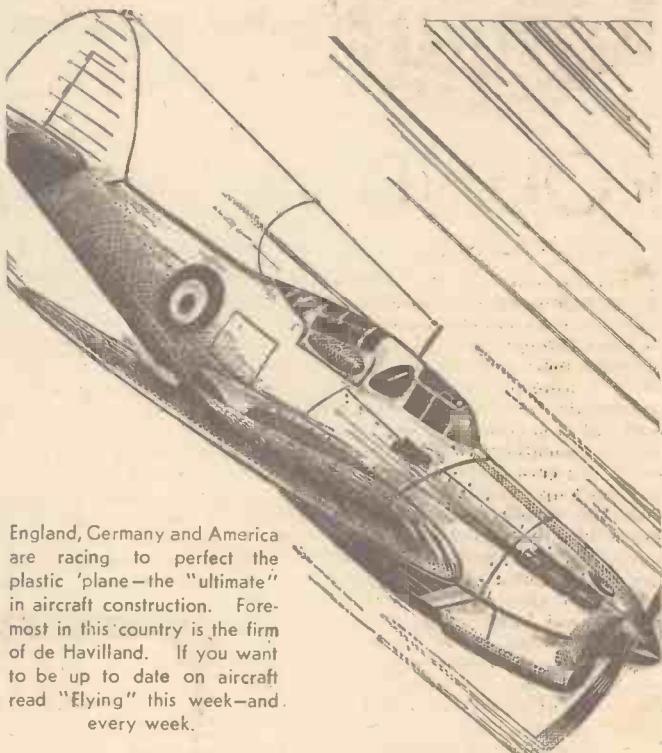
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# Experiments with a Triode-Pentode

See  
Page 101

# Practical and Amateur Wireless

Edited by F. J. CAMM

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

Vol. XIV. No. 343. April 15th, 1939.

## ROUND the WORLD of WIRELESS

### Specialised Receivers

THE requirements for listening on the amateur bands, especially when endeavouring to make contact with a distant amateur through considerable interference, are much more exacting than those required for entertainment purposes on the broadcast wavebands. An amateur transmitter may send out a general call and make contact with an amateur in a distant part, and during the period of working several stations may start up on almost the same frequency, with the result that it may be almost impossible to read his signals, unless a highly-selective receiver is available. To meet such cases special types of receiver have been produced for amateur use, and many novel features will be found incorporated in them. They cannot be handled as easily as a broadcast receiver, but their performance is far superior in every way. They are not inexpensive, although special models are available at moderate prices. The majority of such receivers are imported from America, but English manufacturers are now meeting the demand by producing similar models suitable for the English market. In this issue we review those which are now available, and next week will describe the better-known American models which may be obtained from a number of firms in this country.

### American Facsimile

PLANS for the formation of the first experimental facsimile chain, to be known as the Mutual Facsimile Network, were completed last week in Cincinnati. It is stated that at present there are approximately 1,000 facsimile receivers in operation within the service area of the experimental Mutual Facsimile network.

### Northern Television

TWO Manchester newspapers are sponsoring a campaign for a television service for the northern area, and it is claimed by them that nearly a quarter of the licence holders in Great Britain would be served by a transmitter in Manchester.

### C. S. Franklin Retires

ONE of Marconi's oldest research engineers recently retired after being with the company since 1899. He was Mr. C. S. Franklin, who was responsible not only for the introduction of beam working

in many directions, but who also designed the television aerial now in use at the Alexandra Palace.

### Television Trickery

ONE often hears to-day a doubt expressed as to whether a broadcast programme is actually being enacted in the studio or whether the B.B.C. are making use of gramophone records of other recorded material. The Television section is also now resorting to "dubbing" in connection with certain outside programmes. A case recently occurred where a broadcast was being taken from a theatre, but owing to poor lighting in one scene

and variety stage work, and as an actor has often toured the country. He was at one time professional manager to a well-known firm of music publishers.

### Arms and the Man

BERNARD SHAW'S satire on things military will be broadcast for the first time on April 14th, 18th and 21st. This play is deemed too long for a single broadcast, and so the producer, John Richmond, has decided to present it in three parts, corresponding to the three acts. The broadcast will be in the National programme. Bernard Shaw wrote this play forty-five years ago, and the cast will include Peggy Ashcroft, Barry Jones and John Wise.

### Back to the Seaside

AN April 14th a programme by Reginald Stead and his Orchestra will be broadcast from the Spa, Scarborough, and will be followed by a "tour" of some of Blackpool's entertainments. Entitled "Here We Are Again," the Blackpool broadcast, which will be heard by Regional as well as Northern listeners, will include visits by microphone to the Tower Ballroom, the Palace Theatre, and to the South Pier.

### Eating to Live

ON important new series of talks entitled "Eating to Live" begins in the Northern Ireland programmes on April 19th. Professor D. C. Harrison, professor of bio-chemistry at Queen's University, Belfast, is the general editor of this series, and will himself give the first talk. He will outline the main scope of the series and will have something interesting to say about the history of food, strange facts about it, and some of the strange habits connected with food in different parts of the world.

### "Popeye" in Cabaret Cruise

BILLY COSTELLO (the voice of the famous Popeye cartoons) appeared in person in another edition of Cabaret Cruise, the well-known television feature programme, on April 11th. This was his television début. The programme will be repeated in the evening programme on April 13th.

### ON OTHER PAGES

	Page
Plugs and Jacks .....	99
Experiments with a Triode-Pentode .....	101
On Your Wavelength .....	103
Short-wave Section .....	105
Readers' Wrinkles .....	107
A Review of Communication Receivers .....	108
Connecting Links .....	112
Radio by 'Phone .....	114
The Amateur Transmitter .....	115
Practical Television .....	116
Queries and Enquiries .....	117
Practical Letters .....	118

this was enacted in the studios at Alexandra Palace. When the scene came on the outside cameras were switched off and the studio scene radiated, a return to the theatre being made at the end of the scene. The sound was taken from the theatre.

### New North Regional Announcer

MR. FREDERICK ALLEN has been appointed announcer in the North Regional. He has had considerable experience of professional singing and of concert

# ROUND the WORLD of WIRELESS (Continued)

## Television Stations for U.S.A.

IT is reported that nineteen licences to operate television stations have been granted in the U.S.A. The highest power licence is held at present by the R.C.A. at Camden, New Jersey, which is permitted to operate with a power of 30 kW on both sound and vision transmitters.

## Proposed International Exhibition

**A**N International Exhibition, in which radio and television will play a leading part, is being prepared in Cologne for next year.

## A Day's Gliding

**A**TALK on a day's gliding will be a feature of "Sport in the Midlands" on April 22nd. It will be given by C. E. Hardwick, of Birmingham, who is the President of the Midland Gliding Club. Already there has been one broadcast talk about gliding, under the auspices of this club, at the Long Mynd, in Shropshire.

## Concert from Poland

**T**HE second of the foreign musical relays for Midland Regional (April 21st) is a symphony concert from Poland, by arrangement with Polskie Radio. The first relay was from Sottens, Switzerland, in February.

## From Stage to Screen

**P**OPULAR music from such shows as "San Toy," "Showboat," "Les Cloches de Corneville," "A Waltz Dream,"

## INTERESTING and TOPICAL NEWS and NOTES

tioned, modern and not-quite-so-modern tunes from films and musical productions of the theatre are on the bill; listeners

## New British Music for Military Band

**P.** S. G. O'DONNELL will conduct the B.B.C. Military Band in a programme of Contemporary British Music on April 17th. All the works will be in manuscript, and two of them will be first performances—"The Sea," by Norman Demuth, and "A Military Overture," by Alec Rowley.

## Orchestral Hour

**O**N April 16th, the B.B.C. Midland Orchestra is to provide the Orchestral Hour for National listeners. Dr. W. K. Stanton, Midland Regional Music Director, will conduct the orchestra in favourite items from its repertoire.

## "Pleasure on Parade"

**R**EGIONAL listeners as well as the Northern radio audience will be able to hear one of the North's popular "Music Hall" outside broadcast programmes on April 19th, from the Palace Theatre at Burnley, Lancashire, when excerpts from Frank A. Terry's "Pleasure on Parade" concert party will be broadcast.

## Coventry Hippodrome Orchestra

**T**HE Coventry New Hippodrome Orchestra, which has been contributing frequently to the daytime programmes, is to broadcast in the evening on April 16th, when William Pethers will conduct it in a programme of popular music.



America recently had its first television broadcast. The television studio is housed in the Empire State Building, and this picture shows the television aerial array mounted on the dome at the top of the building.

"Maytime," and "Snow White and the Seven Dwarfs," will be played and sung in a special Northern programme called "From Stage to Screen," on Sunday, April 16th. Arthur Spencer is to conduct the Northern Orchestra, led by Alfred Barker, and the soloists will be Doris Gambell (soprano) and John Haigh (baritone). As shown by the productions men-

## B.B.C. Organ Recital

**A**N organ recital to be given by G. Thalben-Ball on the organ in the Concert Hall, Broadcasting House, on April 20th, will be the last of the present series of public organ recitals. The programme will be devoted to works by J. S. Bach.

## SOLVE THIS!

### PROBLEM No. 343

Allen had a three-valve battery-operated receiver to which he wished to connect a pick-up. He obtained the instrument and as he found that the detector would operate fairly satisfactorily with no grid bias he decided to try out the combination by joining the pick-up between the grid of the detector valve and earth. To avoid a long lead he therefore made a temporary soldered connection between the pick-up leads and the grid of the valveholder and one side of the nearest decoupling condenser. The soldered connections were sound but he failed to obtain any signals, although the pick-up was in good condition. Why was this? Three books will be awarded for the first three correct solutions opened. Entries should be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 343 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, April 27th, 1939.

### Solution to Problem No. 342

The locking screw which held the slow-motion drive to the condenser in Jackson's receiver had become loose, and thus when he adjusted the control the pointer moved round the scale without the condenser moving.

No reader succeeded in correctly solving Problem No. 341, and no books have therefore been awarded this week.

# Useful Applications of Plugs and Jacks

"The Experimenters" here Explain how Plugs and Jacks can be Used to Facilitate Experimenting and also to Simplify the Connection of Loudspeakers, Phones, Meters and other Devices

**B**ECAUSE they are not as widely employed as they were a few years ago, plugs and jacks are probably unknown to a large number of newer readers. This is a pity, for these components are extremely useful as a means of making effective additional connections and for inserting meters and other components into different parts of the circuit of an experimental receiver.

For the benefit of those who are not familiar with plugs and jacks, two typical jacks and a plug are shown in Fig. 1. Many of those who are not new to experimental work will probably find a few in the spares box, and we suggest that they might care to take them out and put them into use again. Those who have none will be interested to know that the price of jacks of the types shown is between about a shilling and eighteenpence; a suitable plug costs a similar amount. The price of the jacks varies according to whether or not terminals or only soldering tags are provided for making external connections.

## Single-circuit and Closed-circuit Types

It will be seen that of these two simple types of jack one is known as a single-circuit, and the other a closed-circuit device. In the single-circuit jack there are simply two terminals or tags, one spring clip and one circular bush. Thus, the component could be connected between the L.T. or H.T. terminals, for example, so that voltage readings could be taken by means of a voltmeter connected to a suitable plug. The plug, it will be seen from Fig. 1, has a metal barrel or shank and also a metal tip, the two being insulated and brought out to terminals inside the bakelite end cap.

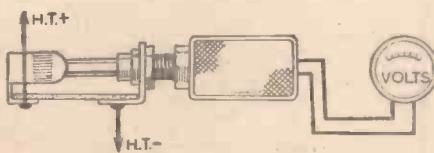


Fig. 2.—How a single-circuit jack can be used for connecting a voltmeter.

Fig. 2 shows, diagrammatically, how a meter could be connected as just mentioned.

## How They are Used

The so-called closed-circuit jack is different in that the spring contact touches a second contact attached to the bush when the plug is not inserted. In other words, the contacts close the circuit, which is broken when the plug is inserted. And if, for example, a milliammeter were connected to the plug while the jack were in the anode circuit of a valve, the anode current could be read immediately by inserting the plug. This is shown in Fig. 3, where it

will be seen that a fixed condenser is connected in parallel with the milliammeter; this is always desirable so that the stability of the circuit is not upset by the inclusion of the resistance of the meter in the circuit.

In an experimental receiver it is a great convenience to have a ready means of

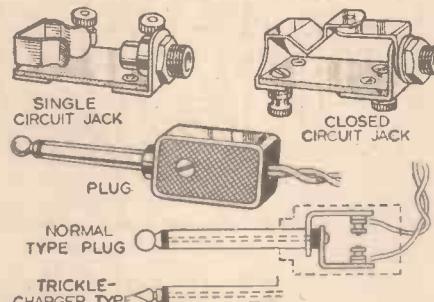


Fig. 1.—Two types of simple jack and also a complete jack plug. Below are shown the construction of the usual type of jack plug and of the special kind used for trickle-charger connection.

checking voltages and currents, and it is well worth while to fit a few single-circuit and closed-circuit jacks at various points. They could be mounted either on the panel, on a small sub-panel inside the set, or on an ebonite strip running along the back of the chassis. It will be understood that the leads to anode circuits should be kept as short as possible, although a few extra inches on the connections to H.T. and L.T. circuits is not of any consequence. Care must, of course, be taken to see that closed-circuit jacks are not fitted between any points of opposite polarity, for they would cause a short circuit.

## Some Interesting Examples

In Fig. 4 we give a skeleton diagrammatic circuit which shows a few points at which jacks could be fitted. Few readers would consider it necessary to use all of them, but one or more can often be useful. The circuit is that of a four-valve set with two H.F. stages, double-diode-triode detector, an A.V.C. and one pentode output valve. This circuit, it should be noted, is not supposed to be complete, but is drawn as simply as possible, merely to show the points at which jacks could conveniently be fitted.

Jacks are in every instance indicated by crosses. That numbered 1 is in the aerial circuit, and should be of the closed-circuit type. Its purpose would be to receive a plug connected to a wave-trap which might be required only for certain stations or for occasional experiment. Jack No. 2 is also a closed-circuit type, and could be used for measuring the anode current to the first valve; since that valve receives the A.V.C.

voltage, the meter could also be used as a visual-tuning indicator. As mentioned above, a fixed condenser should be wired in parallel with the meter; the condenser should be non-inductive and of about 2 mfd. Additionally, it should be connected as close as possible to the plug, while the leads to the jack should be very short and direct. Jacks numbered 3 and 4 are similar in their purpose to No. 2, and can be used for measuring the anode voltage to the second H.F. valve and to the L.F.-amplifier portion of the double-diode triode, respectively.

## Phone and Speaker Connection

Jack No. 5 is for an entirely different purpose and must be of the single-circuit pattern. Its main purpose is to simplify the connection of a pair of phones before the output stage. When phones are connected to it the receiver operates as a three-valver. It could also be used for experiments in simple tone control by connecting a resistor, condenser, or series resistor and condenser across the output from the triode. No. 6 jack is used similarly, but would be suitable for the connection of an extra loudspeaker. In this case, the normal speaker would act as such and also as an output choke, and in conjunction with the 1 mfd. fixed condenser in series with the jack it would form a choke-capacity output

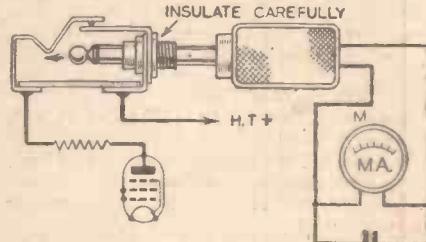


Fig. 3.—The method of connecting a closed circuit jack in a circuit where current measurements are to be taken. Since the jack is in the H.T. circuit care should be taken to insulate it from a metal panel or other earthed part.

filter. The jack could also be used for the connection of a tone-control unit of almost any type.

## For Current Readings

In the L.T.—lead there is a closed-circuit jack (No. 7) which would receive a plug connected to an ammeter used to measure the total L.T. current consumption of the set. The meter would also give an indication, by a comparatively low reading, of the need for accumulator recharging. Jack No. 8, in the H.T.—lead is for the connection of a milliammeter to read the total H.T. current consumption. It would normally be used, when testing, in conjunction with the jacks in the various anode leads (2, 3, 4

(Continued overleaf)

### USEFUL APPLICATIONS OF PLUGS AND JACKS

(Continued from previous page)

and 9). The difference between the sum total of the current readings taken from the last-mentioned four jacks and that obtained when using jack No. 8 would be the current taken by the screening grids of the H.F. pentodes and that passed through the potentiometers which would be used to feed them.

### Trickle-charger Connection

No. 10 jack is a very useful one, since it serves two different purposes. It can be used to measure the L.T. voltage while the set is in operation, and also for the easy connection of a battery trickle charger. When used for the latter purpose great care should be used in connecting it, and also in connecting the plug to the charger, that the polarity is correct. The jack must, of course, be of the single-circuit type, and it will generally be most satisfactory to make the end tip of the plug and the spring connector of the jack positive. That is so that the metal mounting bush is at negative and earth potential. Then if an earthed object should touch the bush the battery would not be short-circuited.

It is better to use a special plug and jack for this purpose to prevent the possibility of short-circuiting the charger when the plug is being fitted. The most suitable type of jack has a pointed end tip which is of smaller diameter than the shank. (See Fig. 1.) Due to this, it is impossible for both tip and shank to touch the inside of the bush together. If the more usual type of ball-ended plug, also shown in Fig. 1, were employed it would be possible to short-circuit the charger leads for an instant while the plugs were being inserted;

that would either blow the fuse in the charger (if fitted) or tend to damage the charger.

There is only one more jack shown in the circuit diagram and this is numbered 11. It is of the single-circuit type, and is included to receive a voltmeter for checking the H.T. supply. Where H.T. accumulators are used it could also be used to connect a charger, provided that the plug were of suitable type, as described above.

It will be clear from the illustrations that the jacks are made for single-hole mounting; the mounting bush is usually about  $\frac{1}{4}$  in. in diameter. There are other types which resemble a tumbler switch in appearance, and these are intended principally for the connection of additional loudspeakers. They can be screwed to a door frame or skirting board.

### Multi-circuit Jacks

Although we have not dealt with them, there are various other patterns of more complicated jacks. These have multiple contacts, and are made so that the insertion of a standard plug opens some of the contacts and closes others. In consequence, they act as combined switches and jacks. They are not very often required and are not always easy to buy nowadays, although they are obtainable in all types from the Peto-Scott Company. One useful type has two make-and-break contacts in addition to contacts corresponding to those of the single-circuit jack. It can be used, for example, for including a pair of phones in the anode circuit of the detector or first L.F. valve and also to break the filament circuits of those valves not in use.

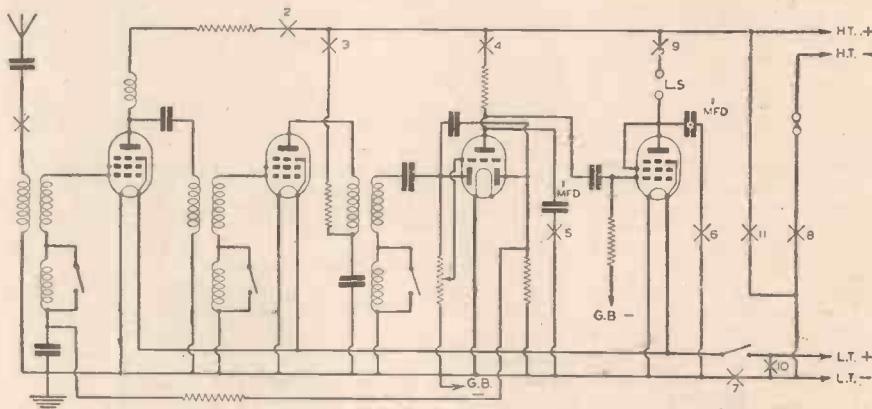


Fig. 4.—A simplified diagrammatic skeleton circuit used to show some of the points at which jacks can conveniently be included.

## IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, April 12th.—Hooray for What, fourth anthology of American humour.

Thursday, April 13th.—Lucky Dip, 12th edition, a weekly entertainment.

Friday, April 14th.—Symphony Concert.

Saturday, April 15th.—International Soccer : England v. Scotland, from Glasgow.

### REGIONAL (342.1 m.)

Wednesday, April 12th.—The Girl Friend, a musical comedy, from Midland.

Thursday, April 13th.—Old Chiselback, feature programme from West.

Friday, April 14th.—Gang Show, comedy production.

Saturday, April 15th.—Visit of The B.B.C. Symphony Orchestra to Bristol : Concert in Colston Hall.

### MIDLAND (297.2 m.)

Wednesday, April 12th.—The Girl Friend, a musical comedy.

Thursday, April 13th.—Instrumental programme.

Friday, April 14th.—Midland Magazine for April.

Saturday, April 15th.—John Clare, a radio play on the life of the Northampton Peasant Poet.

### WEST OF ENGLAND (285.7 m.)

Wednesday, April 12th.—The Blackmore Vale Point-to-Point, a recorded commentary.

Thursday, April 13th.—Old Chiselback, feature programme.

Friday, April 14th.—Mixed Manuals : organ recital from the Guildhall, Southampton.

Saturday, April 15th.—Visit of The B.B.C. Symphony Orchestra to Bristol : Concert in Colston Hall.

### WELSH (373.1 m.)

Wednesday, April 12th.—Old and New Houses, a talk for women in Welsh.

Thursday, April 13th.—"Join In," a programme of popular choruses.

Friday, April 14th.—Henry Richard, a dramatic feature.

Saturday, April 15th.—The Black Pig, a programme about the popular old song.

### NORTHERN (449.1 m.)

Wednesday, April 12th.—Variety from Her Majesty's Theatre, Carlisle.

Thursday, April 13th.—Swaledale : a sketch of changing times.

Friday, April 14th.—Rag-Bag : a mixture of nonsense, songs, burlesque and more nonsense.

Saturday, April 15th.—Fell Top, a radio play adapted for the microphone by Patrick Campbell and Winifred E. Watson from the novel, "Fell Top," by Winifred E. Watson.

### SCOTTISH (391.1 m.)

Wednesday, April 12th.—Variety programme.

Thursday, April 13th.—Rigoletto, Act 2 of Verdi's opera : The Royal Carl Rosa Opera Company from the King's Theatre, Glasgow.

Friday, April 14th.—Gaelic Concert.

Saturday, April 15th.—Scottish Dance music.

### NORTHERN IRELAND (307.8 m.)

Wednesday, April 12th.—Point-to-Point : The Leeman Chase, a commentary at the Meeting of the Tynan and Armagh Hunt, from Farmacaffley, Armagh.

Thursday, April 13th.—Piping, Fiddling, and Singing programme.

Friday, April 14th.—Instrumental programme.

Saturday, April 15th.—Orchestral Concert (in co-operation with Belfast City Y.M.C.A.), from the Wellington Hall, Belfast.

## BACK TO THE SEASIDE

**B**RADCASTS from seaside resorts are beginning to come back into the Northern programmes in full force. On Friday evening, April 14th, a programme from Reginald Stead and his Orchestra, at the Spa, Scarborough, will be followed by a forty-minute O.B. tour of some of Blackpool's entertainments. (This will be on main Regional as well as Northern.) 'Here We Are Again!' is the title of the Blackpool broadcast, which will include visits by microphone to the Tower Ballroom, to hear Larry Brennan and his band, and Reginald Dixon at the organ ; to the Palace Theatre, for an excerpt from the variety programme there ; and to the South Pier, from which listeners will hear something of the show "Crazy People." Victor Smythe is arranging the programme, which will have lyrics specially written by Frank A. Terry. John Woods-Smith will be the entertainer-compere.

# Experiments with a Triode-Pentode

MULTI-GRID valves, whilst designed for specific purposes, such as frequency changing, improved a.v.o. etc., can also be used, with advantage, in certain instances for "straight" circuits in broadcast and short-wave receiver designs. As the triode-pentode type has interesting possibilities in this respect, particularly from the point of view of the short-wave enthusiast, it is proposed to outline a few interesting adaptations.

As will be apparent from its designation, this valve comprises an H.F. pentode with variable-mu characteristics, and an independent triode, this triode being, in the

## Some of the Advantages of this Type of Multi-grid Valve are Explained in this Article

adjustment, or alternatively, but on lower frequencies, using the pentode as a high-gain leaky-grid detector, and the triode as the pre-amplifier.

The merits of an untuned H.F. stage are now fairly generally understood, and in the use of a triode-pentode, with the pentode

acting as the untuned or tuned pre-amplifier, the outstanding advantage lies in the permissible gain control, owing to its variable-mu characteristics, this being carried out in the usual manner by applying bias through a potentiometer.

Generally, it is preferable to use the triode as the leaky-grid detector, as shown in the circuit diagram, Fig. 1, the gain to be expected in reversing the circuit arrangement, by commissioning the triode for the untuned stage, and the pentode as the detector, being, to quite an appreciable extent, counteracted by the extra wiring losses, and leakage introduced by the bias potentiometer, particularly as the frequency range increases.

### Zero Bias

There is, however, the alternative method provided by working at zero bias, and so doing away with the potentiometer wiring, but obviously here the desirable gain control is lost, and the advantages are reduced, whilst the detector cannot be expected to have the same degree of efficiency as even a straightforward standard triode in this position.

Now with regard to the circuit mentioned (Fig. 1). In this arrangement an intermediate untuned stage is employed, the tuned S.G. stage being used to determine correct resonance with any type of aerial, so acting as an acceptor amplifier circuit.

This sequence is recommended for operation down to 10 metres, and whilst home-constructed coils can quite satisfactorily be employed, commercial products are advisable, and the type shown in the

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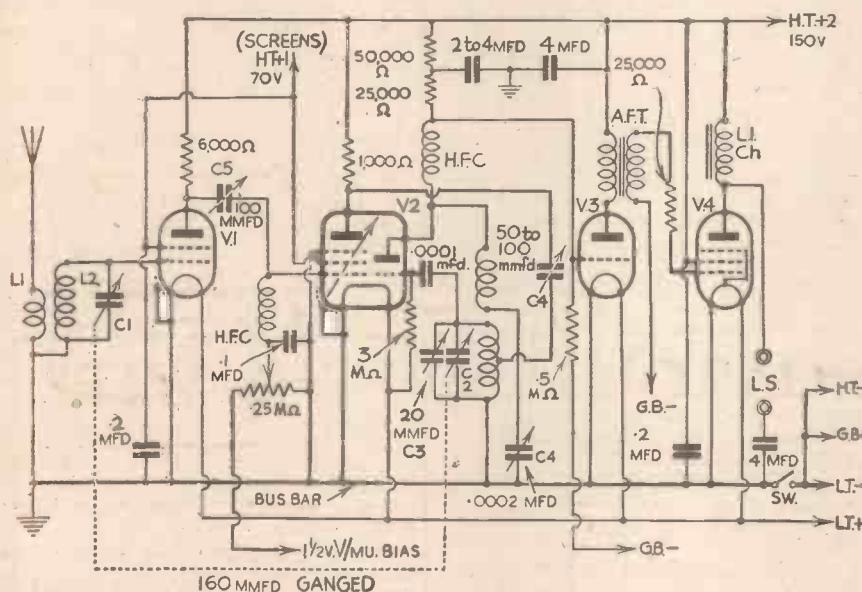


Fig. 1.—A suggested 4-valver built round the triode-pentode as H.F. and detector stage.

case of the T.P.230, which was used as a basis for the following observations, of the midget type, incorporated with the pentode assembly.

Whilst a common heater serves both pentode and triode, it is the fact that these sections can be safely used in absolutely independent circuits without fear of interaction, that this valve can be made to fulfil electrical and constructional requirements where standard counterparts would involve the necessity for extra space, apart from the increased cost.

From the short-wave aspect, shorter wiring, reduced input grid admittance capacity, and therefore lower tendency to precipitated conditions such as frequency drift are possible, and it is with this latter consideration that we are concerned here.

### Midget Valves

The "X" series of midget (Hivac) valves are well acknowledged for their sensitivity at very high frequencies, and as such, the triode section of the T.P.230 can very favourably be employed in most regenerative circuits above approximately 4 metres, using the pentode as either a tuned or untuned pre-amplifier, with variable gain

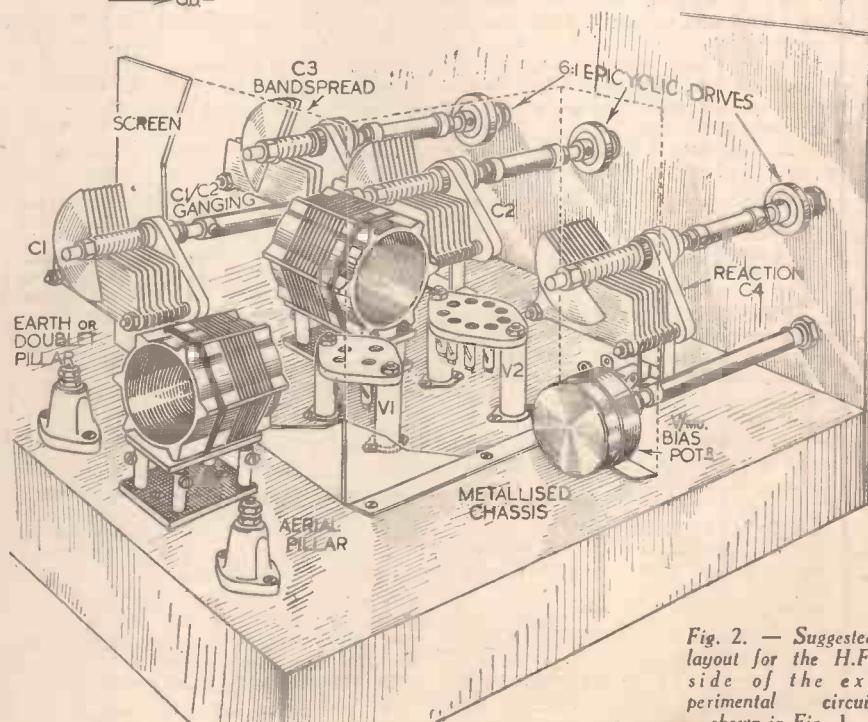


Fig. 2.—Suggested layout for the H.F. side of the experimental circuit shown in Fig. 1.

## EXPERIMENTS WITH A TRIODE-PENTODE

(Continued from previous page)

pictorial lay-out in Fig. 2 are from the Bulgin range, list numbers S.W.2, 3 and 4 covering 10 to 25 metres, 20 to 50 metres, and 30 to 80 metres, respectively.

The condensers C1 and C2 can be ganged, the bandspreader condenser C3 being connected across C2, instead of C1, as is the conventional method. It will be preferable to use a standard type S.G. valve with the anode brought out to the top cap, as owing to the control grid of the pentode being brought out to the top cap of the triode-pentode valve V2, this permits a very short connection through the condenser C4 to be made. As this point is not illustrated it will be as well to explain exactly how best this connection can be arranged. The pre-set condenser C4 should be of the ceramic type, which is provided with solder tags for direct support in the wiring, and it will be found advantageous, both from this point of view and electrically, to use a midget type ceramic of the Clix

Raymart type C.H.P. can be wired directly from the "grid" cap side of this coupling to the wiper contact of the bias potentiometer.

### Voltage Drop

No appreciable advantage will be served in fitting an H.F. choke in the S.G. anode circuit, and a resistance should be substituted as shown, in this case being calculated to drop the applied voltage down to 120 volts, with a commoned screen to the pentode for 70 volts.

The detector portion of V2 requires approximately 75 volts, but this can be varied in the case of home-constructed coils to adjust the reaction to as smooth a control as possible.

Component layout is, it will be noticed, considerably facilitated by the use of the triode-pentode in this manner, but when wiring up this valve the desirability of using reasonably heavy gauge tinned copper wire should be borne in mind, insulating right up to the points of connection with systoflex.

It will be seen that the V1 and V2 valve holders are of the ceramic type, and mounted on stand-off insulators of the Eddystone type No. 1,029, in this way helping still further in the attainment of short, direct wiring, as just mentioned, whilst any modification of adjustments during the experimental stages or at a later date, can be carried out quite easily.

Whilst a direct aerial and earthing system is indicated in the circuit diagram and pictorial layout, it will, however, be apparent that a dipole or doublet type aerial input will quite considerably improve the performance of the receiver, and such a modification can be carried out by removing the strap connection "X" and returning the earth end of L2 to earth.

The audio-frequency side of the receiver, so far as the lay-out is concerned, should offer few difficulties if this is wired up "under-chassis" and located conveniently near to permit reasonably short connections, the transformer being mounted above chassis, but well away to obviate inductive coupling with the H.F. section.

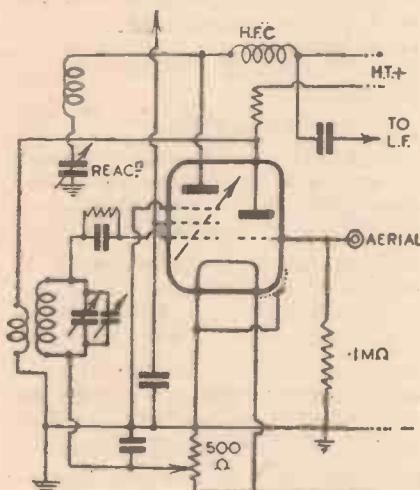


Fig. 3.—An H.F. and detector stage using a triode-pentode. The H.F. stage is untuned.

range of 50 mmfd.s. capacity, with a parallel fixed condenser of 50 mmfd.s. These two condensers should be soldered securely to two suitable and short lengths of 16 S.W.G. tinned copper wire, to the other ends of which have been soldered the top cap connectors.

The H.F.C., which should be of the

### Screening

The screening between the S.G. section and the T.P. section should be carried out with a single unbroken sheet of metal: copper or aluminium will serve here, and there is just one further point concerning this part of the construction. The method of mounting the condenser C1 on this

screen will cause a very slight increase in the minimum capacity setting of this condenser, dependent, of course, on the proximity of the fixed vanes to the screen, but this condition will not upset the ganging appreciably, as the bandspread condenser C3 counteracts this small value.

If care is taken in the preliminary laying-out, and, most important of all, the soldering, some really good D.X. work should be anticipated with this design. An alternative arrangement which will provide interesting comparative data is seen in the circuit diagram in Fig. 3, which shows the pentode of the T.P. being used as a leaky-grid detector with the triode as an untuned stage.

### S.W. Adapter

This arrangement can be used as a serviceable short-wave adapter, and as little space would be required for a simple unit of this nature, it would prove quite worth while as an additional unit to the receiver in question, purely from the "stand by" point of view.

Fig. 4 details the connections for the triode-pentode valve, and these are shown looking at the base of the valve, not on the top of the valveholder.

In midget receiver construction the T.P. can often be used in the above manner, where room will not permit either another

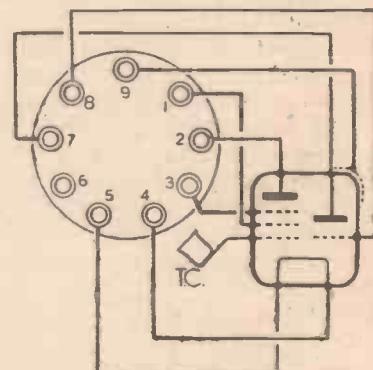


Fig. 4.—Pin connection data for the triode-pentode.

midget or a standard-sized valve to be used; whilst on the other hand, that little extra "punch" can be had by modifying the original pentode wiring, where possible, and introducing an extra stage of either H.F. or L.F. amplification, using the space saved in the employment of the triode-pentode.

### "One Night of Love"

WE understand that with the permission of the Columbia Picture Corporation, Ltd., the famous musical film, "One Night of Love," in which Grace Moore achieved stardom, is to be adapted for radio and produced by Douglas Moodie on April 25th and 26th.

For more than two years Douglas Moodie has been persistently negotiating with the film company for the necessary consent; as the producer responsible for the series of radio versions of big sound-film successes, he regards "One Night of Love" as ideally suitable for re-creation in broadcasting studios.

### Curtailment of Amateur Activities!

ACCORDING to the *Journal des Télécommunications* issued at Berne (Switzerland) the following countries have

## ITEMS OF INTEREST

notified their opposition to the exchange of private communications between experimental amateur transmitters of foreign countries and their own: Aegean Islands (Italy), Spain, including Canary Isles and possessions in Northern Africa, Finland, Iran, Iraq, Italy, Republic of Liban, Madagascar, Spanish Morocco, New Zealand (?), Siam, Syria, Tangiers, in respect of its Spanish portion, Czechoslovakia, Tonga, and Turkey. The list, however, is incomplete as it is stated that no reply has yet been received from Albania, Bulgaria, China, Egypt, Rumania, and Yugoslavia, but in these circumstances it is presumed that amateurs are authorised to communicate with experimental transmitters in these countries.

### B.B.C. Symphony Orchestra at Wolverhampton

THE programme of the concert to be given by the B.B.C. Symphony Orchestra, under its conductor, Sir Adrian Boult, in the Civic Hall, Wolverhampton, on Wednesday, April 19th, at 8 p.m., will be as follows: Overture, "The Bartered Bride" (Smetana); Symphony No. 2 in E flat (Elgar); Concerto in B minor, for four solo violins and strings (Vivaldi); "Prelude à l'Après-Midi d'un Faune" (Debussy); and "Menuet des Follets," "Danse des Sylphes" and "Marche Hongroise," from "The Damnation of Faust" (Berlioz).

The four solo violin parts in the Vivaldi Concerto will be played by Paul Beard (leader of the orchestra), Marie Wilson (second-leader), Barry Squire, and Julius Ungerson. This will be the orchestra's first visit to Wolverhampton.

# ON YOUR WAVELENGTH

Bound Volumes of "Practical and Amateur Wireless"

THE publisher of this journal tells me that he has a very small number of bound volumes of PRACTICAL AND AMATEUR WIRELESS, volumes 1, 2, and 3, and he can supply them while the stocks last at 12s. 6d. each. These volumes are, of course, extremely rare, for the issues concerned have long since been out of print. In a few years' time such volumes will be quite unobtainable except at the prices usually obtained for rare books. If you are interested in reserving volumes of periodicals you should obtain one of these whilst they are available.

Personally, I always have volumes of the periodicals which I regularly take bound up. You know how easily loose issues become mislaid. A friend bobs round, and whilst he is waiting for you to shave he picks up an odd issue, and takes it away with him intending to return it. I have always been a rabid collector of technical books, for I consider the information which you get in any technical book is worth a hundred times the price charged. You cannot have too many technical books. The bound volumes of PRACTICAL AND AMATEUR WIRELESS are not only a complete record of the radio industry, but in themselves form an encyclopædia of all the technical aspects of radio and kindred subjects.

## In Times of War

AS I write these notes the war clouds are once again gathering and the Prime Minister is beginning to stiffen his upper lip. Radio will play an important part in any future war, and it is very necessary, therefore, that steps should be taken to ensure that the Government can keep in touch with the population. To this end the B.B.C. has propounded a scheme which will shortly be inaugurated. It is intended as an emergency precaution against the bombing of B.B.C. transmitters, and also against the possibility of jamming of radio messages by enemy radio stations.

Briefly the scheme is that telephone subscribers will be able to have radio on tap, and the Post Office will in the near future offer to telephone subscribers a loudspeaker which, when connected to the existing telephone



By Thermion

cable, will pick up four different stations, including the National and the Regional. The stations may be changed by pressing a button. Moreover, if you wish to use the telephone while the radio is on you will be able to do so. It is stated that the speakers will be available on hire, and later on the Post Office hopes to extend the service to those houses which are not at present equipped with telephones. In connection with this system the Post Office hopes to supply a nation-wide Government relay service to work in conjunction with private relay services. The Postmaster-General announces that all relay companies will have their licences extended for a further period of ten years on the condition that any company must announce such messages as are considered necessary by local police or A.R.P. authorities.

As an emergency precaution this scheme is sound; the only fear I have is that some future Government, anxious to throttle the freedom of the air as they now are to restrict the freedom of the Press, may see in this emergency scheme a ready-made means of ensuring, as they do in Germany, that the public only receives the views the Government thinks it should have. Such a system

will be an effective means of preventing people listening-in to foreign broadcasts. I think the Post Office should issue some assurances on this matter.

I do not know what will happen to private transmitters in the case of war, but I expect that amateur transmitters will agree to have their apparatus confiscated for the duration of the war. It was interesting during the last one to receive from fans in the Army, letters which showed that even under gun-fire their thoughts were still with their hobby. The letters instead of containing details of hell fire and battle, merely described what the writers hoped to do when they returned home. I hope, however, that the circumstances will not arise again, for the motto of the B.B.C. is "Nation Shall Speak Peace Unto Nation." Wireless, which should have been an emissary of peace, a veritable dove from the heavens, should not be used for purposes of war. It is the one means of overcoming the difficulties of speech and thought prescribed by the Tower of Babel. Too often nowadays the radio is used for propaganda purposes so that one nation can breathe hatred against another—and not only hatred but lies.

OO  
SILENCE



"I'll moo first, and then the cow will imitate me."

A war would undoubtedly retard the progress of television.

### An Appeal

ONE of my readers, J. E. R., of Glasgow, is lying ill in hospital, and, owing to force of circumstances is unable to follow his hobby. He requires an old 'phone set. If any of my readers have such a set perhaps they will drop me a note. Do not send it to me, however.

Whilst I am dealing with this question of appeals I do hope readers will forbear with me on this matter. Nearly every hospital is equipped with wireless, and I feel that those which are not should appeal locally for their aid, where individual circumstances can be investigated so that spurious requests from unscrupulous people are not supplied. Apart from this question, however, such appeals as I have published in the past have inevitably resulted in my receiving far more apparatus than I can accommodate in my office, and I simply have not the time to act as a disposal syndicate. Another result of these appeals is that I receive a crop of further appeals, and I hate to have to turn them down. My comments here apply also to requests for back issues which are out of print, and also old blueprints. In no case can I entertain requests for instruction books for old commercial receivers. If a reader is so misguided to buy a piece of secondhand junk from a dealer who has had it traded in on a part-exchange deal, he must go to that dealer for assistance.

### Stanford Robinson was Faust at Five

IT is some thirty-one years ago that the three-year-old son of a church organist in Yorkshire—a child with a cherubic face—sat beside his father on the organ stool and pulled out the pedal stops . . . They were the only ones he could reach, and then only by balancing, a little precariously, on the edge of the seat.

But this was birthday promotion from mere watching. It was, too, Stanford Robinson's first actual acquaintance with the art of music-making and, since he was destined to become, as Director of the B.B.C. Music Productions Section, one of the best-known conductors in this country when still a young man, there are many aspects of his early study that would have marked him a prodigy in any other age.

Yet his acute interest in music when he should have been playing with trains on the drawing-room carpet did not really surprise anyone. After all, his parents were musical enough.

## Notes from the Test Bench

### Top-cap Valves

A NUMBER of valves are now available with a top-cap connection, and several cases have come to our notice recently where due to misuse the lead from the internal electrode to the top cap has become broken. In most cases this is evident due to movement of the top cap itself, but one case recently occurred where the cap was not loose. In spite of this there was an internal disconnection and the receiver refused to work. External tests showed that H.T. and L.T. were in order, but no signals were obtainable. After various tests had been applied an anode-current test was taken and as the top cap was in this case the anode, the fault was revealed by the absence of anode current. Had the cap been a grid, of course, the fault would have been much more difficult to trace.

### Switch Contacts

A NUMBER of modern receivers incorporate a disc-type switch for wave-change purposes and these usually have a small metal inset on a rotating disc which runs beneath small projecting fingers. On most of these switches a lubricant is employed, and care should be taken to see that this does not come between the moving contact and the fingers. If, therefore, poor results are experienced and all other tests have failed to reveal the cause, it might be worth while to pay particular attention to the switches and see that the contacts are clean.

### Electrolytic Condensers

IT is important to remember that electrolytic condensers are polarised, that is, one connection is positive and one negative. In most receivers the chassis is connected to H.T. negative and most electrolytics in common use have a metal case intended for mounting direct on the chassis—in other words, the case is negative. There are condensers of this type, however, which have a positive case, and when substituting condensers of the electrolytic type care should be taken to obtain those of the correct polarity. When connecting tubular or other two-lead electrolytics the same care must be taken to connect them in the correct sense, as the negative side does not always go to earth.

### WIRELESS CONSTRUCTOR'S ENCYCLOPÆDIA

5/- or 5/6 by post from  
George Newnes, Ltd., Tower House, Southampton  
Street, Strand, London, W.C.2

Father and grandfather were organists and choirmasters, his mother a contralto. A successful pierrot troupe run by relatives and friends gave young Stanford his first taste of light entertainment when he was only four years of age.

In the average home there would not exactly be an excess of jubilation if father presented the family with the score of Gounod's "Faust," but it meant sheer ecstasy in the Robinson home. Hard work, too. Night after night father and son persevered with the work till they knew it by heart; Senior singing the parts in the bass clef and Junior those taking in the treble—Faust included, of course. The fact that Stanford became so frightened of Mephistopheles that he was apprehensive of meeting him in dark corners has nothing to do with the story, unless it underlines those early endeavours to interpret a work as the composer himself might have wished.

"Elijah" and "The Messiah" were similarly memorised during the next two years, and Stanford and a cousin still found time to give frequent concerts in the family circle, from a repertoire that included sketches and "pop" numbers as well as highbrow pieces.

After the family had moved south, Stanford Robinson went to school in North London; but when he was fifteen years of age the headmaster, who preferred mathematics to music, gave him the choice of the two—the mathematics at school or the music out of it. He chose his music, and got successive jobs as pianist in cinemas, hotel grill rooms and restaurants. The meagre proceeds at least provided the wherewithal for private study and the opportunity to form an amateur orchestra. It met regularly every week at his parent's house, where his mother gave the players—none of them was less than ten years older than Stanford—home-made pies and coffee at the end of rehearsals.

Now, in these last ten years Stanford Robinson has superimposed on this background the results of an intensive study of stage and radio opera, both at home and on the Continent. To see him conduct at rehearsals of a typical two-hour studio opera broadcast is akin to watching the discovery of some treasure in ground that has already been exhaustively explored; not because there is anything freakish about his interpretations, but because he has made it his business to know precisely the composer's wishes and instructions and sees that they are carried out. It is perhaps a little curious that by doing so his performances are subtly individual in character.



# SHORT-WAVE SECTION

## COUPLINGS FOR SHORT-WAVE DOUBLET AERIALS

Practical Points to be Considered in Order to Ensure Optimum Results.

By A. W. Mann

BY using a good aerial in conjunction with a well designed short-wave receiver, the possibilities of worthwhile DX are increased.

There is, however, a link in the chain often overlooked by users of home-constructed receivers, i.e., efficient coupling between the aerial and the receiver.

Fig. 1 shows the half-wave doublet type aerial as favoured by some enthusiasts and which may be described briefly as two flat top sections complete with transposed non-radiating feederlines. As the fundamentals, advantages, and limitations of this type of aerial are understood and have been described in previous articles, this discussion will be confined to coupling as applied to home-constructed receivers of experimental design.

If a census of receivers as used by short-wave experimenters were possible, it is probable that simple regenerative types would be in the majority, followed by various high-frequency types.

### Regenerative Circuit

Fig. 2 shows in theoretical form a regenerative circuit in which six-pin coils are incorporated, and the necessary modification in order that a doublet aerial can be used.

This is a very simple method as the primary or aperiodic winding is used to provide inductive coupling between the doublet aerial and the receiver grid coil.

In some instances four-pin coils are used, and consequently a different arrangement is necessary to achieve the same purpose.

### Doublet-coupling

Fig. 3 shows a method of doublet-coupling for use in conjunction with four-pin coils. This consists of a short length of Paxolin former, or tube, about  $\frac{1}{16}$  in. less in outside diameter than the inside diameter of a standard coil former.

An ebonite disc is fitted with two banana plug sockets, this disc being in turn fitted

inside the former. Cork or rubber distance pieces, or spacers, of small diameter are glued to the outside of the former as shown at X. These should be of sufficient length to allow the coupler former to be inserted inside the standard coil former to make a sliding fit, which will allow the

requirements, and any fine gauge wire can be used such as 28 gauge D.C.C.

A coil to cover the 160-metres band, however, will require from twelve to sixteen turns. Much depends on the type of coil used in the receiver, and cut-and-try methods are advisable.

This single winding coil is wound  $\frac{1}{16}$  in. from the bottom of the coupler former, and the ends are taken to the sockets in the top disc, A and B.

Banana plugs are fitted to the twin transmission line which, in turn, are coupled via the sockets A and B to the coupler.

The complete coupler is now fitted inside the receiver coil former, as shown at Fig. 5. Thus we have inductive coupling between the aerial and grid coil of the receiver, and in addition, an adjustable primary which enables us to increase or decrease the coupling between the receiver and the aerial within defined limits at will.

### Improving Selectivity

The greater the distance between the primary coil and the grid coil, the greater the selectivity and sensitivity, within limits, in the way of usable selectivity.

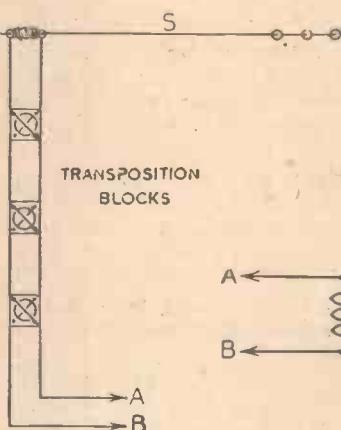


Fig. 1.—A half-wave doublet aerial.

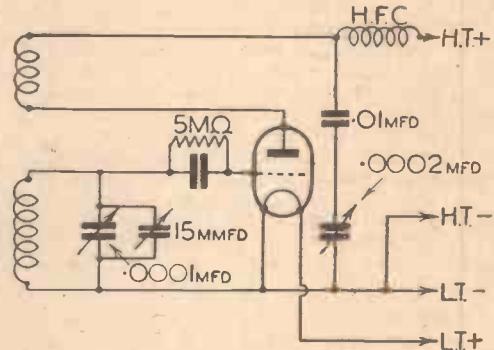


Fig. 2.—Circuit of a regenerative one valver.

coupler to be lifted or lowered at will with ease, and to retain any desired position within the limits of travel. Too tight a fit will require undue force to alter adjustment, and will fracture and break the ceramic coil former.

If four coils are used to cover a series of tuning ranges four units as outlined should be made.

### Coil Windings

Next comes the winding of the single coil, as shown, the number of turns, however, should be found by experiment. Two, three, four, and five turns will cover most

The closer the two windings the greater the volume, and the lower the selectivity and sensitivity.

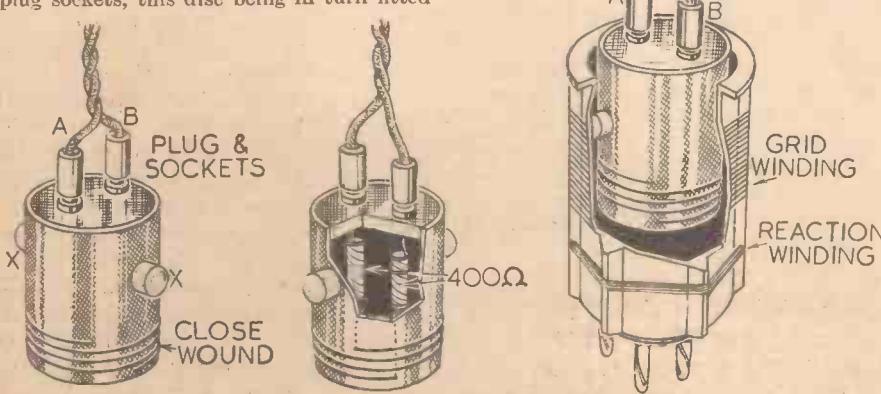
In the desire for improved selectivity it should not be forgotten that a compromise between volume and sharper tuning is desirable, as by endeavouring to increase the selectivity by means of excessive slackness of coupling, this will drastically reduce volume, and the application of reaction in an endeavour to boost up the signal will result in an increase in the noise level which will entirely override the signal.

Passing to Fig. 4, we have another arrangement which is slightly different, as two 400-ohm resistors are fitted inside the former and in series with the coil, as shown at Fig. 6 in theoretical form. Reverting to Fig. 4, this sketch gives a cut-away view, and shows the resistors in place. They must, of course, be of small physical dimensions in order to make possible this method of internal mounting.

Spacers as shown at Fig. 3 X and X are fitted, and the coupler is used inside the receiver coil in the same way as the coupler previously described.

This arrangement is particularly applicable for use in conjunction with T.R.F. receivers, and by its use it is possible to obtain selectivity approaching super-heterodyne standards and, as in the previous example, any degree of coupling within limits. In this instance the coupler is inserted inside the first H.F. stage coil. It should be understood, however, that whilst this method correctly applied will prove very satisfactory, it requires a little patient experiment in order to strike a

(Continued overleaf)



Figs. 3, 4 and 5.—Suggestions for coupling various aerials to standard short-wave coils.

**SHORT-WAVE SECTION**

(Continued from previous page)

compromise between selectivity and volume, and to avoid tricky operation and high noise level.

In using couplers of this type every precaution should be taken to avoid the breaking of the internal wiring of the coils. With this in view the coupler former can be marked, and accidents thus avoided.

**U.S.W. Doublets**

Next for consideration is the coupling of ultra-short-wave doublets and receivers. Fig. 7 shows an ultra-short-wave doublet with twisted flex transmission line.

Here the three coil inductive coupling system can be used to advantage, C being the coupling coil, G the grid, and R the reaction coil respectively (see Fig. 8).

In ultra-short-wave experiments, the diameter of coils, turns spacing and the distance between coil windings are matters of importance and experiment in themselves. There is also considerable scope for experiment with aerial coupling arrangements in this field. For example, present day ultra-short-wave coils are in many instances separate and self-supporting coil units. In these respects they are similar to early type short-wave coils.

Whilst those early coils had certain disadvantages, and lacked the efficiency and small magnetic field of modern coils, they offered one advantage in that the aperiodic coupling between the primary and grid coil was adjustable, and variations in coupling could be carried out by means of an adjustable coil holder, removing a coil-base holding down screw, and setting the latter at an angle to the grid coil base, etc.

The Dimic type, for example, had a swinging base which enabled the coil to be swung within certain limits across the grid-coil face. Thus sensitivity and selectivity could be varied at will.

In addition, dead spots could be removed.

**Semi-adjustable Coupling**

Fig. 9 shows a method of construction which can be adopted by the experimenter to provide semi-adjustable coupling of the doublet-coupling coil in ultra-short-wave receivers.

The coil sockets are mounted on an ebonite base which in turn is fastened by a single screw to a short length of half-inch dowel, X.Y. Thus the coupling between this coil, and the grid coil, can be varied within limits, and the centre screw tightened to hold it in position. A piece of ebonite rod tapped to take a 2-BA bolt would be an even better arrangement.

Aerial coupling offers ample scope for

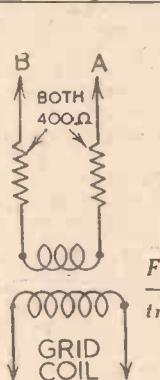


Fig. 6.—Theoretical form of the arrangement shown in Fig. 4.

Fig. 7 (above).—Twisted-flex transmission line.

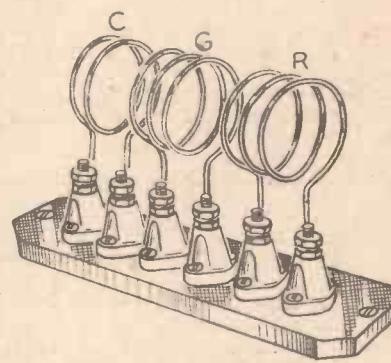


Fig. 8.—Mountings for coils such as are required in the circuit shown in Fig. 2.

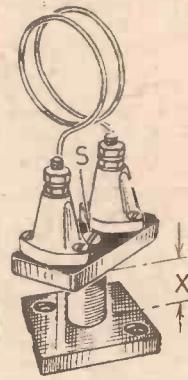


Fig. 9.—Variable coupling suggestion

indication as to the effect of coupling variations is possible, and leaves nothing in doubt.

**Final Hints**

In conclusion, just a few remarks which are applicable not only to doublet-type aerials, but to all types, whether home-constructed from sponsored data, or of commercial manufacture. It seems to be an all too common practice to cut, and alter here and there, and to introduce original ideas which lead to disappointment. An aerial system, no matter what type or design, should be erected as instructed and advised by the technical sponsor or manu-

facturer, and if home-made, should fully conform to accepted data and fundamentals. Recognition of these facts is a definite step towards satisfaction. This applies especially to cutting, and to the ignoring of height recommendations, two factors which are responsible for reduced pick up, and consequent unsatisfactory results.

channel is not the only one which will be used. Make a note of those on which experimental broadcasts are likely to be made: 19.84 m. (15.12 mc/s); 25.55 m. (11.74 mc/s); 31.27 m. (9.595 mc/s); 48.47 m. (6.19 mc/s).

**Norway on New Channels**

NORTH American listeners are now hearing tests made by Norway's super-power short-wave stations at Jelv towards the early morning hours. The transmitters are LCL on 28 m. (10.715 mc/s) and another broadcast on 31.22 m. (9.61 mc/s).

**FANTASY**

FEW people realise how seriously the theory of Rocket flight has been considered, and even tested, of recent years. Willy Ley, one of the world's most famous experts, contributes a fascinating forecast of the future of Interplanetary Flight in a new magazine called FANTASY, which has just been published.

Nearly 40 years ago, H. G. Wells wrote stories that were inspired dreams of the future, based on known scientific facts of their time. As we now know, many of the dreams have come true, and the fiction of yesterday has become the fact of to-day. Now other writers, in their turn, are trying to give us some glimpse of what the mystery of time has in store for us, and it is possible that men may achieve tomorrow what their imagination foresees to-day in the pages of FANTASY—the all-British counterpart of the "science fiction" magazines now sweeping America.

## Leaves from a Short-wave Log

**Proposed Short-wave Station at Seville**

A 40-KILOWATT transmitter is said to be in course of construction in the immediate neighbourhood of Seville (Spain); it will be entirely devoted to short-wave transmissions.

**Listen to Belgrade**

THE new 10-kilowatt transmitter which will eventually replace the one now in use at Belgrade (Yugoslavia), will carry out its first tests during the month of April. It will simultaneously broadcast programmes on channels comprised in the 19, 25 and 41-metre wave bands. At present, transmissions are made daily through YUA, Belgrade, on 49.18 m. (6.1 mc/s).

**Djibouti May Soon be in the Lime-light**

TWO new short-wave transmitters were recently officially inaugurated at Djibouti (French Somaliland); they are FZE, 49.83 m. (6.02 mc/s) and FZE9, 29.3 m. (10.24 mc/s).

**Chungking on Higher Frequency**

CHINESE musical programmes and news bulletins in German, French and English may now be heard daily from G.M.T. 22.00 from XGOA, Chungking (China) on 25.21 m. (11.9 mc/s).

**Good Signals from Treasure Island**

LISTENERS report that test broadcasts have already been heard from W6XBE, the General Electric Company's new transmitter installed on Treasure Island (San Francisco). The engineers are trying out the station with a continual repetition of the recording: Anchors Aweigh, between G.M.T. 01.00-03.00, and the call-sign is announced at intervals. The channel used is 15.33 mc/s (19.57 metres).

**Five New High-power Stations for Japan**

THE construction of five new short-wave stations is being put in hand, according to an advice from New York. The stations are JVW, 41.34 m. (7.527 mc/s); JVW2, 31.01 m. (9.675 mc/s); JVW3, 25.59 m. (11.725 mc/s), and JVW5, 16.83 m. (17.825 mc/s), all of a power of 10 kilowatts. In addition, JZM, a 50-kilowatt station, it is said, will work on 13.94 m. (21.52 mc/s).

**Radio Eireann on the Air**

THE Moydrum (Eire) short-wave transmitter is now carrying out tests on various channels. "This is the Eire short-wave station on 17.84 mc/s" was recently heard at G.M.T. 20.45, but the 16.82 m.

## A PAGE OF PRACTICAL HINTS

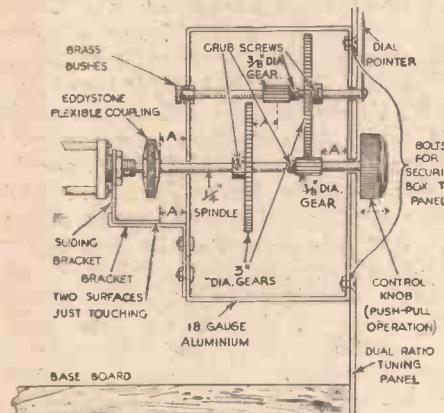
SUBMIT  
YOUR  
IDEA

# READERS' WRINKLES

THE  
HALF-  
GUINEA  
PAGE

## A Dual-ratio Tuning Control

REQUIRING a dual-ratio tuning control for my short-wave set I decided to construct one from odd parts, as shown in the accompanying sketch. The change



A dual-ratio tuning control made with odd parts.

of ratio is effected by pulling the knob out for quick tuning and pushing it in for fine adjustments. The gears were taken from a well-known constructional set, and details of assembly are clearly shown in the illustration.—C. KNOWLSON (90, Davidson Road, E. Croydon, Surrey).

## A Component Tester

THIS useful component tester is made from an old car ignition coil, trembler, and a fused 3.5 v. flash lamp bulb. The ignition coil, after the metal casing had been removed, was placed in a wooden box with the iron core of the coil projecting slightly through one end. Paraffin wax was then poured into the box until it surrounded the coil. A trembler was then fitted against the core of the coil, and the fused 3.5 volt bulb placed in the secondary winding together, and in series, with the test prods. The coil was then adjusted so that when a current was passing no spark jumped across the broken filament wire inside the bulb.

The tester is now ready for use, and when a component is placed across the test prods the bulb will be seen to glow with a blue light, after the manner of a neon lamp. All types of components can be tested in this way, including condensers, resistances, coils, chokes, and transformers as well as the filaments of lamps and valves.—J. J. HALLIDAY (Neasden).

## Winding Transformer Spools

HERE is a dodge for winding transformer spools. As it got rather tiresome after two or three hundred turns, I lifted off the turntable and then shaped a

## THAT DODGE OF YOURS!

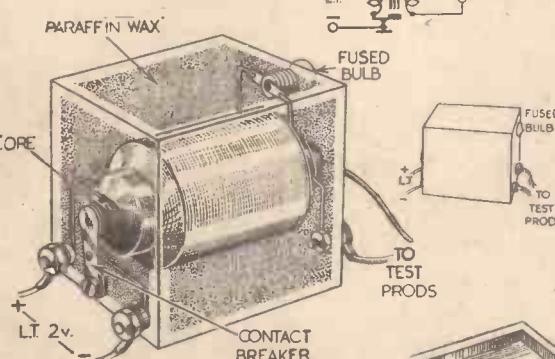
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account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

## SPECIAL NOTICE

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

piece of wood to the size of the cone of the transformer spool. The centre is drilled to make a tight fit on the gramophone-spindle. On a table close by is placed a board about 2 ft. long, on one end of which is mounted the spool of wire. On the other end an old condenser is fixed, the top of the moving vanes being covered with a piece of soft cloth or velvet. See that the vanes do not move too freely. The weight of the spool of wire itself is enough for a nice tension for fine wire.

Before starting to wind see that the motor runs to the regulator speed: 80 turns to the minute is about right. Move the condenser vanes as the spool fills.



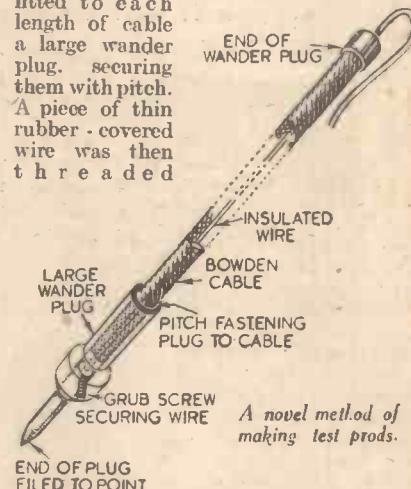
An old car ignition coil and trembler forms the basis for this component tester.

Allow one extra turn for every time you stop to insert insulation paper.—T. A. JONES (Liverpool).

## Handy Test Prods

THE accompanying sketch shows a simple but efficient test-prod, one of a pair I made

from parts found in the junk box. I obtained a piece of scrap Bowden brake cable, as used on cycles, and cut it into two equal lengths of about 7 ins. I then fitted to each length of cable a large wander plug, securing them with pitch. A piece of thin rubber-covered wire was then threaded



A novel method of making test prods.

through each "prod" and fastened by the small grub screw on the plug. The bakelite portion of a small wander plug is fitted on the other end of each "prod," and one of them is painted red and the other black. The end of each plug is filed to a point.—H. PRICE (Loughborough).

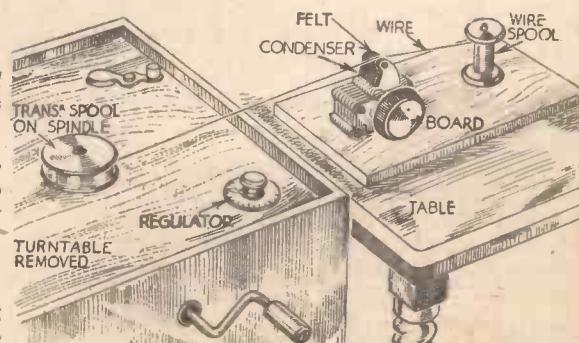
## WIRELESS TRANSMISSION FOR AMATEURS

Edited by F. J. CAMM.

Explaining how to Learn the Morse Code: Applying for a Licence: Building and Operating the Set. Illustrated by Many Practical Diagrams.

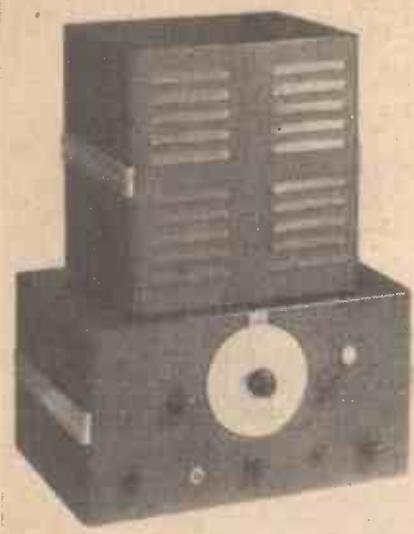
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A handy dodge for winding transformer spools.

AMATEUR transmitters who take their work seriously employ for reception purposes a multi-valve receiver which is built on lines rather different from those taken in a standard broadcast receiver. One of the first requirements of this type of receiver is a high degree of sensitivity, but it must also offer a very high degree of selectivity. But these two factors alone are not sufficient. Selectivity should be capable of variation over a fairly wide band; some means must be provided for the reception of C.W. signals; it is desirable that



This is the Premier Model 5V5, a 5-valve model costing £8 8s. complete with speaker.

A.V.C. should be incorporated to counteract fading, but means must be provided to cut out the A.V.C. action when searching for weak signals and when using the special circuit called for in a superhet for receiving C.W. There are also other factors which are called for in this type of receiver and consequently it is a specialised product which generally is not inexpensive. The American market has catered for this particular type of receiver for a considerable time, and many amateurs are using American apparatus owing to the failure of English manufacturers to produce similar equipment. The gap has now, however, been bridged, and receivers of this type, comparable with the original American models, are now available from such firms as Eddystone, Peto-Scott, Premier, etc. In our issue dated November 26th last we commenced constructional details of one of these receivers, employing nine valves, and this is available for those who wish to make their own apparatus.

# A REVIEW OF COM

## Eddystone Model E.C.R.

One of the best examples of the English receivers in this class is illustrated below, removed from its cabinet, and the external view may be seen at the top of the opposite page. This is the Eddystone model E.C.R., an A.C. mains model, incorporating ten valves (including rectifier) and designed with self-contained coils to tune from 9.5 to 190 metres. The cabinet measures 21in. long by 10in. high and is 10 $\frac{1}{2}$ in. from front to back, the total weight being 50lb. There is an H.F. stage preceding the mixer, and a separate oscillator stage is provided. The three tuned circuits are ganged and provided with electrical bandspread tuning, the control knob for the latter also operating a pointer on the large horizontal tuning scale which is provided. Both the main tuning and the bandspread tuning controls are in the form of weighted flywheels which greatly simplifies rapid and accurate tuning.

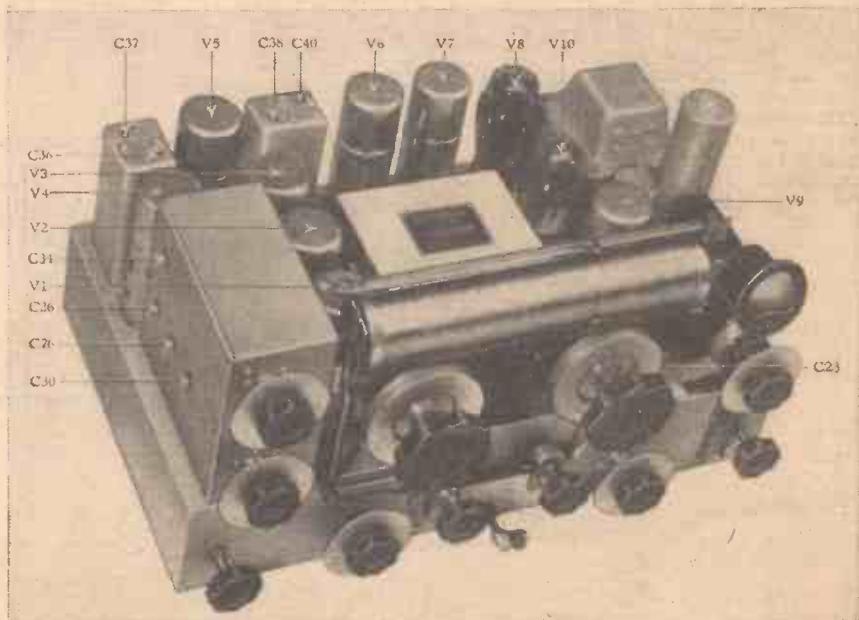
Following the mixer there are two I.F. stages operating at 465 kc/s, and these two stages utilise three I.F. transformers, a special crystal filter unit following the first transformer. This filter is provided with phasing and selectivity controls brought out to the panel and a switch to enable the crystal to be cut out when the

A Description of Some Well-  
Receivers of Specialised  
Apparatus of this Type, which  
will be Described in

highest selectivity is not required. Following the last I.F. is a double-diode, one diode providing demodulation (second detector) and the other giving A.V.C. when the A.V.C. switch is used to bring it into circuit. This switch also brings into action an H.F. manual volume control so that overloading of the H.F. and I.F. stages may be avoided. A triode amplifier follows this stage and an L.F. gain control in the form of a potentiometer feed to the grid is included to enable the signal strength passed to the output stage to be regulated. The output valve follows and a 'phone jack is included in the coupling between these stages, and insertion of the 'phone plug automatically silences the output valve. A separate beat-frequency oscillator stage is coupled back to the demodulator stage in the usual way, and this stage is silenced by means of a switch in the H.T. lead.

## Signal Strength Meter

A useful addition to the panel is the



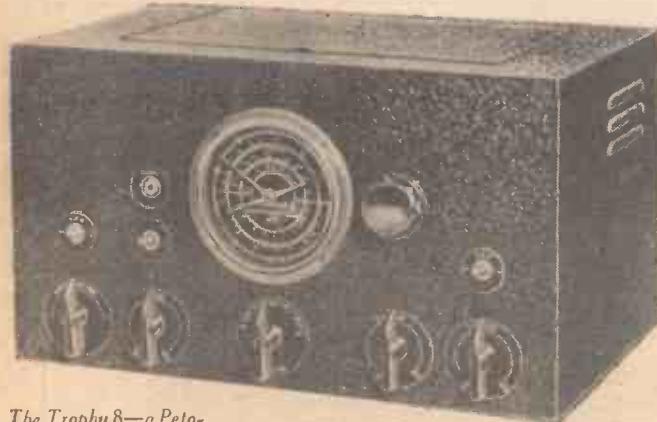
An inside view of the elaborate Eddystone Model E.C.R. This is a 10-valve receiver which costs £45 complete. The cabinet and controls may be seen at the top of the facing page.

# AMUNI-RECEIVERS

Known English Commercial Design. Popular American Ch is Available in England. Next Week's Issue

"R" meter, and this is only in action when the A.V.C. circuit is in operation. Signal strength is read by switching off the B.F.O. circuit and switching in the A.V.C. circuit. A refinement which is often found of the greatest value is a noise-limiting circuit, brought into operation by means of a switch at the back of the receiver. This noise-limiter produces no losses when in circuit and therefore it may be left in action. This model costs £45, including the speaker, which is a separate unit.

Another Eddystone model is the L.P.C., an 8-valve battery model. This incorporates an H.F. stage, mixer with separate oscillator, two stages of I.F. amplification at 465 kc/s, double-diode-triode for A.V.C. and demodulation, L.F. amplifier and a beam power tetrode, with the usual B.F. oscillator. Tuning in this re-

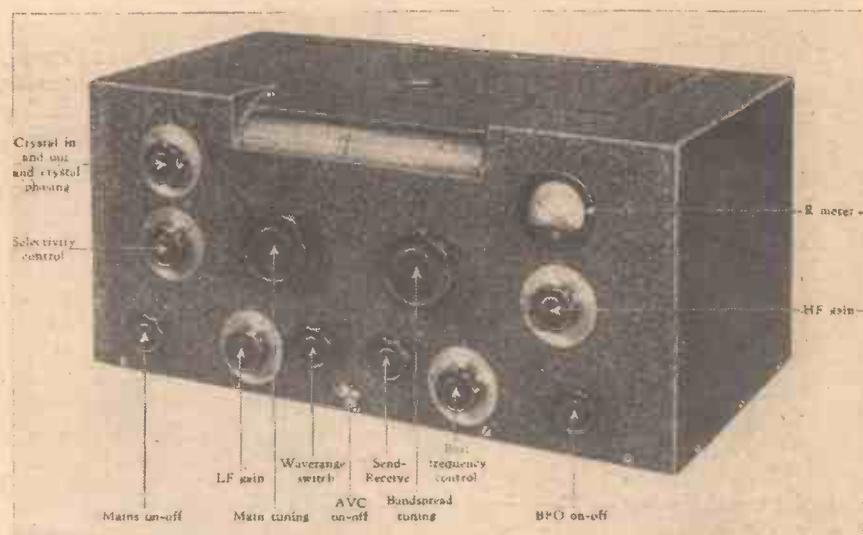


The Trophy 8—a Peto-Scott product. This has a mechanical band spread dial, and costs 12 gns. A suitable speaker may be obtained to match for 2 gns.

ceiver is also provided by means of a flywheel control, and interchangeable coil blocks in die-cast screening boxes are provided for each waverange. There are five such blocks covering from 13.6 to 665 metres. Controls are for tuning, oscillator vernier, H.F. gain, L.F. gain and beat frequency control. Telephone terminals and a telephone jack are provided with an on-off switch on the side of the die-cast aluminium-silicon

alloy chassis. The H.T. current consumption of this model is 16 mA at 135 volts, and the L.T. consumption

frequency oscillator, I.F. and output tetrode stages, with a full-wave rectifier. The I.F. transformers are of the iron-cored type, and the coils are of the litz-wound high "Q" type. A special aerial matching control is provided, with the usual 'phone jack, A.V.C. switch and send-receive



The controls of the Eddystone E.C.R. Two pointers are provided on the dial so that band-spreading may be accurately carried out.

is .9 amps. at 2 volts. The dial is calibrated in kilocycles for five ranges and also in degrees. The price is also £45 complete.

In the 1939 edition of the Eddystone Shortwave Manual, which costs 1s., constructional details of a mains-operated 9-valve receiver of similar type will be found, complete with coil-winding data. In this receiver an I.F. of 1,600 kc/s is employed.

## Premier Model 5V5

The receiver in the first column is produced by the Premier Supply Stores, and is a 5-valve A.C. model covering from 12 to 2,000 metres, with individual coils for each of 5 bands. A separate band-spread condenser is provided, with a 2-speed drive giving direct and a 100:1 reduction. American valves are used in a combination incorporating a triode-hexode frequency changer, I.F. amplifier, demodulator, beat-fre-

switch. The latter, which is incorporated in most modern receivers of this type, merely breaks the H.T. supply (a simple on/off switch in the H.T. negative lead) so that the set may be switched off when going over to the transmitter, and it may then be brought into use instantly by operating this switch, thus avoiding the need of waiting whilst the valves heat up.

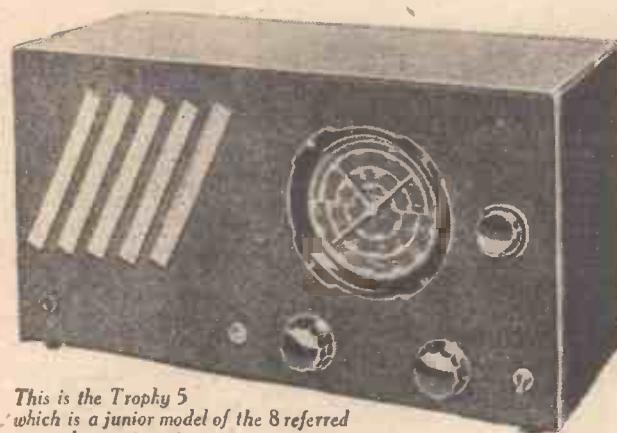
In many receivers the speaker is included as part of the complete layout, although this may give rise to troubles from feed-back effects. To avoid this, a number of the models are made as complete receiver units only, and the speaker is included as a separate unit. In this Premier model the speaker is housed in a separate steel case, designed to match the receiver cabinet, and this is included in the price of £8 8s. The speaker may be seen in the illustration standing on the receiver.

## Peto-Scott

The most popular receivers of this type in the Peto-Scott range are known as the Trophy models, available in a 5, 6 and 8 valve combination. The Trophy V utilises a triode-hexode as frequency changer, a triode-pentode as I.F. and B.F.O., a double-diode-triode as demodulator, A.V.C. and

first L.F. and a pentode output stage. A full-wave rectifier is included in the mains section. Tuning is carried out by a self-contained coil unit covering the band from 10 to 550 metres and a mechanical bandspread device is provided. This is of the two-pointer type giving an equivalent scale length of 8ft. The circular dial is engraved in metres and kilocycles. An A.V.C. switch, B.F.O. switch and headphone

9 $\frac{1}{2}$ in. by 6in. deep, and the speaker is an 8in. permanent magnet unit with reinforced diaphragm. A matching transformer is provided and the quality of reproduction is maintained at a high level by lining the cabinet with Celotex. The speaker costs 2 guineas. The price of the receiver is 12 guineas (exclusive of the speaker) and the set is housed in a black-crackle finished steel chassis 17 $\frac{1}{4}$ in. by 9 $\frac{1}{2}$ in. by 12in. deep.



*This is the Trophy 5 which is a junior model of the 8 referred to on the previous page.*

jack complete the panel lay-out. The cabinet is of steel, in black crackle finish, and measures 17in. by 9in. by 8 $\frac{1}{2}$ in. deep. This model costs £9.

The Trophy 8 is a more comprehensive model in which there is an H.F. stage, heptode mixer with separate triode oscillator, I.F. stage, double-diode-triode and pentode output stage, a pentode being used for the B.F. oscillator. A full-wave rectifier is also employed in the mains section of this model. Self-contained coils cover the range from 7 to 550 metres in five bands and tuning is also carried out in this model by means of the mechanical band spread condenser drive. The I.F. transformers are of the iron-core type, and there is the usual A.V.C. and B.F.O. switch. The latter, in this particular model, is in the form of a short-circuiting switch across the oscillator coil, instead of being in the H.T. lead as in most cases. The 'phone jack is in the output circuit, whilst the L.F. gain control consists of the usual variable grid leak in the input circuit. A refinement in this model is a tone-control in the grid circuit of the output valve. The standard send-receive (H.T.-) switch is fitted and may be seen in the illustration immediately below the 'phone jack.

A separate speaker is required for this model, the output sockets providing for a high-impedance model. A small model is available from Peto-Scott in a metal cabinet finished in the same manner as the receiver cabinet. The overall size is 9 $\frac{1}{2}$ in. by

9 $\frac{1}{2}$ in. by 6in. deep, and the speaker is an 8in. permanent magnet unit with reinforced diaphragm. A matching transformer is provided and the quality of reproduction is maintained at a high level by lining the cabinet with Celotex. The speaker costs 2 guineas. The price of the receiver is 12 guineas (exclusive of the speaker) and the set is housed in a black-crackle finished steel chassis 17 $\frac{1}{4}$ in. by 9 $\frac{1}{2}$ in. by 12in. deep.

Another model of interest in the Peto-Scott range is a dual-purpose set tuning from 10 to 2,000 metres with a self-contained coil unit, and fitted with a large rectangular dial calibrated in wavelengths and with station names. The valve combination is H.F. pentode as H.F. amplifier, a triode-hexode as frequency-changer, H.F. pentode as I.F. amplifier, triode as B.F. oscillator, and double-diode-pentode for A.V.C., demodulation and output stage. The mains section includes a full-wave rectifier. The controls include A.V.C. switch, tone, H.F. and L.F. gain, and send-receive in addition to the usual tuning control. Di-pole aerial connections are provided on the input side, and for the use of 'phones a jack is included. The cabinet, in black crackle, incorporates also the loud speaker, and this particular receiver costs only 10 guineas.

#### A Transceiver

Although not in the same class of receivers we

might mention *A new arrival on the English market—Hamrad's model L39. This is a 12-valve, 12-waveband receiver costing £25.*

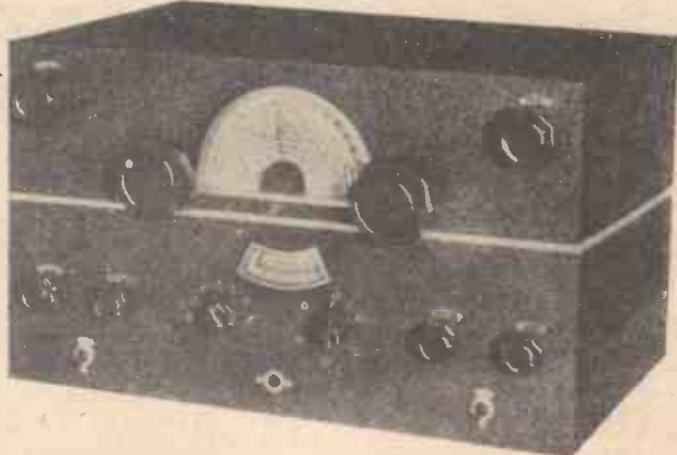
that Messrs. Peto-Scott can also supply a 5-metre transceiver, of the 2-valve battery-operated type. In this the first valve functions as a super-regenerative detector and the second as L.F. amplifier in the receiving condition, and when switched over to transmit the two valves operate as modulator and oscillator respectively. The effective range is 3 miles with a 12ft. aerial. The price of this is 11 guineas complete, and the weight, with batteries,

is 21lb. A strong carrying case is provided measuring 10 $\frac{1}{2}$ in. by 7 $\frac{1}{2}$ in. by 8 $\frac{1}{2}$ in., and this houses all batteries and 'phones.

#### Hamrad Model L39

The remaining English model to be reviewed, and illustrated below, is the new Hamrad L39, a 12-valve receiver which has just been produced. This incorporates a number of novel features, and the panel controls include, in addition to main tuning and bandspread, H.F. and L.F. gain, tone, B.F.O. pitch, crystal and phasing controls, with B.F.O. and A.V.C. on/off switches, send-receive switch and wave-range selector. The 12 valves include the latest television Ratheon 1851 acting as H.F. on all bands. The mixer circuit is of entirely new design and incorporates a separate oscillator stage. There are two I.F. stages with crystal gate, a diode demodulator, an A.V.C. amplifier, a beat-frequency oscillator, an "R" meter amplifier, and two L.F. stages delivering an output of 4 watts. The R meter scale may be seen below the main tuning dial.

Tuning is split up into 12 bands, the usual amateur 10, 20, 40, 80 and 160 metre ranges, plus seven further bands from 9.5 to 500 metres. The selector switch, when set to normal, enables the receiver to be tuned continuously over this band, but



when set to any of the amateur band indications the amateur band in question is spread exactly over the tuning dial, thus overcoming bandspread difficulties. Eighteen coils in all are employed in the H.F., mixer and oscillator sections and these are mounted in a rotating turret and only the coils actually in use are in circuit.

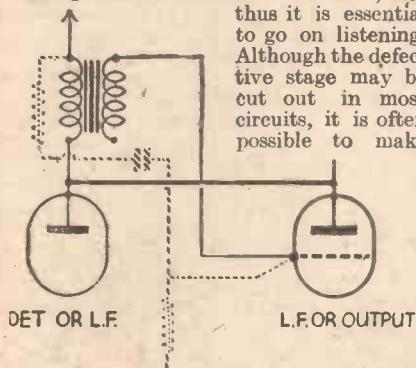
This receiver has been designed by an amateur, the price being £25.

# The British Long-Distance Listeners' Club

## Stand-by Repairs

IT often happens that during a particular period of listening something goes wrong with the receiver. In many cases it is not a difficult matter to trace the fault and if a new component is needed this is obtained when convenient. There are occasions, however, when a particular item is required, or perhaps some schedule of working with an amateur is in hand, and thus it is essential to go on listening.

Although the defective stage may be cut out in most circuits, it is often possible to make



A makeshift repair for a broken-down transformer.

a stand-by repair which will enable the receiver to be kept in action at a higher state of efficiency than by cutting out one stage. A particular instance of this is where the primary of an L.F. transformer "burns out." The two anodes could be linked as shown by the heavy line in the above illustration, and this would cut out one stage of amplification, and signals could thus still be obtained. If, however, a resistance, condenser and grid leak are available these may be inserted, as shown in the broken lines, and this will convert the transformer coupling to resistance-capacity coupling and give better signal strength than the first method of repair.

## Speaker Differences

A NEWCOMER to radio is often puzzled when told to get an "M.C." speaker to improve quality. He is generally under the impression that this type of speaker is only suitable for mains apparatus, although there are two distinct types of moving-coil speaker. The principle of both is identical, namely, the movement of a cone caused by the intersection of lines of flux across a magnetic field and a coil of wire mounted at the apex of the cone. The accompanying illustration shows a sectional view of an energised and a permanent-magnet type of moving-coil speaker, from which it will be seen that

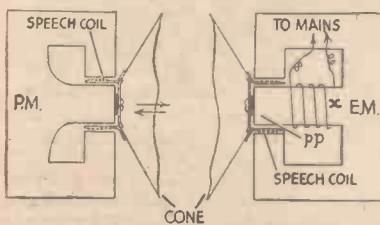


Diagram illustrating the difference between a permanent magnet and an energised moving-coil loudspeaker.

the only difference is that the energised model has a coil wound round the pole piece of the magnet. This is known as the field coil, and it is connected to a voltage source in order to energise the magnet.

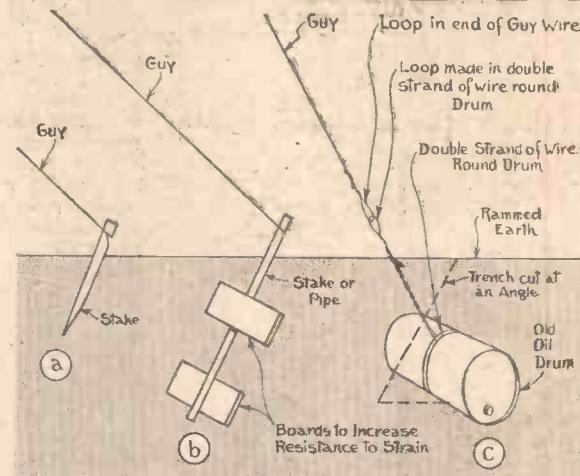
## Anchoring a Mast

A MEMBER has built a large lattice mast, but finds that it is difficult to anchor it so that it is sufficiently firm to withstand strong gales. There are several different schemes available for this purpose, and three common ones are illustrated below. For a small mast, or for the short guy ropes attached to the lower part of the mast, a peg driven in at an angle as shown at "a" will suffice. For a large mast, or a guy attached at a higher position on the mast, the peg must be provided with some form of anchor, and a simple plan is to place a fairly long board across the rear of the bottom of the peg and a similar board in front of the upper portion as shown at "b." This will offer greater resistance than leaving the peg alone in the earth, and in many

cases will provide all the anchorage which is necessary. For a very high mast, however, some additional scheme may be called for, and at "c" we illustrate a very good idea. This consists of the use of an oil drum, filled with concrete or any other heavy material, and attached to the end of the guy in place of a peg. The object is to have as large an area in contact with the earth as possible, and also to provide a good weight on the end of the guy.

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# CONNECTING LINKS

The Importance and Design of Connections for Aerials, Extension Speakers, Inter-communication Apparatus and Similar Equipment By W. J. DELANEY

MANY amateurs spend a considerable amount of time and money on the equipment of a listening station, only to spoil results on account of false economies in regard to important connecting links. In some cases, in fact, these links are often treated with contempt, and any old material is called into use. Before going any further, perhaps I should define the items which I have termed connecting links. There is the lead-in from aerial to receiver, and this may, of course, take many different forms. Then there are the connections from a battery receiver to the necessary batteries and from a mains receiver

was noted that the current in the last valve gradually increased as the valves were removed. Even with one valve only in the set the current was less than 2 m/A. After much unnecessary testing and modification, it transpired that the accumulator leads were made from telephone flex, which had been removed from a house telephone and left behind by the P.O. engineers. This material was of tinsel construction—not ordinary stranded wire, but owing to its apparent good insulation and make-up, it had been thought ideal for the purpose of L.T. supply whereas it would not carry sufficient current for one of the valves in use. As soon as ordinary flex was substituted results were obtained. In battery and mains receivers the L.T. supply is probably the most important and runs to the highest current rating and, therefore, material capable of carrying the current must be used. In an ordinary battery set standard 5-amp lighting flex is ideal and will ensure that there is no voltage drop through the leads. This point is especially important if the accumulator is placed at some distance from the receiver. In an A.C. receiver it may even be necessary to use heavier wire, especially where three or more valves are in use, and 10-amp or even 15-amp flex should be used, in spite of the difficulty of satisfactorily making connection with the various sockets—due to the thickness of the wire. When dealing with flex it should be remembered that if the rubber covering is not in two colours for identification purposes, it is possible to preserve polarity through the leads by following a coloured cotton or some similar identification mark generally provided. This is sometimes inside the rubber covering, amongst the actual flexible wire, or between the outer cotton covering and the rubber sleeveing.

## H.T. Leads

For H.T. purposes, as the current is very low, ordinary 5-amp flex is quite suitable, but in some circuits the difference in potential between adjacent leads may be such that flex is not ideal and the leads may have to be separated. This is another point which has to be attended to. For grid bias quite thin flex is suitable as the voltage and current are both low. For all supply leads it should be made a rule to avoid joints and endeavour to obtain a single unbroken

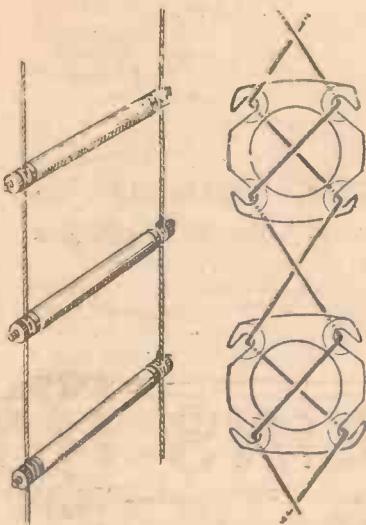


Fig. 1 Aerial feeders, or connecting links, as used for short-wave reception.

to the mains outlet. There are also the leads running from the receiver to a distant listening point. Although on a slightly different scale there are the connections needed between one room and another for inter-communication systems and also for remote control apparatus. Perhaps it may be thought that these items should not call for an article or instructions regarding their use, but a proof that this is so may be given. Some years ago I had occasion to service a newly-built battery receiver which failed to give any worthwhile results. Signals were extremely weak and I was assured that every component and valve had been separately tested. Accordingly the wiring was checked and found to be correct and all connections were sound. At the time only a simple voltmeter was available, with a dual-range scale and H.T. and L.T. voltages were correct at the respective parts of the circuit. Unfortunately, an anode current test could not be made, but everything appeared to be in order until such a test was made, when it was found that there was negligible anode current.

## Flex Leads

The accumulator was therefore examined and, as it was not in a very good condition, a substitute was obtained. Still no results. Valves were removed one at a time and it

## Aerial Leads

Another equally important connecting link is that between aerial and receiver. Again, special materials are available, either in the form of a heavy flex with good insulation designed to withstand weather conditions, or of a heavy single gauge wire with similar insulation properties. Bell wire and ordinary single flex is often employed, but the insulation quickly perishes in the open air, the copper corrodes, and as the wire is thin noises may be set up due to fractures in the lead. Again, solder connections at all points, and where such connections are exposed to the air, paint them with a heavy outdoor paint and then wrap with insulation tape. The type of lead will, of course, depend upon the

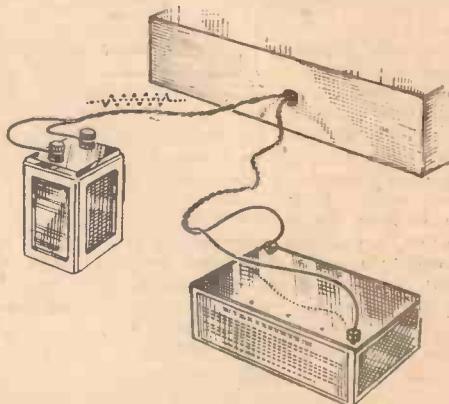


Fig. 2. Battery connections. Resistance in the L.T. leads can reduce efficiency.

type of aerial, and you may need a single lead or a pair of leads running parallel or transposed. For the latter twin flex is often called into use, but it may need renewing periodically. Parallel leads may be obtained by using short lengths of ebonite tubing into which terminals are screwed at each end, the wire being clamped beneath the terminal heads.

## Extension Leads

To feed an extension listening point bell-wire is generally suitable, but in some cases the capacity across a long lead of this material may be detrimental. In that case the type of wire known as "flat-laid" should be used. This consists of two

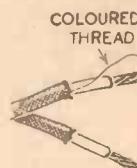
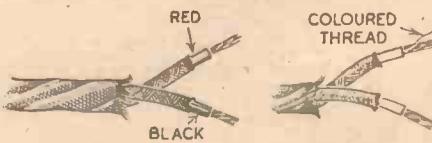


Fig. 3. Separate flex leads are easily identified as shown here.

leads from source to the components or valves being supplied, especially where flex is concerned. Twisted and unsoldered flex is very unsatisfactory and a high-resistance joint may be set up which will cause a voltage drop. Endeavour where possible to solder flex joints, but make quite certain that all individual strands are tinned and that the joint is not merely a surface one, uniting two or three outer strands with the remainder embedded in flux inside the joint.

wires lying side by side inside an outer insulated covering and the wires are spaced slightly. It is also available with three or four strands laid in a similar manner, and this will be necessary where the extension listening point is also used as a remote-control point for the receiver. Care should be taken when fitting this particular connecting link to avoid running it parallel with any A.C. mains leads which may be buried in the walls.

(Continued on facing page.)

# TELEVIEWS

## Still Hoping

THE hopes of the provinces that their television needs would be really clarified as a result of questions in Parliament has not materialised in the manner desired. The Assistant Postmaster-General stated that the extension of the television service to areas outside the range of the London station involved serious problems, both technical and financial. On the advice of the Television Advisory Committee technical research is being undertaken in regard to possible methods of relaying television programmes from London to other centres, but the research work is likely to occupy a considerable time and it is feared that no decision concerning the extension of the service to other centres can be reached in the near future. Surely this comment of the P.M.G. reveals quite clearly that the promised financial co-operation of the cinema industry would help to expedite this work and remove at one stroke the position which is unfair to those outside London and the Home Counties. When asked about the coaxial cable, Sir W. Womersley said that the Post Office was not using this cable for purposes other than telephonic, and further technical research would be necessary before it could be employed for television. Finally, another Member of Parliament asked the P.M.G. if he was aware that in the television area of Manchester there was one third of the population of the country, and were they not

entitled to this service as well as those in the London area? The reply was to the effect that these facts were known and the P.M.G. was anxious to get television into all centres as soon as possible. The public has been told repeatedly of the desire of the Post Office to provide television facilities in other parts of the country, but this was recorded four years ago in the original television report, and it seems strange that no tangible move has yet been made to give practical expression to this need. Any lethargic tendency on the part of the authorities must be countered with every legitimate means at the disposal of the provincial population, for in this way decisions can be expedited in no uncertain manner.

## Disappointing

ALTHOUGH the Television Advisory Committee met recently for the first time under the chairmanship of Lord Cadman to deal with immediate television problems, the two most important of which were provincial television stations and cinema rediffusion, the general public were disappointed to find that no statement was issued to give any indication of the progress made. It is, of course, conceivable that the agenda items were so far reaching in their importance that one or more subsequent meetings will have to be held soon in order to clarify the whole situation. The radio manufacturers are obviously divided on the value of big-screen television

in its relation to the sales of domestic receivers, but there seems little doubt that although in two separate categories they must be mutually beneficial to one another. In any case, the provinces, with Manchester providing the bulk of the initiative, are determined to continue their campaign for the early provision of television reception facilities. In this connection it is learned that Sir Allan Powell, the B.B.C. chairman, who takes over his new duties soon, has stated at one of his first actions will be to inquire into the prospects of television for the north of England. Sir Stephen Tallents, in a recent address, said quite clearly that the future of the home television service was assured and the pace of its establishment was the only thing in doubt. Lancashire and the north have, therefore, adopted the slogan "Quicken the Pace." Support for this move is coming from all quarters, particularly in the radio and cinema trade. Quite frankly, there can be no gainsaying the justice of this demand, for it is realised that in the provinces the sales of television receivers is certain to surpass very materially anything that has occurred in the London area. The trade and employment benefits alone must justify the public pressure which is being brought to bear on the Government for the service, and success is assured from the moment regular signals are on the air.

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## CONNECTING LINKS

(Continued from previous page).

### Inter-communication Leads

For use between rooms fitted with inter-communication apparatus standard twin bell-wire is quite suitable, but care must be taken that the gauge of the wire is considered in conjunction with its length and the type of circuit which is employed. This remark also applies to low-impedance

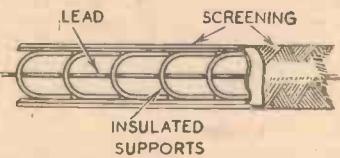


Fig. 4.—A special form of low-capacity screened cable link.

output circuits in a receiver. It would obviously be undesirable to have the connecting leads of higher resistance than the speaker or microphone and this is often one cause of failure to obtain good signals at an extension listening point. With some of the more up-to-date communication apparatus the house wiring (mains) is used as a conveyor of the signals, and in one instance the ordinary P.O. telephones are used. There is one remote-control device also on the market in which the house wiring is employed to convey impulses by means of which a receiver is switched on and off or station selection carried out. The main points which have to be attended to are, therefore, current-carrying capacity; insulation; resistance; and in some cases the capacity to earth. By attending to these points it may be possible to obtain higher efficiency from your equipment than you are at present getting.

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# RADIO BY TELEPHONE

## Main Details of the Proposed Telephone Relay System

THE Postmaster-General recently announced in the House of Commons that plans were being completed for the distribution of radio programmes over the telephone system and that each subscriber would have four programmes available. Considerable interest has been aroused by the announcement, but confusion seems to exist as to the system which is to be adopted. Conflicting reports have appeared in the lay press regarding the idea, which is, of course, not by any means new. Wired Wireless, as it is often called, has been in use for many years and many different systems have been tried from time to time. In America considerable headway has been made, and home or office communication systems have been introduced in which the signals are carried over the telephone wiring system without interaction with the telephone signals.

In most cases this is accomplished by using a high-frequency signal modulated in the usual way, and this travels along the conducting path offered by the telephone wires, and may be rectified and made audible by tapping off the signal at any desired point.

THE cousin of the ruler of a native settlement in West Africa was recently heard at the B.B.C. Theatre Organ in "Music Hall" on a Saturday evening, accompanying Miss Adelaide Hall, Brooklyn (U.S.A.) born star of "Blackbirds."

The man to enjoy this great privilege was Fela Sowande, who also appeared in "Blackbirds" and who is now Musical Director of the startling all-coloured show, "Dark Sophistication," which Miss Hall is presenting at a London night-club. Sowande and Miss Hall were seen in an excerpt from this revue on Television, with the dance-band and choir which Sowande formed and trained for it. At the night-club, Sowande, as part of his repertoire, plays on an electric organ, installed by a London firm, stated to be the first organ ever featured in a night-club.

A genuine West African, Fela Sowande was meant to take holy orders, but drifted into music when his missionary father died during his schooling. Young Sowande outstripped his classmates and rose to the position of teacher at the very school where he was educated. Noting his natural aptitude towards music, his father, knowing music would be essential to a church calling, had him trained by a Trinity College teacher (Mr. T. K. E. Phillips) who taught him to play the piano and the organ.

Sowande then joined the choir at the Cathedral Church of Christ, Nigeria—where he was born and reared—and when Mr. Phillips, who was organist and choirmaster there, went on a trip to England, his young student took control of the musical arrangements in his place. At the age of twenty-five, it was a high honour.

Finding quite a lot of time on his hands, Sowande took up mathematical work in the Survey Department of the Civil Service, and when he left home to come to England four years ago, he intended to pursue both this profession—the engineering side of it—as well as music. What made him come to England were our dance bands, which he heard on a portable radio set which had come into his possession. He studied the arrangements they played and from among his friends got together a twelve-piece coloured

### Long-wave Signals

In the proposed British system there are, at the moment, four stations to be radiated, National, Regional and two others. These will be received at the Post Office station, and converted to frequencies of 172, 216, 252.5 and 280 kc/s. These signals will be fed to the telephone lines, and at the subscriber's house there will be a small junction box, similar to that now in use for connection purpose. It will be mounted near the existing box and two leads only will pass from this new box to a point close to the subscriber's existing radio receiver. At the end of this connecting line there will be a double-pole-change-over switch unit, and to this the aerial and earth leads of the normal receiver will have to be joined, in addition to two leads from the aerial and earth terminals of the receiver. Thus, by operating the switch it will be possible to connect the normal aerial and earth to the receiver, or to connect the Post Office pair of lines to those points. All that then remains is to tune the receiver to the long-wave band at the frequencies above-mentioned when the relayed stations are required, or to tune the receiver in the usual

way when the normal aerial and earth are connected.

### Advantages of the System.

There are a number of advantages to be gained from the proposed system. First and foremost is the freedom from all forms of interference. Man-made static, electrical interference, heterodyne whistles and all similar troubles will be non-existent, whilst it will be possible to employ a receiver having broader tuning by means of which higher quality signals will be obtainable. The ordinary receiver has naturally to be made to tune fairly sharply in order to eliminate station overlap and this results in a certain deterioration of quality in some cases. The signals to be sent over the telephone system will be well separated and will be made to offer a high standard of quality, and thus, by using a flatly-tuned set, it will be possible to obtain the advantages of the better quality, as well as to remove all risks of any form of interference. Obviously the quality will depend upon the receiver design, as this is used in its complete form, but there will be cases where the general design from a quality point of view could be improved and thus better signals will be obtained over the Post Office system than may at present be available to listeners. Prices of rental, date of commencement and other details are not yet available, but will be given in due course.

## Radio Biography

### FELA SOWANDE

dance band, with which he endeavoured to imitate what he heard. He learnt to play trumpet, clarinet and saxophone. He formed native choirs.

A stranger in London, attending the Polytechnic, he found engineering and music too much to tackle, so he dropped the former and sought a music-teacher who could instil more advanced ideas into his theory. He met Gerry Moore, a famous swing pianist, who not only improved his style, but also secured him work in night-clubs, telling him to study American records as much as he could, which would be of more value to him than anything else.

Playing at a small dance arranged by the coloured people in London, Sowande was heard by Lew Leslie, the man responsible for the "Blackbirds" shows. He was engaged to join the pit-orchestra as pianist, and rapidly made his presence felt, becoming deputy conductor and orchestrator in a very short time.

It was he who rehearsed the show, and took charge when the Musical Director was absent. Besides this capacity, he was used as a feature on the stage, playing Gershwin's "Rhapsody in Blue" at the piano. A young American vocalist, named Mildred Marshall, sang in the course of this scene. She and Sowande fell in love and were married. That edition of "Blackbirds" at an end, Sowande went back to night-club work, but when the show was broadcast a few months ago, he wrote the entire score and took part in the cast.

His wife was a friend of Adelaide Hall, whom she met in "The Sun Never Sets"—the Drury Lane production, so when Adelaide returned to England from America to go on tour with "Blackbirds" recently, all three renewed acquaintance, which led to her engaging Sowande as Musical Director of her production now running at the Old Florida, in which she is attempting to bring a real atmosphere of Harlem to Mayfair.

Sowande is tall and slender, dresses neatly, speaks educatedly, and has such American ideas—both in his professional and private life—that it is hard to believe that he comes from West Africa, and not the U.S.A. His name has much significance. Fela in full is "Oluwa Fe Ola," which interpreted means "God Loves Honour." Sowande is an abbreviation of "Oso-Wa-Mi-De," or "The Native God Has Found Me."



Fela Sowande

## PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM

6/- or 6/6 by post from George Newnes, Ltd., Tower House, Southampton Street, W.C.2.

# The Amateur Transmitter

Quite a number of amateur transmitters appear to be experiencing some difficulty in making the adjustments necessary for satisfactory operation and tuning of such circuits as are employed, for maximum efficiency, therefore the following hints concerning the operation of a simple transmitter circuit will be useful.

To cover the average requirements, the circuit shown in Fig. 1 will be taken as being representative of a normal low-powered station.

It will be seen that it consists of a crystal oscillator followed by a frequency-doubler which, in turn, feeds a final power amplifier.

The Tuning Procedure of a Simple Transmitter Circuit is Discussed in This Article

By J. O. SPARKS

ear side lamp, and pass the loop down over the coil when the lamp will be caused to glow by virtue of the R.F. currents.

The small curve shown in Fig. 2 indicates the behaviour of the anode current during the rotation of the tuning condenser and it will be noted that as the circuit approaches its resonant point the current decreases

conducive to a long and useful life of the valve.

So far, the oscillator has been operating without any load; therefore, the next obvious step is to apply the load which might take the form of the aerial or inter-stage coupling, according to the circuit design. If this is applied with the meter still in circuit, it will be noticed that the reading is affected, and it will be necessary, therefore, to retune the anode tank circuit until the minimum reading is again produced. Referring to Fig. 2, it will be seen that a dotted curve appears above the other, and this represents the change which will be noticeable between the current readings when the circuit is unloaded and loaded.

The difference between these two minimum settings can be taken as a rough indication of the output, as the greater the output the less pronounced will be the dip, but it must be remembered that it is possible to make the load so heavy that oscillations will be stopped.

Another item intimately related to this procedure is the fact that when the oscillator is operating under load less voltage is fed back to the grid circuit for excitation; therefore the voltages across the crystal will be reduced, and less heating of that component will take place. This, incidentally, is another reason for watching the anode voltage during preliminary adjustments as serious harm can be caused to the crystal if excessive current is set up across that circuit.

From the curve it would appear that the most satisfactory operating point is at X but, while this might be so as regards the loop lamp, it is not the best for general operation. In practice, it is advisable to operate on a part of the curve close to Y as it will be found that this will give more consistent results and, at the same time, reduce the strains imposed on the crystal.

## Frequency Doublers

Assuming that the coupling from the preceding stage is in order, and that the bias is correct for the valve and H.T. in use, the first test should be carried out without any anode voltage on the doubler valve. It is necessary, however, to insert a suitable milliammeter in the grid return circuit to enable the rectified grid current to be measured. When the drive is applied,

(Continued on page 119)

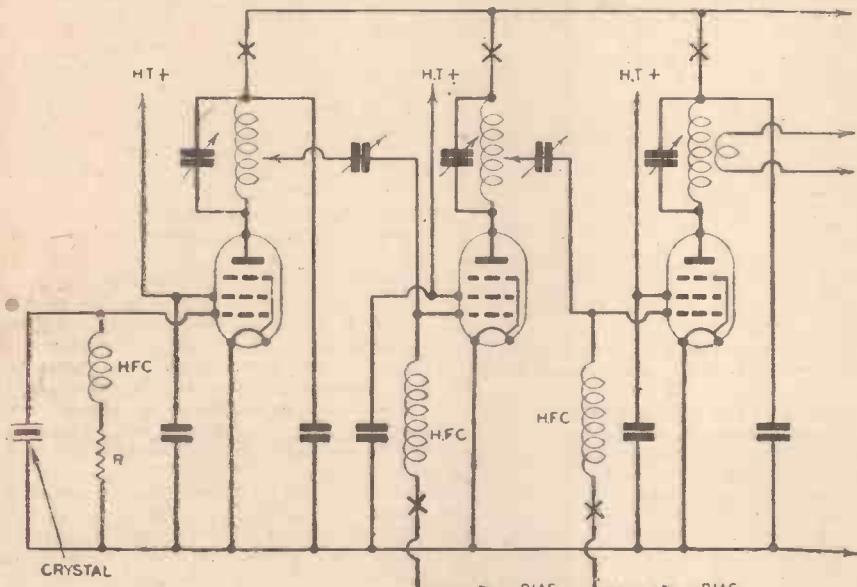


Fig. 1.—The fundamental circuit of the transmitter under consideration. The points "X" indicate where meters are inserted for test readings.

To avoid any misunderstanding, it must be appreciated that the remarks given below apply equally well to whatever form of inter-stage coupling is employed, and it is quite immaterial whether the valves are battery or mains operated.

## The Oscillator

When this stage is ready for testing a suitable milliammeter must be connected in the anode H.T. supply but, before switching on it is advisable, and this applies in all other instances, to commence operations with an anode H.T. voltage much lower than that which will normally be used. The variable condenser tuning the anode tank circuit should now be rotated until the meter needle gives a definite downward kick. Leaving the condenser at approximately that setting, the H.T. can now be increased to the normal operating value, and the tuning finally adjusted until the maximum needle dip is obtained. When the minimum current is indicated, the circuit will be generating oscillations and the maximum radio frequency power will be developed in the anode tank circuit. The loop lamp test can be applied to prove whether this condition actually exists and, for the benefit of those not already familiar with this method, it is only necessary for them to take a small loop of wire, having a diameter just sufficient to pass over the tank coil, and connect the two free ends to an ordinary pocket lamp or low wattage

rather rapidly, but after the maximum dip has been reached and as the circuit passes out of resonance, it rises almost instantaneously to maximum. From this curve it will be realised the object of keeping the anode voltage low until the desired tuning point is reached as the maximum current, i.e., when the circuit is not oscillating, might be several times that of the anode current specified by the valve makers. Needless to say such over-running is not

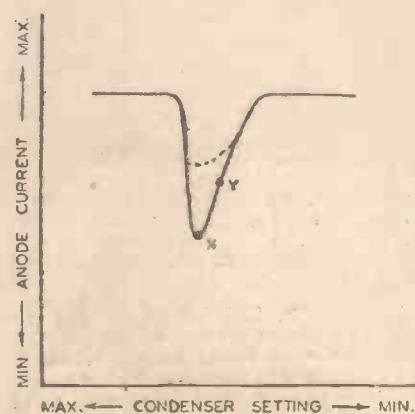


Fig. 2.—The anode current curve of an oscillator, showing the current drop when the anode circuit is tuned to resonance.

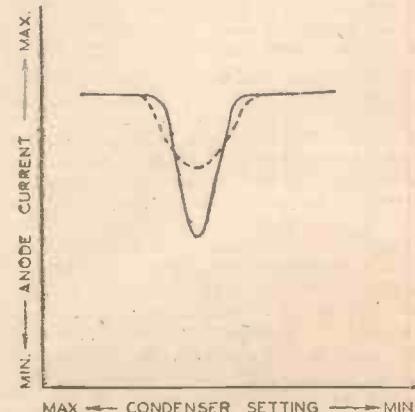


Fig. 3.—The curve is made symmetrical in the case of "doubler" and P.A. stages.

# Practical television

April 15th, 1939. Vol. 4. No. 147.

## The Second Fight

THE televising of the second big boxing match recently passed off without any apparent hitch, although prior to the evening, various contradictory reports kept appearing. The B.B.C. arrangements with the Harringay promoters made it quite clear that in so far as big-screen rediffusion in cinemas was concerned, there was to be no monopoly furnished to one group, while payment was to be made on the basis of seating capacity in each cinema showing theradiated pictures. The only cinema which took advantage of these facilities was the Monseigneur News Theatre, at Marble Arch, where the Scophony apparatus was installed to give a back projected picture 6ft. by 5ft. To guard against any unauthorised rediffusion, the promoters offered £100 reward for information concerning reproduction in those places for which permission had not been given. This was ostensibly directed towards some of the restaurants and public-houses, who may have felt justified in making a charge to customers to see the fight on one or more home receivers capable of giving reasonably-sized pictures. The radiated picture quality of the actual fight itself was very much superior to that of the Boon-Danahar affair. A variety of circumstances contributed towards this. Increased lighting was in use; a line link replaced the previous radio link for relaying the pictures from Harringay to the Alexandra Palace, while a yellow canvas and a blue roped ring replaced the normal white colouring. This last-named prevented any blurring effect on the boxers; a point complained about in the last match as it often gave a shadow or ethereal appearance during the course of the match.

## Television Relays

IT has been regarded generally as an encouraging sign that the B.B.C. has stated officially that it does not oppose the large-screen rediffusion of its programmes before paying audiences when the programmes concerned are either of events of national importance or interest, independent of commercial promotion; or when the subject is a sports event, the rights of which are held by a promoter. As Mr. Ostrer has pointed out, however, the cinema industry can hardly be expected to pay out thousands of pounds for television receiver equipment, and then find that the B.B.C. is not satisfied with the arrangement. Definite guarantees need to be given, just as in the case of home viewers, that no

changes will occur for a period of time. In any case, the Gaumont British Corporation made it known that for the present they were directing their attention towards the equipping of all their theatres in the London area with Baird cathode-ray tube projection receivers, and it was for this reason that the Harvey-Gains fight was not shown. The first details of this apparatus were given in a recent issue of PRACTICAL AND AMATEUR WIRELESS, and additional information has now become available. The screen itself rises through a stage trap door when required, and is silver surfaced, giving non-directional but very bright pictures, a feature so essential in large cinemas. The twin projector units housed in one casing have the controls within easy reach of the operator. The cathode-ray tubes are a new type developed recently by the Baird company, and have the fluorescent screen mounted on a separate support

cradles to allow rapid and accurate alignment between lens and fluorescent screen for, as readers will appreciate, this is an important factor when wide aperture lenses are employed. Although the power consumption of each tube is of the order of only 16 watts, the picture brightness on the screen is adequate for cinema working, while for picture steadiness the television projector is unsurpassed by any film projector.

## Outside Broadcast Details

THE statement to the effect that the B.B.C.'s television relay station at Swain's Lane, Highgate, is now completed marks another step forward in the development of satisfactory television technique in so far as it is related to outside broadcasts. Experiments have shown that reception is very satisfactory in this locality, and in consequence the re-radiated pictures will



One of the most complicated outside television broadcasts ever attempted was given recently when the whole of "Magyar Melody," the musical comedy at His Majesty's Theatre, was televised. This was the first time that a musical show has been given in its entirety. Our illustration shows the television cameras being tried out during a rehearsal at His Majesty's Theatre.

inside the tube. This is then scanned by a beam of electrons moving obliquely to the face; keystone or trapezium distortion being corrected in the line-scanning circuits of the equipment. The lenses used at the Marble Arch Pavilion are 14in. f/1.8 and this gives a picture magnification from tube screen to silver screen of over thirty. The tubes are accommodated in adjustable

be much freer from different forms of interference. The B.B.C.'s television mobile unit uses a carrier frequency of 64 megacycles, and whenever possible a beam aerial is employed so as to increase signal pick-up at the receiving station. Where connection can be made to the special television cable laid round London, the four vehicles of the mobile unit are reduced to two.



# QUERIES and ENQUIRIES

## Screened Leads

"I am troubled with hum in an amplifier I have built and I wonder which leads I ought to screen to cut out the trouble. It would appear that the hum is at mains frequency, and I am not certain whether the ordinary type of screening sleeving would be suitable."—H. W. (S.E.22).

**THEORETICALLY**, to screen leads or components for L.F. induction it is necessary to use iron. If the hum is induced from a lead carrying A.C., or from an inductive component such as a choke or transformer, then some form of iron screen is called for, but the standard braided sleeving often proves quite useful in spite of this fact. It should be possible to eliminate induction between leads by running them at right angles and by well spacing them, whilst components should be similarly displaced and only screened as a final measure if the hum is not removed by these means.

## Coil Data

"In order to carry out some experiments with new circuits I should like to make up various types of coil. Unfortunately I am not very good at mathematics and although I can find from a table the various inductances required I am not clear how to work out the size of the coils and the gauges of wire to be used. Is there any book you have published which would help me or can you put me on to anything which would be of use to me in this connection?"—L. E. R. (Highbury).

**O**UR book, "Coils, Chokes and Transformers," gives a considerable amount of data which might be of use to you, but you would probably find that some form of abac or other table would offer a wider range of material if you are intending to carry out experimental work on unorthodox lines. A good calculator such as the "Lightning Radio Calculator, Type A," obtainable from F. L. Postlethwaite, of 41, Kinfauns Road, Goodmayes, Ilford, Essex, could be recommended. This has two rotating scales, and a transparent cursor, and is printed on stout board. By means of the scales you can calculate frequency and wavelength, inductance capacity, frequency, and similar combinations, and any type of coil winding may be calculated, or wavering discovered from a given coil winding.

## Filter Design

"In reading an article on tone control circuits I came across the expression 'L-section filter,' and I should be glad if you could explain exactly what this is, and how it works. Can you recommend a good book on the mathematical side of radio as I am more interested in this now, than the actual making of parts?"—L. W. A. (Barrow-in-Furness).

**T**HE L-section filter consists of an inductance in one lead, with a condenser across the two leads. At a given frequency the values of the condenser

and inductance will resonate with the applied frequency. The response curve is in the form of a gradual hump and thus the filter is of limited use. Several may be used in series to obtain improved performance. For a mathematical course we would suggest "The Mathematics of Wireless," obtainable from this office for 5s. 6d. post free.

## Auto-transformer

"Can you tell me what an auto-transformer is? I thought these things were only used in A.C. mains motor-generators, but an old circuit which I have turned up for radio specifies an auto-transformer for L.F. coupling, and I cannot see how this would work."—N. T. A. (Kenton).

## RULES

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

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

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

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

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

**T**HE auto-transformer consists merely of a tapped choke, used for L.F. coupling and fed in the usual way from the anode of the preceding valve through a condenser to the tapping. One end of the choke is joined to the grid and the other to G.B. (or earth). By changing round the connections to the ends two different ratios are obtainable. The portion of the winding between the coupling condenser and earth acts as the primary, and the total winding as secondary and thus the ratio is dependent upon the amount of wire between coupling condenser and earth.

## Link Coupling

"What is the best method of incorporating a link coupling in my transmitter? I am not clear whether the coupling leads are important or whether they may be made from standard twisted lighting flex."—L. E. Y. (York).

**F**OR the link coupling standard flex is quite in order. Alternatively, you can use ordinary tinned copper wire of suitable gauge passed through insulated sleeving. The actual coupling coils should, of course, be rigidly supported at a suitable point round the tank or other coil to which the coupling is required.

## Transmitting Licence

"I am interested in transmitting and should be glad if you would answer these

two queries. The G.P.O. require a certificate of calibration for the crystal in a transmitter. Does the crystal have to be bought before a certificate is obtained? If so, this is hard on unsuccessful applicants. Is it necessary to advise the Post Office of any change in the design of a transmitter after an A.A. licence has been obtained?"—C. F. P. (Harborne, Birmingham, 17).

**T**HREE is no need to send the certificate when applying for the A.A. licence. You should merely state that you intend to obtain the crystal from a reliable firm who will issue the necessary certificate with it. The certificate will only be called for when you apply for the full licence. Any change in the transmitter circuit should be notified to the authorities, although when using an artificial aerial this is not essential, provided that you make certain that no radiation takes place. It is desirable, however, to notify the authorities when you make any considerable modification in the design of the apparatus.

## Push-pull Output

"Can you advise me definitely whether Class A output amplification is the very best for quality results? I have heard so much about different forms of push-pull that I am rather at a loss to know just what type of push-pull may be considered to give the best reproduction and I wish to build up a good amplifier for use with records and with a special quality radio unit."—L. D. (N.W.3).

**C**LASS A is generally considered to be the most suitable for ordinary use. It gives the lowest percentage of second harmonic distortion, but includes harmonic distortion in other directions. Other forms of push-pull are generally modifications of Class A and have for their object either lower H.T. consumption or the removal of distortion due to the particular types of valve used, i.e., pentodes. Negative feed-back, low-loading, and similar schemes are also devices included to remove certain forms of harmonic distortion, but for general domestic use with the small powers called for, and the apparatus with which the amplifier is employed, the standard or Class A form of push-pull may be regarded as the most satisfactory.

## REPLIES IN BRIEF

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

K. A. B. (Roxburgh). Bulgin's address is Abbey Road, Barking, Essex; Clivis is 79a, Rochester Row, S.W.1; Microfus is 4, Charterhouse Buildings, E.C.1. The other firms are no longer in business.

G. N. (Shipton-Bellinger). Unfortunately, the issues, blueprints and all details are now out of print. D. McP. (Fort William). We regret that we cannot identify the set from your description, but could not, in any case, supply details of one using a set of the coils mentioned.

W. W. (Perth). The coil is quite suitable for the set in question.

W. A. J. (Newbridge-on-Wye). We regret that you do not give sufficient information to enable us to diagnose the cause of the trouble. Could you let us have some further information?

W. C. (Buxton). The speaker should be satisfactory, but we have not tested it and cannot advise definitely. The 50s. All-wave Three covers from 18 to 52 metres on the short-wave section.

A. R. (Bridgwater). We regret that there is nothing we can recommend in your case.

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

# LETTERS FROM READERS

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

## An Appreciation from Vancouver

**SIR**,—As a reader of PRACTICAL AND AMATEUR WIRELESS it has always been my intention to write you expressing my appreciation for your very interesting publication, and I am now happy to do so.

I am particularly interested in "Leaves from a Short-Wave Log," and would very much appreciate regular continuance—and perhaps extension—of same. Although not all items therein are "news" to us over here, I find much valuable information on S.W. stations on that page which is still unknown over here at the time your magazine arrives.

Wishing PRACTICAL AND AMATEUR WIRELESS all success.—H. ORLAW (Vancouver, British Columbia).

## The "Sprite" Three

**SIR**,—I thought you would be interested to know that exactly one year ago I made one of the sets described in your paper—the "Sprite" Three.

I am glad to say it is still going strong, and that it has not cost me one penny for replacements to either valves or components. It is certainly a very good set to recommend to anyone. The average time the set is in use is 8½ hours a day, and the cost of current used for one year was 1s. 9d. I am using a Climax D.C. eliminator via a Westinghouse rectifying unit.—A. MILLINGTON (Manor Park).

## Correspondents Wanted

**SIR**,—I would be very grateful if you could put me in contact with a short-wave enthusiast, who is also a beginner.—V. MATTHEWS (125, East St., Bedminster, Bristol).

**SIR**,—I have been a reader of PRACTICAL AND AMATEUR WIRELESS for a very long time now, and enjoy it very much. I would like to correspond with any reader living in England, or abroad, who is interested in short-wave reception and transmission.—F. STOTEN (3, Friern Barnet Rd., New Southgate, London, N.11).

## A 5-valve Battery S.W. Superhet!

**SIR**,—In reference to the requests which have been appearing recently in your journal regarding a 5-valve S.W. battery superhet. I, also, would be very pleased to see details of such a set in the near future. Out here, more so, of course, than at home, a radio set constitutes our only source of up-to-date news, and while in the larger towns mains are available, many people are in the same position as myself, and must necessarily use a battery set. On the 25 and 31-metre band just now a straight set is pretty hopeless, being quite unable to sort out the various transmissions clear of each other, and a superhet is the only solution. It should, I think, consist of tuned H.F. stage, F.C. (with separate oscillator), I.F. stage(s), D.D. triode second detector A.V.C. and output pentode. In order to

simplify modifications in the output stage, auto-bias should not be employed. I, personally, use two P.M. 22C pentodes in push-pull, which give a fairly healthy output.

For colonial use a superhet that is unable to get down to 13 metres is not of much use. The best reception of Empire programmes in this part of the world is undoubtedly that radiated on 13.97 metres (GSH), and to ensure good reception at this frequency I think a separate oscillator valve is almost imperative.

Whilst on this subject, it must be admitted that coil changing is a nuisance. There are several good makes of American sets on the market, battery operated, tuning from 13 to 560 metres in three bands, employing switched coils. If you could produce a design something on these lines I haven't the slightest doubt that it would appeal to a good number of your readers.

Many thanks for your assistance in the past. I am looking forward to a really "hot" design—there is still a thrill to be had from the reception of the old country on a home-produced set, such as one can never get from a manufactured proprietary model.—D.W. SMITH (Central Province, British West Africa).

## Logged on 14 mc/s

**SIR**,—I have been a reader of your paper since the first issue of Practical Wireless and, good though it was then, I think it is still improving. Having followed other readers' logs with interest, I am submitting a selection of QSLs received here recently: 14 mc/s amateur zone: VK5AI (first G report), VK7CK, XU8MT (second G report), VS7RF, HSIPJ, ZT5P, ZS1J, ZT2G, ZS2X, VP2AT, HP1A, W6AM, VE4EK, VE4NI, VP3THE, OX2QY (W10XAB) and the broadcast CR7BH, VK6ME, W9XAZ, TGWA, VK9MI (ship off Australian coast), etc. Also letter veris. from 15-watt police transmitter W3XGB, and Richard Stoddart verifying my report of reception of KHRH, the Hughes' plane that was over Berlin at the time of my reception. Receiver in use is a S.G.-S.G. 2 Pen with 'phones, and antenna is an ordinary inverted-L with half-wave top for 15 mc/s.

*The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.*

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

I have just received a card from VQ8AS (power 12 watts), QRA P. Caboche, Diego Garcia Islands, Chagos Archipelago, c/o VQ8AF, Box 163, Port Louis, Mauritius. The card is for a report sent on October 9th, 1937.

I would like to get in touch with one or two other readers, especially those living abroad, or in this district, with whom I could correspond.—R. DEWEY (10, Summerhill Road, Saffron Walden, Essex).

## American Radio Relay League's Contest

**SIR**,—This year's American Radio Relay League's phone contest is now over (March 18th-26th). Perhaps this selected list of amateur stations heard on the 14 mc/s band will be of interest to your readers. Exceptional signals are indicated as R9.

*Australia and the Pacific.*—VK2DV, VK2AGU (Sydney), VK3AH, VK3BM, VK3DD, VK3DG, VK3GG, VK3HG, VK3PK (Melbourne), VK5RN. *Hawaii*: K6BNR, K6FAZ, K6KGA, K6OJI, K6OTH, K6NYD (R9).

*Asia.*—VS7RA (Ceylon); K4ILB, KA1ME (Manila); XZ2JD (Burma) (R9); PK1RI, PK2AY, PK3WR, PK4KS (Dutch East Indies). J4NK was heard at 19.25 G.M.T. on March 24th, on 14,250 kc/s, calling: "CQ Europe," and announcing "J Japan," etc.

*Africa.*—SUIRO, SU1MW, CN8MB, FA3HC, VQ4ECJ (Kenya); CT2AB, CT2BC, CT2BP—all in the Azores.

*South America.*—Chile: CE2BX (Valparaiso), CE3AT (Santiago), CE4AC; Argentina: LU4AW, LU4BC (Buenos Aires), LU5CK, LU9BV; Uruguay: CX2CO, CX2AU (Montevideo); Brazil: PY2IT, PY2DA, PY2CA, PY7AI; Venezuela: YV4AA, YV4AL, YV4AE, YV5ABE (R9), YV5ABF (R9), YV5ACG (Caracas); Ecuador: HC1PZ.

*Central America and West Indies.*—HR5C (Honduras Republic) (R9); VP1BA (British Honduras); YN1IP (Managua, Nicaragua); TI5JJ (Costa Rica); Cuba: CO2GY, CO2WM, CO2JJ, CO2LY, CO7EV, CO7CX (R9); Porto Rico: K4FAY, K4FKC; Dominican Republic: H3N; Haiti: HH2B (Port-au-Prince); Barbados: VP6MR, VP6FO (R9); Bahamas: VP7NS (Nassau); Bermuda: VP9R.

*North America.*—Newfoundland: VOID; Canada: Typical Eastern district stations, VE1CR (Sydney, N.S.) (R9), VE2HG (Montreal), VE2AB (Quebec), VE3AIB (Toronto); Middle West: VE4ACP, VE4BF, VE4IF, VE4VD, VE4XA, VE4YR, VE4ADV (Winnipeg); West: VE5FG and VE5AFB (Yukon Territory).

*United States.*—Typical Eastern and Central districts: W1BLO (R9), W2IKV (R9), W3EOZ (R9), W4SW, W8DSI, W9RUK; South: W5ECT, W5AKZ, W5ASG, W5DNB, W5BEK; West: W6GRM, W6GCT, W6DTB, W6MYO, W6GRL, W6MEK, W6AM (R9), W7ESK, W7DX, W7BVO, W7GAE, W7EOI.

*Europe.*—Unusual Stations: ZB1L (Malta); OH2QM (Finland); LY1BF (Lithuania); YR5AA (Rumania); SV1MP (Greece); UK3AA (Moscow, U.S.S.R.).

A noteworthy feature of the contest was the appearance of more than the usual number of lady operators. They include: W2IXY (R9), W2EOA, W8ROP; VE1DC, VE1EL, VE1GH, VE3CA, VE4NI (Winnipeg).

All success to your excellent magazine.—REGINALD H. GREENLAND, B.Sc. (Barnsley, Yorks).

# 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.

## ALDERSHOT AND DISTRICT RADIO SOCIETY

Hon. Sec.: H. Atthill, "Ardverney," College Road, Heath End, Farnham, Surrey.

THIS society held its inaugural meeting on Friday, March 17th. The need for co-ordination of amateur radio activities in the district, a long-felt want, has resulted in the formation of this society.

The secretary will be pleased to inform persons interested of the objects and facilities available, and this information can be obtained from him at the above address.

Lectures and Morse instruction are to be arranged as soon as possible, and during the summer it is hoped to hold outdoor events, such as direction finding experiments, and field days.

The committee consists of: Mr. H. Atthill (G8CV), secretary; Mr. S. Ward (G5NF), treasurer, and Mr. W. James (G6XM), technical adviser.

## THE CROYDON RADIO SOCIETY

Headquarters: St. Peter's Hall, Ledbury Road, Croydon.

Meetings: Tuesday, at 8 p.m.

Hon. Pub. Sec.: Mr. E. L. Cumbers, 14, Campden Road, S. Croydon.

THE vice-president, Mr. G. S. Vellacott was in the chair for the Croydon Radio Society's Annual General Meeting on Tuesday, March 28th, in St. Peter's Hall, S. Croydon. The hon. treasurer, Mr. C. R. Amos, said membership and subscriptions stood at a new high level, and the future looked most encouraging. The balance sheet for the past session was adopted, after which election of officers for next session was undergone. Those re-elected were: chairman, Mr. P. G. Clarke; vice-chairman, Dr. R. A. Bailey; hon. secretary, Mr. I. F. Marshall; the hon. treasurer and the hon. publicity secretary, Mr. E. L. Cumbers; Mr. H. Johnson became a new auditor, and Mr. H. Bairdett hon. librarian.

Then members availed themselves of Mr. Vellacott's plea for future programme suggestions. Dr. Bailey was loud in his praises of the Society's own personnel in giving lectures. Indeed, he went further and said that circuits given by members at these lectures should be filed, and kept by the hon. librarian for future reference. He quoted many an instance of a member producing a circuit with novel ideas, and a complete record of them would be most valuable to the Society as a whole. Mr. Marshall followed this up by recommending the purchase of certain technical reference books, which would be of great use to members.

Hon. Pub. Sec.: E. L. Cumbers, 14, Campden Road, S. Croydon.

## BRADFORD SHORT-WAVE CLUB

Headquarters: Bradford Moor Council School, Leeds Road, Thorntbury, Bradford.

Hon. Sec.: G. Walker, 33, Napier Road, Thorntbury, Bradford, Yorks.

ON Friday, April 14th, members of the above club will hear a lecture given by Mr. Fraser, of Ambassador Radio Gramophone, of Brighouse; the

## THE AMATEUR TRANSMITTER

(Continued from page 115.)

the coupling should be adjusted until the maximum grid current is indicated, but it must be remembered that the tank circuit of the driver stage, in this instance the oscillator, will also have to be adjusted to correct any variations in its tuning produced by the alterations made to the coupling.

Once these adjustments have been completed, voltage can be applied to the anode, and the anode tank circuit tuned to the required frequency. This will be indicated in a manner similar to that of the oscillator with the exception that the curve will be more symmetrical, as indicated in Fig. 3. The next step is to apply the anode load, and make final adjustments for maximum output.

subject will be short-wave receiver design, and this will be supported by a demonstration of their new receiver.

This lecture will probably be last in the present clubrooms, as the club has secured new rooms at 1, Ferniehurst Buildings, Baldwin Road, Baldwin. These rooms will have a decided advantage over the present ones, as they can be locked, and the gear left assembled ready for use, instead of having to disconnect it and store it away in a cupboard every week as we have to do at the present time. Any further particulars regarding membership can be obtained from the secretary.

## RADIO, PHYSICAL AND TELEVISION SOCIETY

Headquarters: 72A, North End Road, West Kensington, W. 14.

Meetings: Friday evenings.

Hon. Sec.: C. W. Edmans, 15, Cambridge Road, North Harrow, Middlesex.

ON Friday, March 31st, Mr. G. Konried, of Messrs' H. Tinsley and Co., delivered an interesting lecture entitled "The Radio Frequency Dielectric Test Set, designed by the National Physical Laboratory." The lecture was well illustrated by lantern slides and apparatus.

As the test-set which Mr. Konried described had been designed for use at an extremely wide range of frequencies, from 10 kilocycles to frequencies as high as 10 megacycles, it had been quite impossible to use any form of bridge circuit on account of the fact that resistances in some form or another would have to be employed. Instead of a bridge circuit a special arrangement using a standard condenser and a valve-voltmeter is used. The valve-voltmeter itself is of the bridge type to prevent inaccuracies due to variations in voltage of the power-supply and the condenser is an expensive arrangement of very sound mechanical construction. Special arrangements are made with regard to the electrodes, and supports, for the sample of dielectric under test, precautions being taken to ensure that the electrodes fit exactly against the dielectric.

Meetings of the Society are held nearly every Friday evening during the winter months at 72A, North End Road, West Kensington, W. 14, at 8.15, when there are lectures on Radio and other subjects of scientific interest. There will be no meeting on April 14th, but on the following Friday, April 21st, a representative of Messrs. Partridge, Wilson and Co., Ltd., will lecture on Rectifier Equipment. Further particulars may be obtained from the Hon. Secretary.

## CLAYESMORE RADIO CLUB

Hon. Sec.: I. H. Gordon, Clayesmore School, Iwerne Minster, Blandford, Dorset.

THIS term we welcome Mr. P. G. Summers, who has kindly consented to be president. Work in the workshop this past term has been extremely active. An efficient lock has been fitted to the clubroom door, and every member has been provided with a key.

On Saturday, March 4th, the club paid a visit to the B.B.C. transmitter at Bournemouth. On arrival, members were rather amused at the building in which the TX was housed, but we found it interesting, especially the "tuning" fork frequency control, and the H.T. and L.T. supplies. We congratulate A. W. G. Wilson (2CGD), on obtaining his A.A. licence, he has now built a 6L6 C.O., and modulator. Much experimental work has been carried out on amplifiers, both mains and battery, and two efficient ones have been constructed. An attempt was made to receive television sound, but this was unsuccessful, owing to the surrounding hills. Two 5-metre transreceivers have been constructed for use in conjunction with a sailplane, piloted by Mr. J. Simpson.

Plans have been drawn up for "Speech Day" next June, and the programme will include—Demonstration of radio communication from sailplane to ground, operating of club P.A. system, and recording of speeches. We should like to hear from anyone who could give a few tips on electrical recording.

## P. A. Stage

The procedure for this part of the circuit is practically identical with that mentioned above but, if the valve employed is such that it has to be neutralised, it is essential for that to be carried out in a satisfactory manner before any attempt is made to complete final tuning. As with the doubler stage, the tuning current curve will be more in keeping with Fig. 3, and it should be noted that maximum grid current will indicate maximum drive.

Although the circuit, Fig. 1, does not show a tank circuit in the grid of the P. A., it is highly possible that such might be embodied in many designs, therefore, when that is the case it will, of course, be necessary to tune that circuit, as well as the driver anode tank circuit, when any adjustments are made to the coupling during the tuning of the circuits for maximum grid current.

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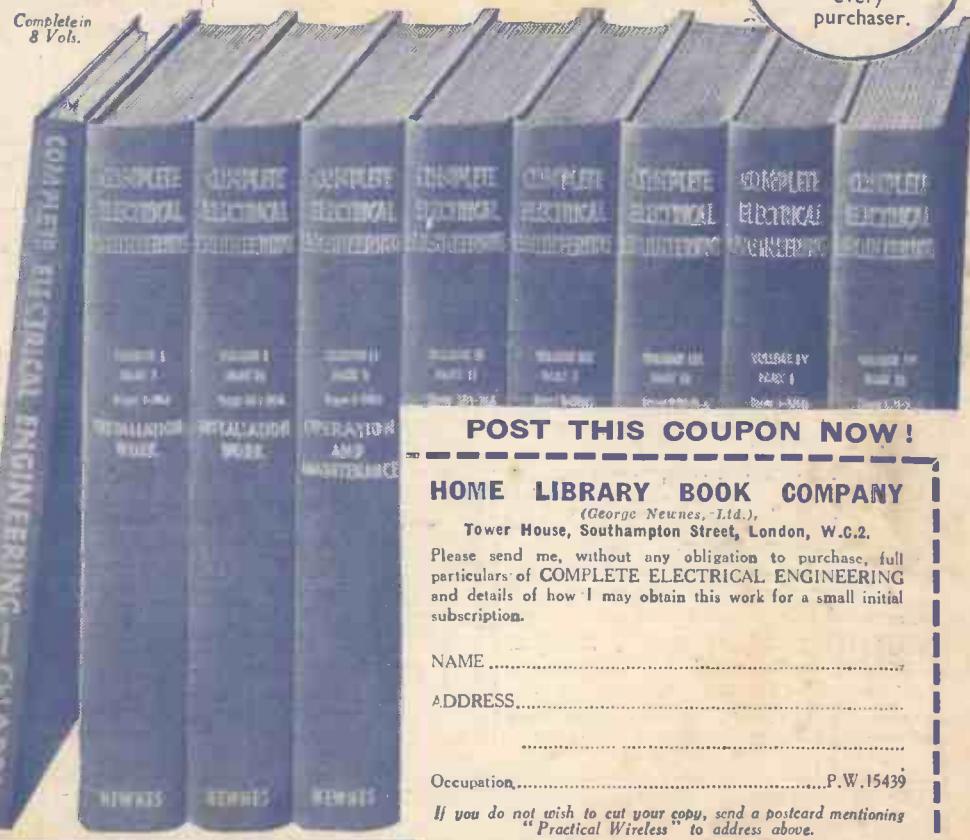
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# AN EXPERIMENTAL ALL-WAVE TUNER

See  
Page 123

# Practical and Amateur Wireless

A GEORGE  
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Publication

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

Edited by F.J. CAMM

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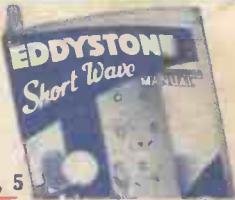
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# REVIEW OF COMMUNI-RECEIVERS

See  
Page 130

# Practical and Amateur Wireless

Edited by F. J. CAMM

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

VOL. XIV. NO. 344 April 22nd. 1939.

## ROUND the WORLD of WIRELESS

### Radio in Aviation

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

### Blood Transfusion

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

### SOS Rebroadcasts

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

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

### Outside Broadcasts

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

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

### St. George's Day

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

### Jam On It—Second Helping

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

### Royal Academy Banquet

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

### Old-time Dance Music

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

### Variety from Bristol

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

### ON OTHER PAGES

	Page
An Experimental All-wave Tuner .....	123
Short-wave Section .....	125
On Your Wavelength .....	127
Readers' Wrinkles .....	129
A Review of Communi-receivers .....	130
Radio in Aviation .....	132
Metal Rectifiers .....	134
Practical Television .....	136
Practical Letters .....	141
Queries and Enquiries .....	143

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

### Sponsored Programmes

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

### Television in America

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

# ROUND the WORLD of WIRELESS (Continued)

## Another Meeting of European Broadcasters

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

## France's New National Station

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

## Germany's Radio Channels

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

## A 2,000-year-old Battery?

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

## General Listening Barometer

**T**HE first stage of one of the most ambitious schemes hitherto undertaken by the B.B.C.'s Listener Research Section has just come to an end. Known as the "General Listening Barometer," the present scheme has tackled the problem of supplying broadcasting with a "box office" return.

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

## INTERESTING and TOPICAL NEWS and NOTES

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



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

## Some Spark Gap

**T**HE apparatus which provides the ten million volt discharge which is used to herald the transmissions from Schenectady (N.Y.) will be on view in the Steinmetz Hall during the World's Fair at New York. This spark generator of one million volts is capable of throwing a ten million volt flash over a gap of thirty feet; this takes place within barely fifteen seconds of the moment the lever is pulled to set the machine in operation.

## Dramatic Publicity for Car Radio

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

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

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

## Torquay Municipal Orchestra

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

## Variety from Hanley

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

## Seaside Bands Broadcast

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

## SOLVE THIS!

### PROBLEM No. 344

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

### Solution to Problem No. 343

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

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

# AN EXPERIMENTAL ALL-WAVE TUNER

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

By "The Experimenters"

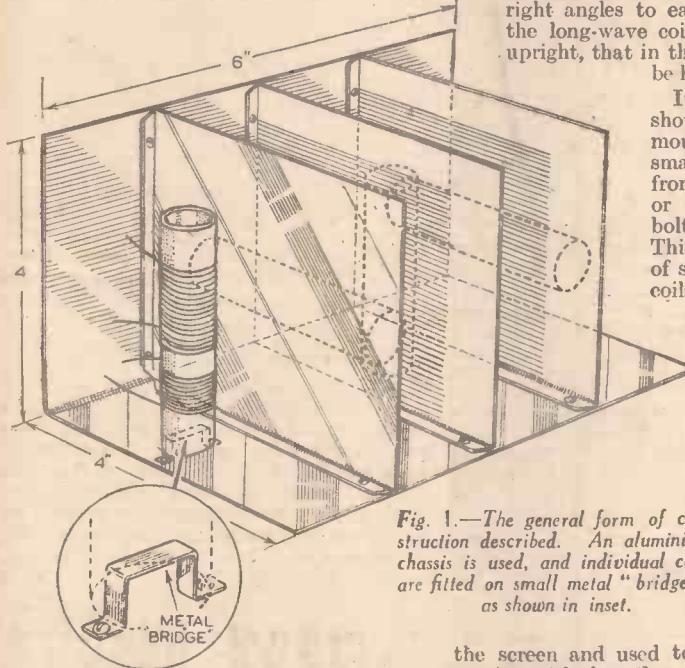
**T**HREE are plenty of all-wave tuners on the market, but most of them are fairly expensive, and many are not easily adaptable to individual requirements. Quite apart from that, the real constructor gains far more pleasure from making his own components than from buying them ready for use. It should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

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

Inset to Fig. 1 is shown the method of mounting the coils: a small "bridge" made from strip aluminium or brass is riveted or bolted to the chassis. This "bridge" is made of such a size that the coils fit tightly over it.

The flat screens can be riveted or bolted to the angle screen, making sure that a good and tight joint is secured. Leads from the coils should, for preference, be made from rubber-covered flex, which can be passed through holes in the screen and used to make direct connection with the other components.

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



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

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

## Separate Coils

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

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

## Rotary Switches

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

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

## For Intervalve Tuning

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

(Continued overleaf)

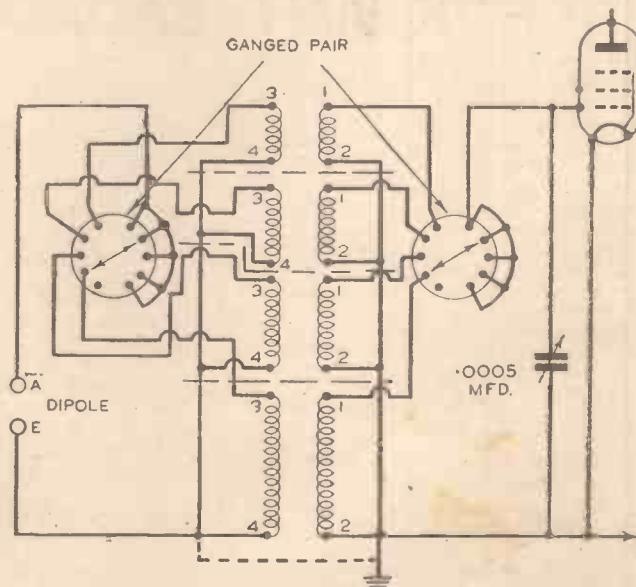


Fig. 2.—This circuit shows how a four-range tuner can be used with a double-pole five-way rotary switch. Connections are shown for a dipole aerial, but an ordinary aerial earth system can be used by making the connection shown by the broken line.

## AN EXPERIMENTAL ALL-WAVE TUNER

(Continued from previous page.)

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

### S.W. and M.W. Coils

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

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

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

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

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

### For Long Waves

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

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

### Matching

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

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

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

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

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

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

### General Coil Data

In the case of all coils it is important

## IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, April 19th.—Visit of the B.B.C. Symphony Orchestra to Wolverhampton: Concert in the Civic Hall. Thursday, April 20th.—Lucky Dip, Thirteenth edition; a weekly magazine programme.

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

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

### REGIONAL (342.1 m.)

Wednesday, April 19th.—Concert Party programme.

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

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

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

### MIDLAND (297.2 m.)

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

Thursday, April 20th.—Ten Years and

All That, 1929-1939; musical memories.

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

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

### WEST OF ENGLAND (285.7 m.)

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

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

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

Saturday, April 22nd.—Squire's Party.

### WELSH (373.1 m.)

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

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

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

Saturday, April 22nd.—Orchestral concert.

### NORTHERN (449.1 m.)

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

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

Friday, April 21st.—Orchestral programme.

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

### SCOTTISH (391.1 m.)

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

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

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

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

### NORTHERN IRELAND (307.1 m.)

Wednesday, April 19th.—Band concert.

Thursday, April 20th.—Chamber music.

Friday, April 21st.—Choral programme.

Saturday, April 22nd.—Band concert.



# SHORT-WAVE SECTION

## IMPROVISED S.-W. APPARATUS

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

By W. J. Delaney

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

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

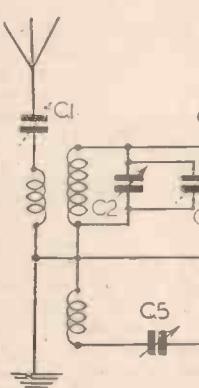


Fig. 1.—A standard short-wave circuit, showing how an L.F. stage may be added.

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

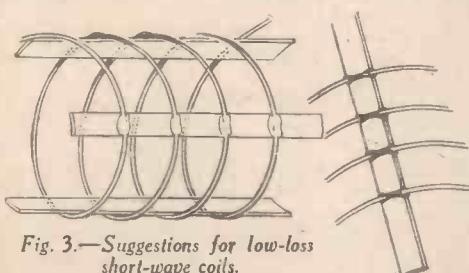
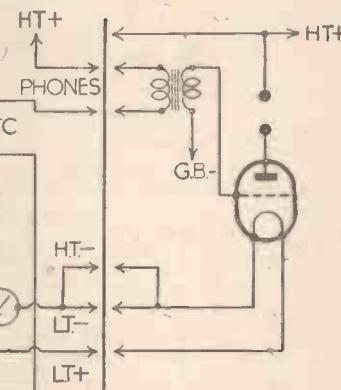


Fig. 3.—Suggestions for low-loss short-wave coils.

### Condensers

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

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



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

### Using Old Vanes

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

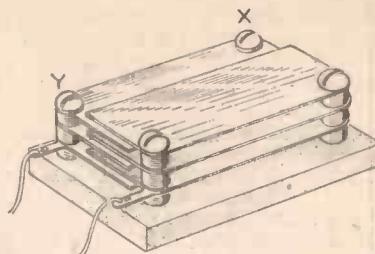


Fig. 2.—A fixed or pre-set condenser made up from odd plates from a dismantled variable condenser.

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

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

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

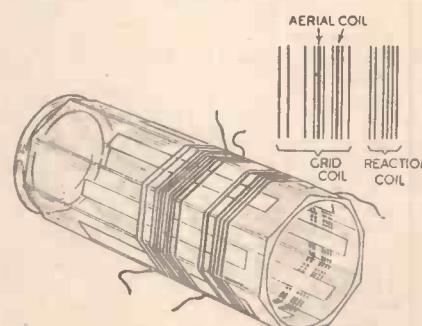


Fig. 4.—A novel method of making a low-loss self-supporting coil with 3 windings.

**SHORT-WAVE SECTION**

(Continued from previous page)

**The Coil**

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

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

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

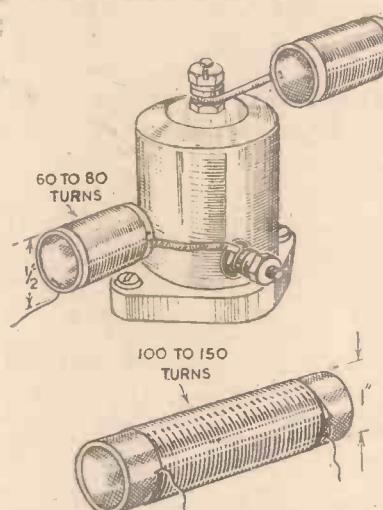


Fig. 5.—A simple but efficient home-made S.W. choke and a suggestion for improving an old choke.

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

**H.F. Choke**

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

## Leaves from a Short-wave Log

**Melbourne Adopts The Kookaburra**

**V**LRL3, Melbourne (previously known as the Lyndhurst transmitter), is now well heard on 25.25 m. (11.88 mc/s) from G.M.T. 09.00-12.00. Although only advertising broadcasts on weekdays it has also recently been logged on a Sunday. Time signal is given by means of the conventional "six pips" at G.M.T. 21.00. The studio has adopted the laughing call of the Kookaburra made so popular by the Sydney VK2ME transmitter.

**Radio Romania on Short Waves**

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

**Guadeloupe Changes Its Wavelength**

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

**Radio Teheran Calling**

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

**Don't be Misled**

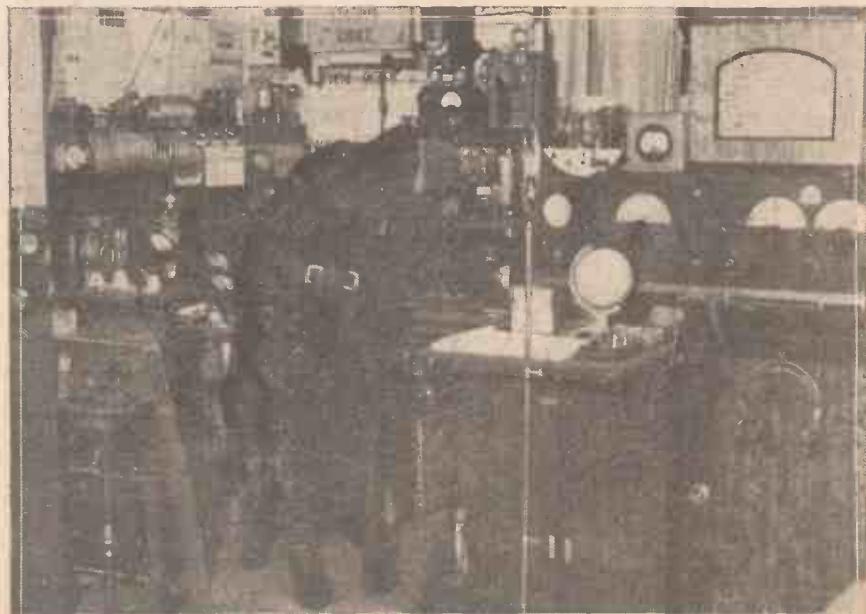
**S**OME confusion is caused by the fact that one may hear Italian broadcasts on two neighbouring channels, namely, 31.02 m. (9.67 mc/s), and on 31.09 m. (9.65 mc/s). These are two entirely different stations, the former being Rome (Prato Smeraldo) I2R09, and the latter IAB, Addis Ababa (Abyssinia). Wait for the call to confirm identification as both possess a woman announcer, thus complicating the puzzle.

**That Illicit West African Station**

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

**New Venezuelan Transmitter**

**Y**V4RQ, Puerto Cabello (Venezuela) is a new 2-kilowatt station now operating nightly from G.M.T. 23.00 on 59.76 m. (5.02 mc/s). The call is given out every quarter of an hour, and is followed by a short military march.



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

# ON YOUR WAVELENGTH

## National Television Push

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

## Provincial Service

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

## Birmingham the First?

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



By Thermion

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

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

## Will England Lead?

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

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

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

"The speed at which we can go

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

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

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

## The Radiolympia Poster Competition

**T**HE results of the competition held by the R.M.A. Exhibition Sub-Committee for suggestions from members of the trade for the poster and slogan to be used for advertising Radiolympia, has resulted, after a large number of entries had been judged, in the decision to use part of four suggestions, and to award prizes as follows: A Marconiphone representative sent in a design and the slogan, "Let's all go to the Radio Show," and is awarded 10 guineas; while a Philips representative suggested a design for which he is also awarded 10 guineas.

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

## "SEEING IN"

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

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

### Listening With a Purpose

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

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

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

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

## Notes from the Test Bench

### Adapting Tools

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

### Control Knobs

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

### Rubber Mounting

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

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

### A.R.P. Shelters at Ekco Works

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

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

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

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

### Walled, Roofed and Floor-boarded

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

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

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

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

### TO FIND THAT FAULT!

### THE WIRELESS CONSTRUCTOR'S ENCYCLOPÆDIA

5/- or 5/6 by post from

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

## A PAGE OF PRACTICAL HINTS

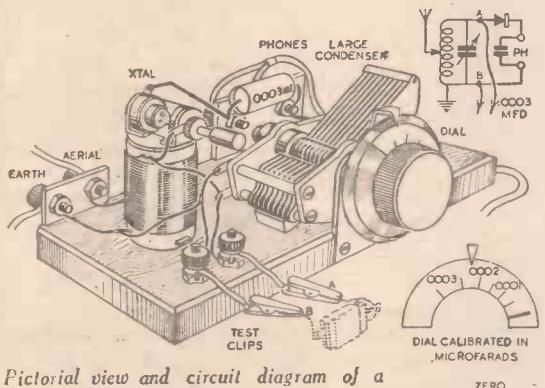
**SUBMIT  
YOUR  
IDEA**

# READERS WRINKLES

**THE  
HALF-  
GUINEA  
PAGE**

### A Condenser Testing Unit

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



Pictorial view and circuit diagram of a condenser testing unit.

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

### A Neat Chassis Test Jig

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

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

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

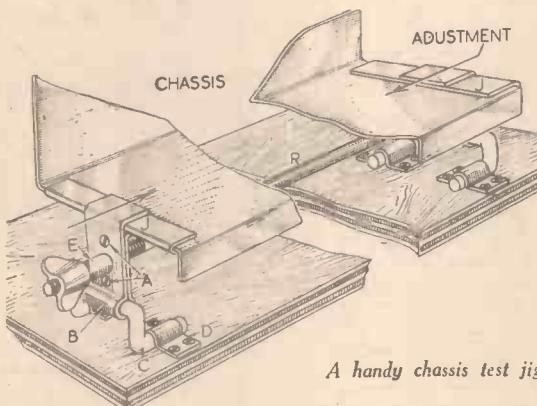
Two lengths of soft steel rod "C" were likewise heated and bent to the form

### THAT DODGE OF YOURS!

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

depicted, these in turn being clamped to a suitable thick plywood baseboard by brass clamping pieces "D."

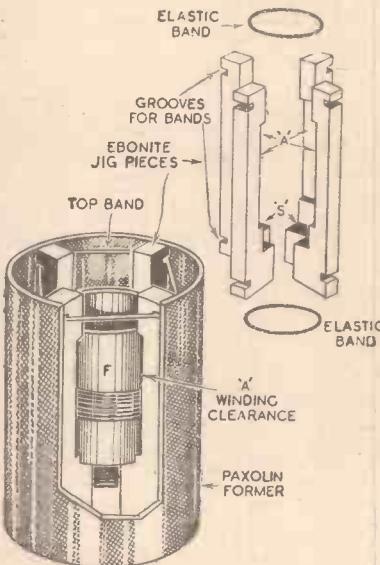
The 4 BA brass screws "A" clamped the shanks securely, and clearance holes were drilled in these shanks for the steel-adjusting rod. To permit ease of adjustment with the wing nut, a brass bush "E" was slipped over the rod between the nut and the hinge shank. The jaws "J" are separate, and are shaped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



A handy chassis test jig.

### An Inductance Coupling Jig

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

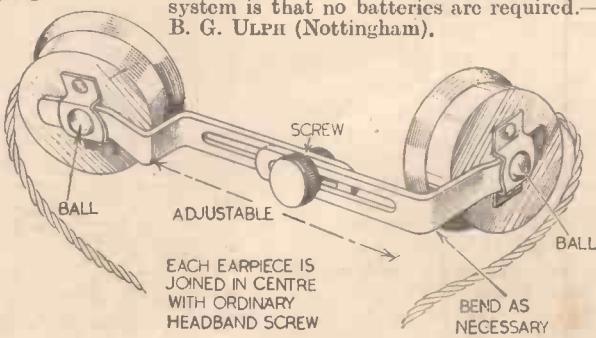


A method of centralising aperiodic coils.

elastic bands, and for this method, slots required cutting in the ends of each support, to recess the elastic bands to prevent fouling the inner surface of the outer former when positioning. It will be apparent that by varying the thickness of the supports, a closer coupling can be arranged, thus increasing the range of their utility.—T. N. MORRIS (West Ham).

### A Simple 'Phone Conversion

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



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

# A REVIEW OF COMMUNI-

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

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

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

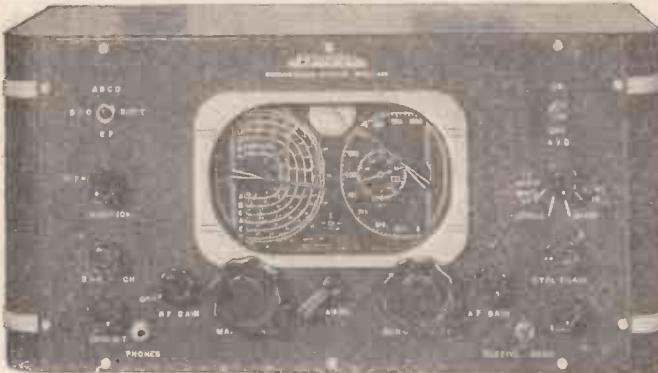
## National Radio

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

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

## Controls

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

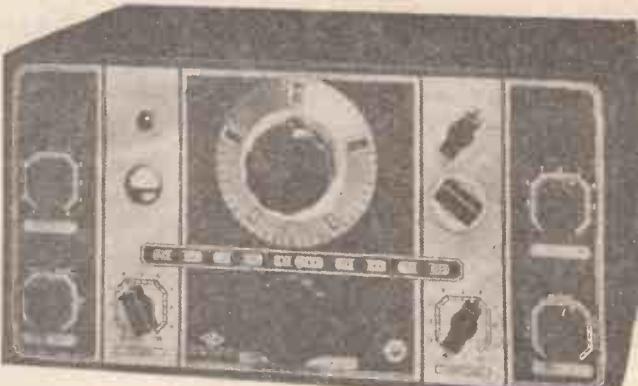


The Howard Model 450A. Note the novel tuning dials with bandspread device.

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

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

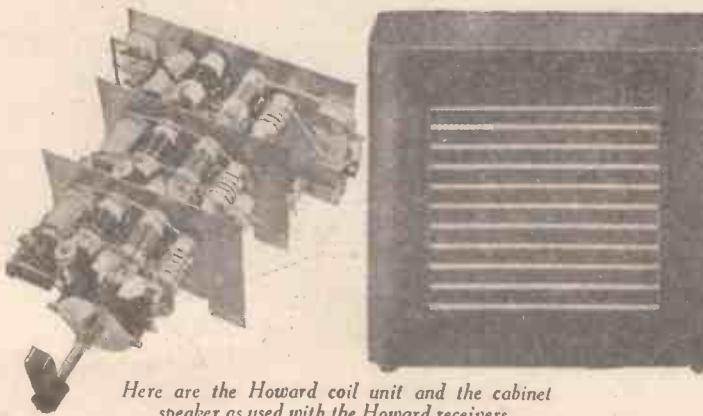
a visual tuning indicator of the cathode-ray type. The aerial input arrangements permit either the doublet or single-wire type of aerial to be used, and the makers suggest that for use below 50 metres an earth connection may be undesirable. The output connections are taken to a 4-prong socket for connection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



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

## Model NC-80X

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

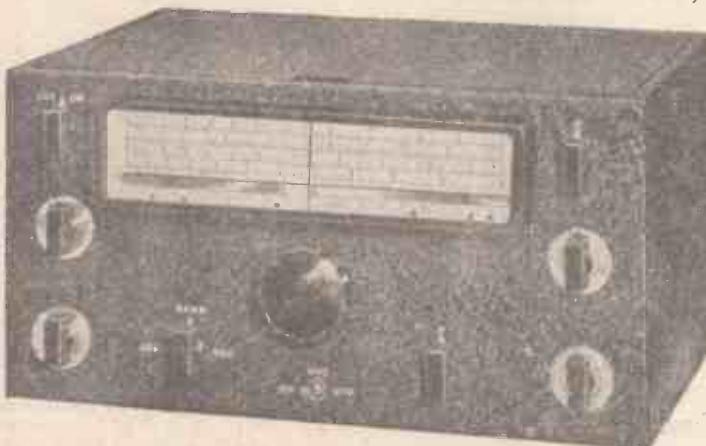


Here are the Howard coil unit and the cabinet speaker as used with the Howard receivers.

# RECEIVERS

which are Obtainable from  
Obtained on Application

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



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

## Hammarlund

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

## Skyrider 23

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

of the 330 degree scale. To one side of this dial is a new signal meter, calibrated in both S units and decibels, and this is balanced on the other side of the tuning dial by a frequency range indicator. Both these dials are indirectly illuminated. A crystal gate is provided, with a separate phasing control, and a combined control gives various degrees of selectivity, A.V.C., on and off and stand-by switching. There are the usual H.F. and L.F. gain controls, a tone control and a pitch control, with a socket for 'phone connection. The I.F. used is 455 kc/s, and the I.F. transformers are of the iron-core type. The total weight of this model is 56lb., and the price is £33 10s. A suitable speaker for the receiver may be obtained for £4.

## RME-69 and RME-70

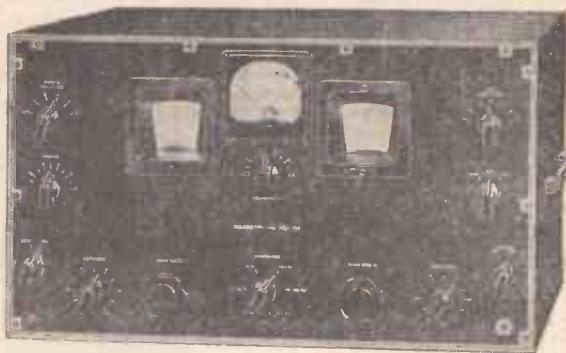
In the RME-69, which is a 9-valve receiver, including rectifier, there is an H.F. stage of special design. The range of this receiver is from 32 mc/s to 550 kc/s and the intermediate frequency is 455 kc/s. There is a band-spread dial in addition to the main tuning dial, and these are balanced with a signal strength meter which indicates the amplitude of the received carrier. It is arbitrarily calibrated in R units and also in decibels. A novel additional feature in this receiver is the inclusion of a modulation-monitor for the purpose of judging quality of L.F. equipment in a 'phone transmitter.

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

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



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



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

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

#### Aerials

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

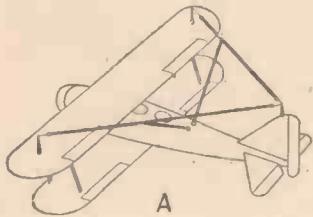


Fig. 2.—The early form of aerial with weighted end.

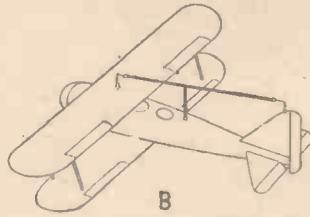


Fig. 3.—Here the weight is divided to avoid fracturing the aerial.

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

The types of weight used for the terminal bob varied in different countries and included solid weights secured on a spring, finned weights to increase downward pull-on

the aerial, and distributed weights to reduce a snatching action which will



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

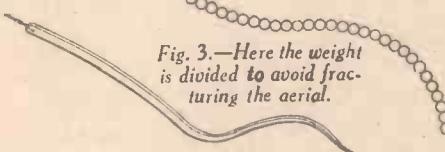
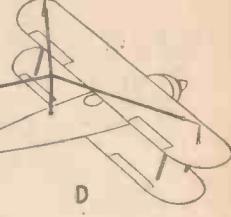
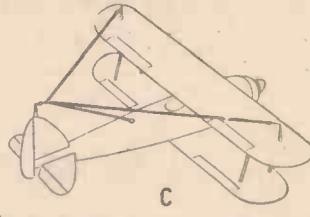


Fig. 5.—A standard insulator.

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

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



#### Details of the Equipment Receiving Radio

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

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

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

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

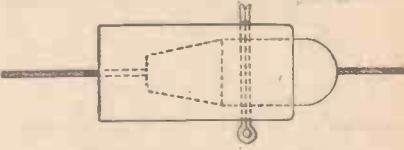


Fig. 5.—A standard insulator.

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

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

Nevertheless, fractures were still frequent. Investigations made by means of a cine-camera showed that the bob frequently made deep dives and lurches, ending with a sharp snatch on the wire when it reached its extreme position.

The kinetic energy of the bob suddenly dissipated in the wire was apparently the cause of the fractures experienced. One way of overcoming this effect was to break up the weight into a number of small units strung in a chain on a steel cable. The movement of this "bead" aerial, as it has been called, is not essentially different from that of the single weight, but, owing to the fact that the complete

# AVIATION

## Used for Transmitting and Signals from Aircraft

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

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

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

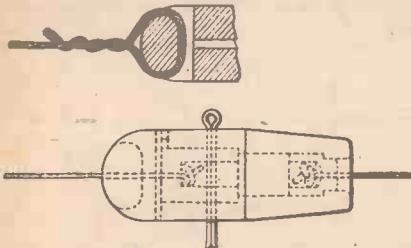


Fig. 6.—A "skirt" to eliminate formation of ice on the insulator.

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

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

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

### Short Waves

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

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

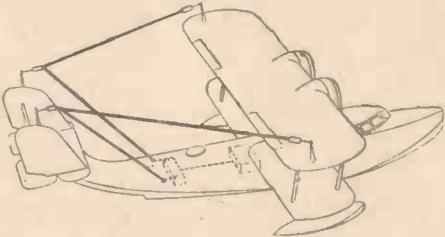


Fig. 8.—This type of aerial has several advantages.

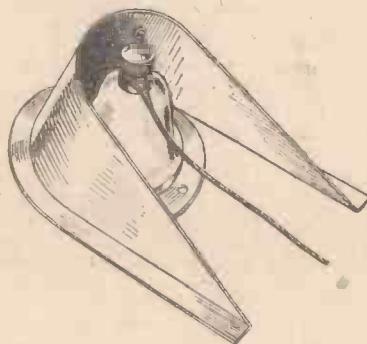


Fig. 7.—A lead-in bush, protected from ice formation.

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

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

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

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

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

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

(Continued on page 142)

# METAL RECTIFIERS

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

By The Technical Staff

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

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

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

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

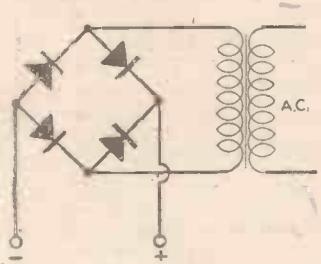


Fig. 1.—The Bridge circuit on the left and the Voltage-doubler on the right. Both give full-wave rectification.

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

### Advantages

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

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

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

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

### Circuits

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

One of the most popular applications of

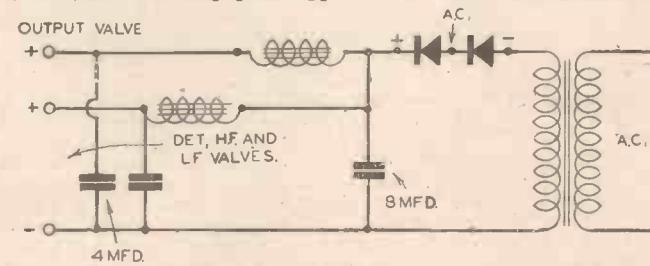


Fig. 2.—The basic circuit of an H.T. eliminator. The three sections are described in the text.

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

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

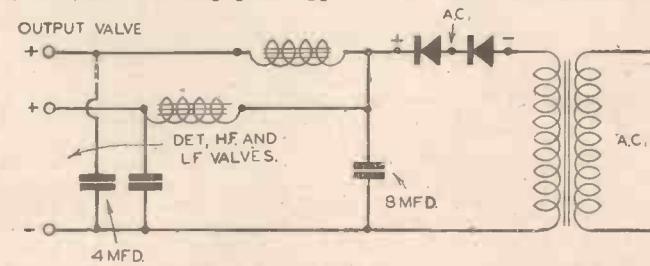


Fig. 3.—A half-wave rectifier suitable for receivers employing Class B or Q.P.P. output.

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

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

### Q.P.P. and Class B Circuits

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

(Continued on facing page)

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

An eliminator circuit recommended by the makers of the Westinghouse Metal

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

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

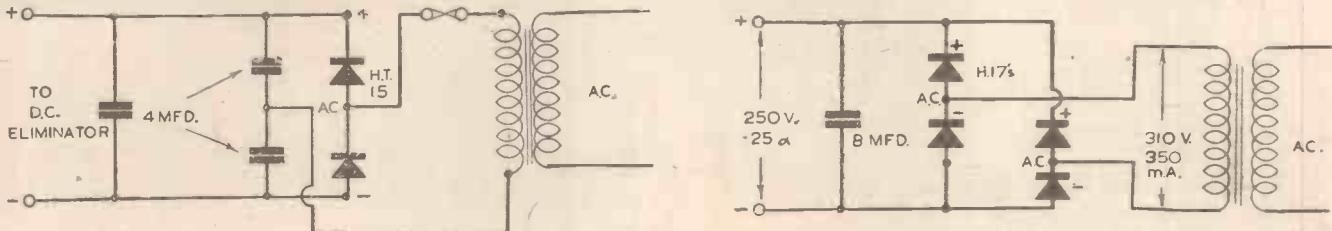


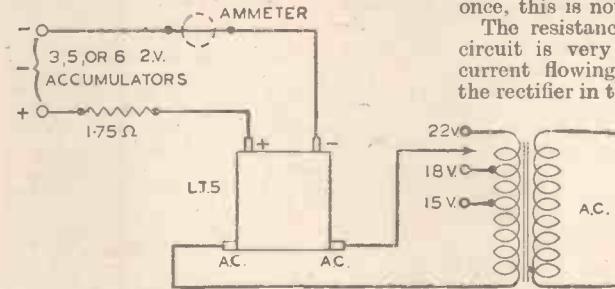
Fig. 4.—The circuit on the left is recommended for supplying D.C. eliminators with a rectified supply from A.C. mains. On the right is shown a rectifying arrangement for use with D.C. receivers on A.C. supplies.

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

#### Conversion of D.C. Apparatus

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

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



#### Battery Charging

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

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

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

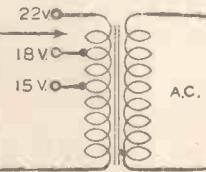


Fig. 5.—One example of a simple but efficient L.T. battery charger.

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

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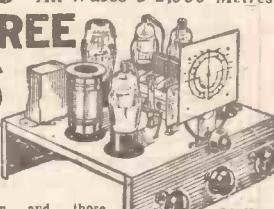
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### The L.C.C. and Television

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

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

### Television Activities Abroad

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

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



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

# The price of silence



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

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



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### TROPHY 3

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3-valve battery and A.C. models. Effective wave-range 6.2 to 550 metres. Amazing sensitivity. Improved slow-motion tuning, metre calibrated scale. Built-in speaker. Supplied complete in cabinet with self-locating inductors for 12-52 metres.

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Cash or C.O.D.  
6 gns., or 7/6 down  
and 18 monthly  
payments of 7/9. **£6:6:0**

**12 MONTHS'** Guarantee  
including valves

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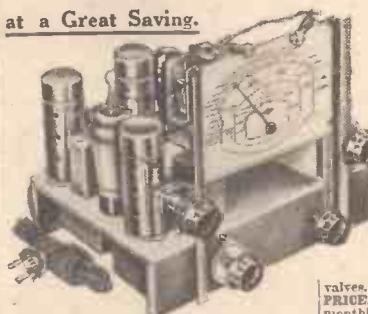
Available with all coils for 6-550 and 18 monthly payments of 7/9.

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Very low H.T. consumption.

Size 11½" wide, 9½" deep, 9½" high.

Complete with 3 British valves and knobs. VALUE 5 gns.

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# TELEVIEWS

## Mechanical Systems in America

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

## An Exhibition Difficulty

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

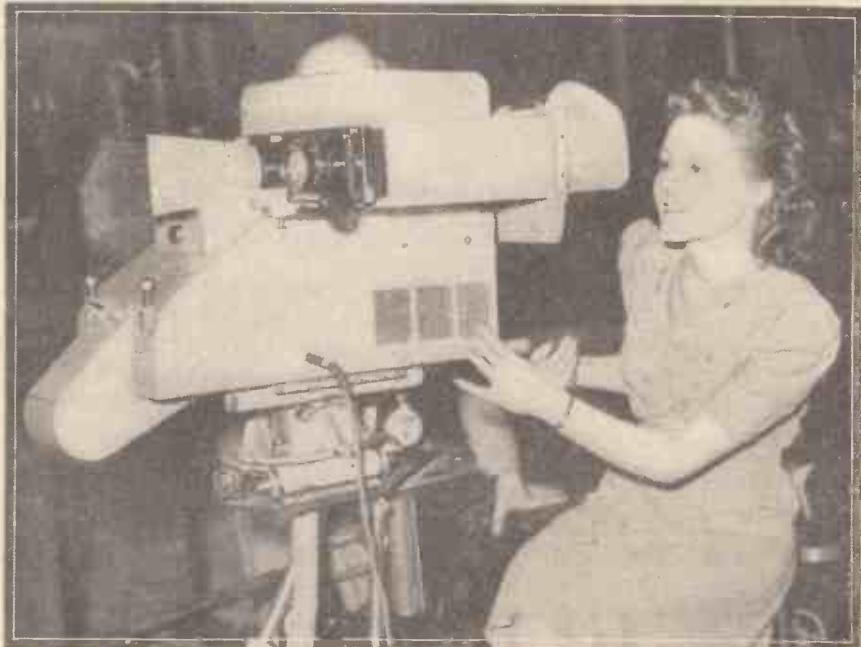
opportunity of comparing the individual performance of sets on a scale which has not been attempted before.

## Television Film Flicker

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

## Airing a Grievance

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



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

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

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

## Routine Tests

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



## Impressions on the Wax

### A REVIEW OF THE LATEST GRAMOPHONE RECORDS

**E**LISABETH SCHUMANN returns to *Lieder* for her record this month.

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

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

#### Operas in English

**T**O their recent series of records of opera in English, *H.M.V.* now add a first class version of the famous quartet from "Rigoletto," and the trio from the Prison Scene of "Faust." The quartet, which reveals Gilda's disillusionment as she overhears the Duke making love to another girl, is sung by Webster Booth, Noel Eadie, Eric Coates and Arnold Matters. The "Faust" trio (which occurs when Mephistopheles and Faust visit Marguerita in prison) is sung by Webster Booth, Joan Cross, Norman Walker and the Sadler's Wells chorus.

### CATALOGUES RECEIVED

*Ediswan Industrial Lighting Handbook*

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

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

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

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

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

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

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

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

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

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

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

### MOTOR REPAIR AND OVERHAULING

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

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

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



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ELECTRICAL MEASURING INSTRUMENT

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



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

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0-120 volts	0-600 volts
Current	0-6 milliamps.
0-30 milliamps.	0-120 milliamps.
Resistance	0-10,000 ohms
0-60,000 ohms	0-1,200,000 ohms
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### ELECTRADIX

To Readers of "Practical and Amateur Wireless".

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

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

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

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

D.G. GENERATORS—Slotted wound—110 volts 1 amp., 15/-; 200 volts 1 amp., 17 6/-; 200 volts 1 1/2 amps., 26/-.

LUGAS AERO, 9/12 volts, 120 watts D.C., enclosed, 4,000 revs. As used on Aircraft wireless. Cost 41/-, Reduced Sale Price, 12 6/-.

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MOTOR BARGAINS, in midget H.P. motors for A.C. or D.C. 200/230 volts, 1/10th H.P. D.O.T. type totally enclosed K.B. Cover 2,000 revs. at a price never before offered; 7/- only. Next

larger G.M. No. 2 type high speed 1/60th H.P. 4,000 revs., 8/-, Larger still 1/45th H.P. Model G.E. 1, 1 1/2, 24/-, Other A.C. motors, 3, 4, 5 and 1 H.P. etc.

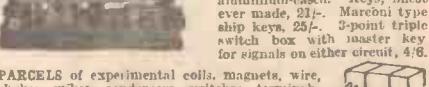
NEW PANELS Metal, Paxolin or Ebonite. Polished aluminum, 18 and 16 gauge, bright or enamelled. 12in. x 12in., 3/-, 18in. x 16in., 5/-, Ebonite quarter-inch Panels 24in. x 24in. for 8/8. SCREENAL for lining Cabinets, anti-interference screen, flexible, fireproof thin asbestos faced aluminum foil back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

TAPPER KEYS for Morse or Signal Transmission. R.A.F. Type KBSL, massive balanced brass pivot bar, spring mounted tungsten contacts. On polished wood base with lamp sockets; Walter's H.T. key. All bakelite, with cover, 10-amp. contacts. Brown's car patrol double-acting, cast aluminium-easel. Keys, finest ever made, 21/-, Marconi type ship keys, 25/-, 3-point triple switch box with master key for signals on either circuit, 4/8.

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

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# LATEST PATENT NEWS

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

## VALVE CIRCUITS FOR WIRELESS RECEPTION.

Naamloze Venootschap Philips' Gloeilampenfabrieken. No. 497,206.

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

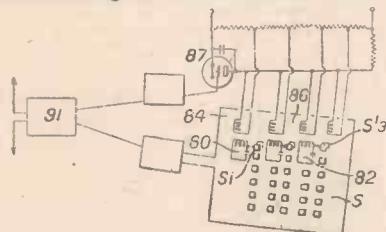


Fig. 1.

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

**TELEVISION.** Toulon, P. No. 497,367. A group S of separate contiguous elements S1 . . . S13 (Fig. 2) in a surface or line is permanently connected to a common transmitting channel 91, and scanning is effected by a local static distributor 87. The distributor supplies successive impulses to coils 84 . . . 86 which bring tuned circuits S0 . . . S2, associated with the elements, to resonance in succession. Alternatively the distributor applies a voltage to the successive individual leads to the elements, which renders them permeable to the signals in turn.

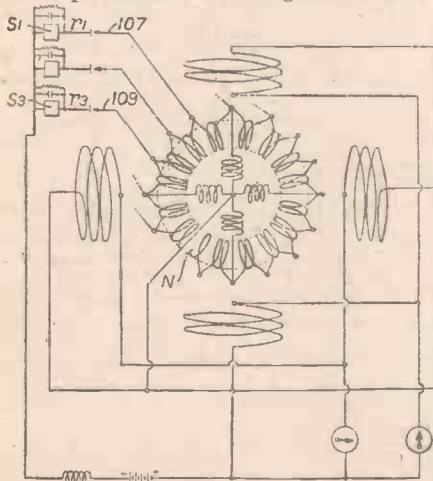


Fig. 2.

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

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

## TELEVISION.

Farnsworth Television, Inc. No. 497,605.

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

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

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

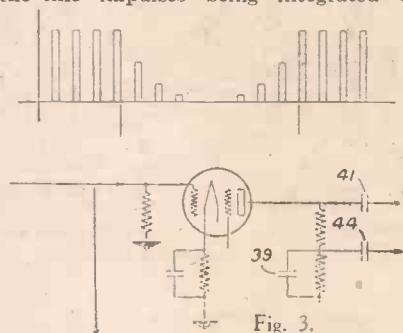


Fig. 3.

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

## NEW PATENTS

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

### Latest Patent Applications.

8392.—Baird Television, Ltd., and Jones, V. A.—Television, etc., apparatus. March 13th.

9053.—Baird Television, Ltd., and Tingley, G. R.—Means for controlling the deflection of cathode ray, etc. March 22nd.

8555.—Baird Television, Ltd., and Trufitt, E. V.—Thermionic valve circuits. March 17th.

8959.—Belling & Lee, Ltd., and Strafford, F. R. W.—Means for attaching radio aerials to supporting masts, etc. March 21st.

8374.—Browne, C. O.—Systems for televising, etc., a photographic record of a scene. March 16th.

8823.—Clothier, S. L., and Hogencamp, H. C.—Apparatus for television communication. March 21st.

8826.—Clothier, S. L., and Hogencamp, H. C.—Motion-picture film scanning May 20th.

8453.—Daimler-Benz Akt.-Ges.—Aerials for wireless reception in motor vehicles. March 16th.

8799.—Edgar, E. C., and Truss, E.—Combined loudspeaker and sound diffuser screen. March 20th.

8656.—Ferranti, Ltd., and Thomas, G. I.—Aerial coupling systems in superheterodyne radio-receivers. March 18th.

8506.—Ferranti, Ltd., Scarby, N. H., and Neill, V. A.—Tuning devices for radio receiving apparatus. March 17th.

8382.—Hughes, R.—Radio programme indicator. March 16th.

8929.—Izzard, A. T.—Wireless receiving aerials, etc. March 21st.

8953.—Kolster-Brandes, Ltd., and Beatty, W. A.—Carrier wave transmission systems. March 21st.

8609.—Marconi's Wireless Telegraph Co., Ltd., Rust, N. M., Brailsford, J. D., Oliver, A. L., and Ramsay, J. F.—Automatically variable frequency selective filters. March 17th.

8610.—Marconi's Wireless Telegraph Co., Ltd., Rust, N. M., Brailsford, J. D., Oliver, A. L., and Ramsay, J. F.—Automatically variable audio correction circuits. March 17th.

8914.—Munro, R.—Radio range-finder apparatus. March 21st.

8559.—Philco Radio & Television Corporation.—Radio tube and socket structures. March 17th.

8712.—Philco Radio & Television Corporation.—Radio tube socket. March 18th.

8713.—Philco Radio & Television Corporation.—Tuning control device for radio receivers, etc. March 18th.

8875.—Radio Corporation of America.—Sound recording. March 20th.

8890.—Rudkin, E. P.—Wireless receiving system. March 21st.

8522.—Scophony, Ltd., and Rosenthal, A. H.—Secret transmission of television, etc. March 17th.

8843.—State, S.—Wireless reception means for use with hair driers, etc. March 20th.

8662.—Taylor, G. H.—Method of wireless communication, etc. March 18th.

8588.—Wallace, M.—Wireless apparatus for the simultaneous reception of a plurality of signals. March 17th.

### Specifications Published.

502,472.—Baird Television, Ltd., and Colls, J. A.—Electron multipliers.

502,172.—Mallory & Co., Inc., P. R.—Variable-inductance tuning devices for radio apparatus. (Cognate Application, 21914/37.)

502,178.—Banfield, B. J.—Radio receivers and the like.

502,251.—Mallory & Co., Inc., P.R.—Radio frequency tuning devices.

502,351.—Baird Television, Ltd., and Ridgeway, D.V.—Television receivers.

502,358.—Carpmael, A. (Veldc, H. R. C. Van de).—Television receivers.

502,269.—Adie & Nephew, Ltd., C. J., and Fletcher, R. A.—Earthing posts for wireless receiving-apparatus.

502,460.—Monge, G. de.—Radio aerials.

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

## PRACTICAL WIRELESS SERVICE MANUAL By F. J. CAMM

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

# LETTERS FROM READERS

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

## "Audible" Radiations

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

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

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

## That Elusive Friendly Spirit!

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

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

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

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

## Correspondent Wanted

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

## U.S.A. and Canadian Police Car Calls

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

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

CUT THIS OUT EACH WEEK.

## Do you know

—THAT in a transmitter it is possible to measure the modulation by means of a cathode-ray oscilloscope.

—THAT the lead-in wire in most types of aerial is an actual part of the aerial and must be considered when calculating the length of the aerial.

—THAT it is a dangerous practice to break the anode circuit of high-powered valves whilst H.T. and L.T. are still connected.

—THAT when considering condenser voltage ratings, surge voltages, or peak voltages, have to be considered.

—THAT special insulated resistors are now available and remove the risk of short-circuits to a metal chassis.

—THAT the glass of a window may be used as the dielectric of a condenser coupling the aerial lead-in to a receiver.

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

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

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

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

## Prizewinners' Thanks

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

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

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

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

## Decoupling

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

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

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

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

## Logged on the "Prefect" S.W. Three

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

YR5PP, 5AA, SM6WE, LX1AY, LY1J, 6J, 1S, CTICK, IQG, IQA, IZZ, OZ9R, IITKM, G6VX, 5LU, 8CP, ES5C, F3DY, LAIF, HA2C.

SU1MW, 1CR, EQ1AY (?), HP9CK, LU1QA.

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

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

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

W4DRZ, 6GRL, 7DRX, 8CMA.

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

April 22nd, 1939

# RADIO CLUBS & SOCIETIES

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

## SLOUGH AND DISTRICT SHORT-WAVE CLUB

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

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

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

## THE SURREY RADIO CONTACT CLUB

Club Headquarters : 70, George Street, Croydon, Surrey.  
Secretary : S. A. Morley, 22, Old Farleigh Road, Selston, Surrey.

THE April meeting of the Club which took place on the 4th instant, consisted of a sale of members' surplus gear. The auctioneering was very well conducted by Mr. J. W. Hooke (G5XH), who was ably assisted by his two clerks G2KU, and Mr. Drummond. It is very gratifying to know that the Club is taking charge of the 1.7 m/c N.F.D. station, which has been allotted to Croydon. The site has been chosen at Riddlesdown which is about 600ft. above sea-level, and at the present time members are busily engaged in preparing the gear for this event which takes place during the first week-end in June. Will prospective members please note the name and address of the new secretary.

## COLDERS GREEN AND HENDON RADIO SCIENTIFIC SOCIETY

All communications to be addressed to : H. Ashley Scarlett, 60, Pattison Road, Hampstead, N.W.2.  
THE Open 40-metre Direction Finding Competition will be held on May 21st. The area of operations will be about : St. Albans—Berkhamsted—Dunstable—Stevenage. Map to be used.

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

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

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

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

## ROMFORD AND DISTRICT AMATEUR RADIO SOCIETY

Meetings : Every Tuesday, 8.30 p.m., at Red Triangle Club, North Street, Romford, Essex.  
Hon. Sec. : R. C. E. Beardow (G3FT), 3, Geneva Gardens, Chadwell Heath, Essex.

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

## EASTBOURNE AND DISTRICT RADIO SOCIETY

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

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

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

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

## THE MEDWAY AMATEUR TRANSMITTERS' SOCIETY

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

Hon. Sec. : S. A. C. Howell (G5FN), "Veroulque," Broadway, Gillingham.

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

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

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

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

## THE EXETER AND DISTRICT WIRELESS SOCIETY

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

Meetings : Mondays at 8 p.m.

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

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

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

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

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

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

## ASHTON-UNDER-LYNE AND DISTRICT AMATEUR RADIO SOCIETY

Headquarters : Commercial Hotel, 86, Old Street, Ashton-under-Lyne.

Meetings : Alternate Wednesdays from April 12th.

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

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

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

## DOLLS HILL RADIO COMMUNICATION SOCIETY

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

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

THE president (G5SK), has now completed a series of talks on transmitter design. A power pack was designed to be capable of giving 200 mA. at 400 volts, using an 83 mercury vapour rectifier, and choke input for smoothing. For the P.A. stage a T20 valve was used, to be run at an input of 24 watts, and for the modulator a 6L6 was used, under conditions which enabled it to handle 11.5 watts of audio at 7 per cent. distortion; this should enable a good quality signal, as regards amateur work, to be radiated. On April 11th, a junk sale was held. A talk of particular interest to amateurs who deal with high voltages is to be given by G6OV, on April 25th, at 8 p.m., in which G6OV will lecture on methods of first aid in cases of electric shock. Any readers of PRACTICAL AND AMATEUR WIRELESS who are interested will be welcome at this meeting.

## RADIO IN AVIATION

(Continued from page 133.)

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

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

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

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

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

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

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

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

## PATENTS AND TRADE MARKS

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



# QUERIES and ENQUIRIES

## Twin Turntables

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

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

## Parts for Receivers

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

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

## D.C. Mains and Earth

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

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

to earth the mains, and this blows the fuse. A 2-mfd. fixed condenser rated at 250 volts would be suitable, and this is all that is needed to avoid the trouble.

To charge at .5 amps from a 200-volt supply you need a 100-watt lamp in series with the mains lead.

## Adding a Pick-up

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

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

## RULES

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

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

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

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

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

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

## Electrolytic Condenser Mounting

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

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

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

## Visual Tuning Indicator

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

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

## A Licence Problem

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

## REPLIES IN BRIEF

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

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

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

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

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

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

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

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

# Practical and Amateur Wireless BLUEPRINT SERVICE

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Two-valve : Blueprints, 1s. each.  
Four-range Super Mag Two (D, Pen) .. PW36B  
The Signet Two (D & LF) .. PW76

Three-valve : Blueprints, 1s. each.  
The Long-range Express Three (SG, D, Pen) .. 24.4.37 PW2

Selectone Battery Three (D, 2 LF (Trans)) .. — PW10

Sixty Shilling Three (D, 2 LF (RC & Trans)) .. — PW34A

Leader Three (SG, D, Pow) .. 22.5.37 PW35

Summit Three (HF Pen, D, Pen) .. PW37

All Pentode Three (HF Pen, D (Pen), Pen) .. 29.5.37 PW40

Hall-mark Three (SG, D, Pow) .. 12.6.37 PW41

Hall-mark Cadet (D, LF, Pen (RC)) .. 16.8.35 PW48

F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three) .. 13.4.35 PW49

Genet Midget (D, 2 LF (Trans)) .. June '35 PM1

Cameo Midget Three (D, 2 LF (Trans)) .. 8.6.35 PW51

1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) .. —

Battery All-Wave Three (D, 2 LF (RC)) .. —

The Monitor (HF Pen, D, Pen) .. —

The Tutor Three (HF Pen, D, Pen) .. 21.3.36 PW61

The Centaur Three (SG, D, P) .. 14.8.37 PW62

F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) .. 31.10.36 PW64

The "Cot" All-Wave Three (D, 2 LF (RC & Trans)) .. 18.2.39 PW69

The "Rapide" Straight 3 (D, 2 LF (RC & Trans)) .. 4.12.37 PW72

F. J. Camm's Oracle All-Wave Three (HF Det., Det., Pen) .. 28.8.37 PW78

1938 "Triband" All-Wave Three (HF Pen, D, Pen) .. 22.1.38 PW84

F. J. Camm's "Sprite" Three (HF Pen, D, Tet) .. 26.3.38 PW87

The "Hurricane" All-Wave Three (SG, D (Pen), Pen) .. 30.4.38 PW89

F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet) .. 3.9.38 PW92

Four-valve : Blueprints, 1s. each.  
Sonotone Four (SG, D, LF, P) .. 1.5.37 PW4

Fury Four (2 SG, D, Pen) .. 8.5.37 PW11

Beta Universal Four (SG, D, LF, CLB) .. —

Nucleon Class B Four (SG, D, (SG), LF, CLB) .. 6.1.34 PW34B

Fury Four Super (SG, SG, D, Pen) .. — PW34C

Battery Hall-Mark 4 (HF Pen, D, Push-Pull) .. —

F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) .. 26.9.36 PW67

All-Wave "Corona" 4 (HF Pen, D, LF, Pow) .. 9.10.37 PW79

"Acme" All-Wave 4 (HF Pen, D (Pen), LF, CLB) .. 12.2.38 PW83

The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) .. 3.9.38 PW90

Mains Operated.

Two-valve : Blueprints, 1s. each.  
A.C. Twin (D (Pen), Pen) .. —

A.C.-D.C. Two (SG, Pow) .. —

Selectone A.C. Radiogram Two (D, Pow) .. —

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D.C. Ace (SG, D, Pen) .. —

A.C. Three (SG, D, Pen) .. —

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D.C. Premier (HF Pen, D, Pen) .. —

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F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) .. —

"All-Wave" A.C. Three (D, 2 LF (RC)) .. —

A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) .. —

Mains Record All-Wave 3 (HF Pen, D, Pen) .. —

All-World Ace (HF Pen, D, Pen) .. —

Four-valve : Blueprints, 1s. each.  
A.C. Fury Four (SG, SG, D, Pen) .. —

A.C. Fury Four Super (SG, SG, D, (Pen)) .. —

A.C. Hall-Mark (HF Pen, D, Push-Pull) .. —

Universal Hall-Mark (HF Pen, D, Push-Pull) .. 9.2.35 PW47

A.C. All-Wave Corona Four .. 6.11.37 PW81

## No. of Blueprint Date of Issue.

## SUPERHETS.

Battery Sets : Blueprints, 1s. each.  
55 Superhet (Three-valve) .. 5.6.37 PW40

F. J. Camm's 2-valve Superhet .. 13.7.35 PW52

F. J. Camm's "Vitesse" All-Waver (5-valver) .. 27.2.37 PW75

Mains Sets : Blueprints, 1s. each.  
A.C. £5 Superhet (Three-valve) .. — PW43

D.C. £5 Superhet (Three-valve) .. 1.12.34 PW42

Universal £5 Superhet (Three-valve) .. — PW44

F. J. Camm's A.C. £4 Superhet 4 .. 31.7.37 PW50

F. J. Camm's Universal £4 Superhet 4 .. 22.10.39 PW60

"Qualiton" Universal Four .. 16.1.37 PW73

Four-valve : Double-sided Blueprint, 1s. 6d. PW78

Push-Button 4, Battery Model .. 22.10.39 PW80

Push-Button 4, A.C. Mains Model .. — PW83

## SHORT-WAVE SETS.

One-valve : Blueprint, 1s. Simple S.W. One-valver .. 0.4.33 PW88

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The "Fleet" Short-wave Two (D (HF Pen), Pen) .. 27.8.38 PW80

Three-valve : Blueprints, 1s. each. Experimenter's Short-wave Three (SG, D, Pow) .. 30.7.38 PW30A

The Prefect 3 (D, 2 LF (RC and Trans)) .. 7.8.37 PW63

The Band-Spread S.W. Three (HF Pen, D (Pen), Pen) .. 1.10.38 PW68

PORTABLES.

Three-valve : Blueprints, 1s. each. F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) .. — PW65

Parvo Flyweight Midget Portable (SG, D, Pen) .. 10.6.37 PW77

Four-valve : Blueprint, 1s. "Imp" Portable 4 (D, LF, LF, Pen) .. 19.3.38 PW86

MISCELLANEOUS.

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

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Lucerne Minor (D, Pen) .. — AW426

A Modern Two-valver .. — WM409

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Fair and Family Three (D, Trans, Class B) .. — AW410

£5.5s. S.G.3 (SG, D, Trans) .. 25.11.33 AW412

£5.5s. Three : De Luxe Version (SG, D, Trans) .. 2.12.33 AW422

Lucerne Straight Three (D, RC, Trans) .. — AW435

Transportable Three (SG, D, Pen) .. — AW437

Simple-Tune Three (SG, D, Pen) .. June '33 WM271

Economy-Pentode Three (SG, D, Pen) .. — WM327

"W.M." 1934 Standard Three (SG, D, Pen) .. Oct. '33 WM337

£3.3s. Three (SG, D, Trans) .. Mar. '34 WM354

1935 £6. Battery Three (SG, D, Pen) .. — WM371

I.P.T. Three (Pen, D, Pen) .. — WM380

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Minitube Three (SG, D, Trans) .. Oct. '35 WM395

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2HF Four (2 SG, D, Pen) .. — AW421

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Lucerne Straight Four (SG, D, LF, Trans) .. — WM350

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Mantovani A.C. Three (HF Pen, D, Pen) .. — WM374

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'Varsity Four .. Oct. '35 WM395

The Request All-Waver .. June '36 WM407

1935 Super Five Battery (Superhet) .. — WM379

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Heptode Super Three A.C. .. May '34 WM350

"W.M." Radiogram Super A.C. .. — WM366

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Family Portable (HF, D, RC, Trans) .. — AW447

Two H.F. Portable (2 SG, D, QP2) .. — WM363

Tyres Portable (SG, D, 2 Trans) .. — WM367

SHORT-WAVE SETS—Battery Operated.

One-valve : Blueprints, 1s. each.

S.W. One-valver for America .. 15.10.33 AW420

Rome Short-waver .. — AW452

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Home-made Coil Two (D, Pen) .. — AW440

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World-ranger Short-wave 3 (D, RC, Trans) .. — AW355

Experimenter's 5-metre Set (D, Trans, Super-regen) .. 30.6.34 AW433

Experimenter's Short-waver (SG, D, Pen) .. Jan. 10. '35 AW463

The Carrier Short-waver (SG, D, P) .. July '35 WM300

Four-valve : Blueprints, 1s. 6d. each.

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Standard Four-valver Short-waver (SG, D, LF, P) .. Mar. '35 WM383

Superhet : Blueprint, 1s. 6d.

Simplified Short-wave Super .. Nov. '35 WM397

Mains Operated.

Two-valve : Blueprints, 1s. each.

Two-valve Mains Short-waver (D, Pen) A.C. .. — AW453

"W.M." Hand-spread Short-waver (D, Pen) A.C.-D.C. .. — WM368

"W.M." Long-wave Converter .. — WM380

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Emigrator (SG, D, Pen) A.C. .. — WM352

Four-valve : Blueprint, 1s. 6d.

Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) .. Aug. '35 WM301

MISCELLANEOUS.

S.W. One-valve Converter (Price 6d.) .. — AW329

Enthusiast's Power Amplifier (1/6) .. — WM387

Listener's 5-watt A.C. Amplifier (1/6) .. — WM392

Radio Unit (2v.) for WM392 (1/6) .. Nov. '35 WM398

Harris Electrogram (battery amplifier) (1/6) .. — WM399

De Luxe Concert A.C. Electrogram (1/6) .. Mar. '36 WM403

New Style Short-wave Adapter (1/6) .. — WM388

Trickle Charger (6d.) .. Jan. 5, '35 AW402

Short-wave Adapter (1/6) .. — AW450

Superhet Converter (1/6) .. — AW457

B.L.D.C. Short-wave Converter (1/6) .. May '36 WM405

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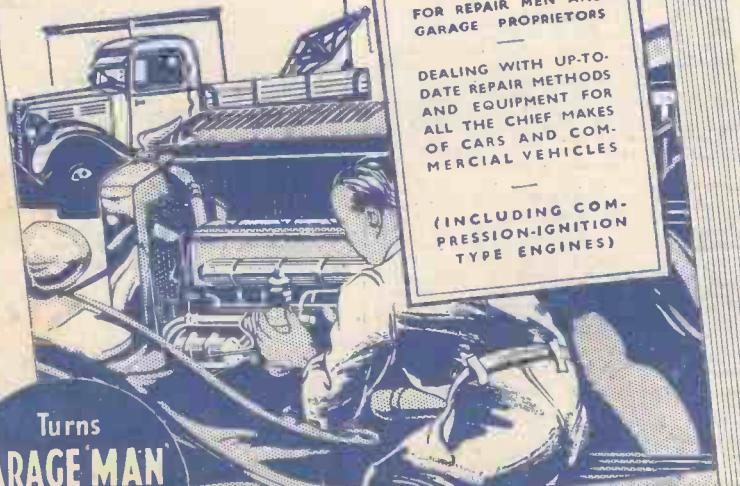
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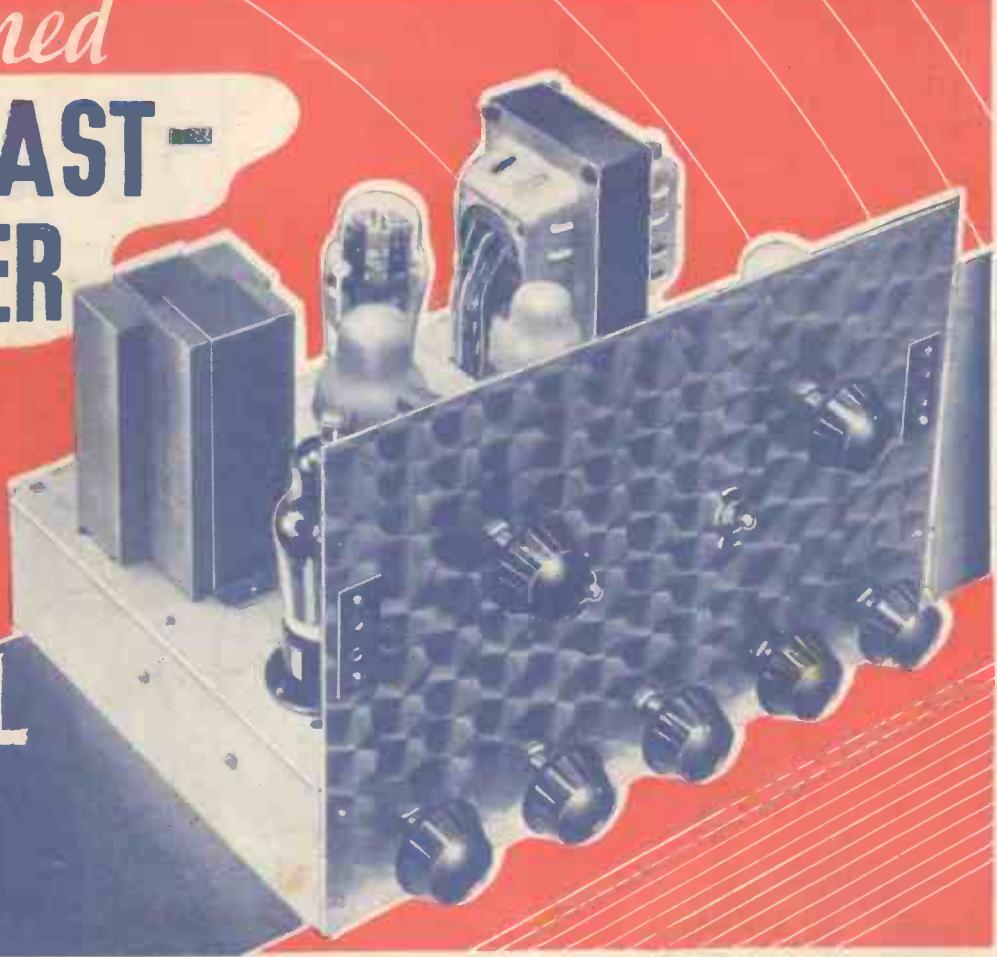
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April 29th, 1939.

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# THE S.S. ONE-VALVER—See Page 147



# Practical and Amateur Wireless

Edited by F. J. CAMM

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

Vol. XIV. No. 345 April 29th, 1939.

## ROUND the WORLD of WIRELESS

### Contrast Expansion

THE various articles which we have published from time to time on contrast expansion have aroused considerable interest, and it would appear that these radio "sidelines" have a wide appeal. There has been, however, in the past a scarcity of information regarding suitable circuits for English valves and components, and when these have been employed in American circuits the results have not always been of the high standard which was expected. The General Electric Company have developed a circuit, however, which works admirably and which also possesses features of unusual interest to those listeners who are anxious to improve the results obtained with ordinary gramophone records. In this issue we describe a novel two-purpose unit built round the expansion circuit, and have incorporated a special tone-control stage. Switches have been incorporated so that either the expander or the tone control or both may be used as desired, and by means of a unit of this type the reproduction from gramophone records may be made to attain a realism which must be heard to be believed. The tone-control section may, of course, be used for radio reproduction as well as with records, and gives better results than are usually obtained with normal forms of tone control, owing to the separate boosting and cutting controls for high and low notes. The expander does not, of course, operate on radio in the same manner as with records, but with certain programmes it may be used with good effect.

### B.B.C. Wavelength Changes

IT has been decided that the wavelength of the Droitwich and London Regional transmitters shall be modified as from midnight on March 3rd next year. The Broadcasting Conference which has been meeting in Switzerland has recommended these changes in conjunction with others and have proposed that the new wavelength of Droitwich shall be 1,511 metres and of the London Regional 327.5 metres.

### American Television

THE success of the recent cinema television relays of the big fights and other events has resulted in the Americans investigating the situation, and it is stated that as a result they are to install Baird big-screen apparatus in a

number of New York cinemas so that similar events may be shown to the public there.

### Coal-mine Radio

A FURTHER stage in the application of radio as a life-saver has been made in Australia. Two-way radio-telephone apparatus is to be installed in coal mines there and will facilitate the sending of warnings in the event of any risk of danger,

### ON OTHER PAGES

	Page
The S.S. One-valver	147
Bad Contacts	149
On Your Wavelength	151
Short-wave Section	153
Readers' Wrinkles	155
Combined Contrast Expansion and Tone Control	156
—	156
Radio in Aviation	158
Practical Television	162
Readers' Letters	165
Queries & Enquiries	167

will enable any entombed parties to assist in rescue work by relaying instructions, and will also speed up the delivery of coal by enabling drivers of trucks to receive instructions whilst travelling.

### A Licence Question

TWO fishermen were recently fined 10s. each at Campbeltown, near Edinburgh, for operating unlicensed wireless receivers on their skiffs. During the hearing of the case the authorities stressed the fact that the licence for a home receiver did not cover any other wireless installations belonging to the licensee.

### B.B.C. Exhibition

THE *Nottingham Journal* has compiled figures for the touring exhibit which the B.B.C. recently sent to the Midlands,

and the following figures are given: Birmingham, 16,406 (12 days); Nottingham, 10,562 (15 days); Leicester, 7,486 (14 days); Wolverhampton, 4,872 (13 days).

### American Times

ON Sunday next, April 30th, time in the Eastern United States changes from Eastern Standard Time to Eastern Daylight Saving Time—advancing the clock one hour. Changes should accordingly be made to any published schedules which you may possess, bearing in mind that we are also now one hour advanced on G.M.T.

### New Bournemouth Studios

ALTHOUGH the transmitter at Bournemouth is to be closed down, arrangements are being made to install new studios there. These will normally feed the Start Point Station, connection being made through the control room at Bristol. This latter point is now to be made the main junction for all West of England relays and will take over much of the work previously carried out at Gloucester.

### Humour in Music-making

THE second of R. Sterndale Bennett's illustrated talks, "Humour in Music-making," will be heard on May 3rd in the Midland programme. He will show the various means which composers have used—including imitation and caricature and whimsicality—to express humour in vocal and instrumental music. The vocalists will be Geoffrey Davis (tenor), Cecil Cope (baritone) and the B.B.C. Midland Singers, conducted by Edgar Morgan. Mr. R. Sterndale Bennett is Music Director of Uppingham School. In the programme are some of the compositions of his brother, T. C. Sterndale Bennett, the entertainer.

### National Service

J. BOWEN EVANS will give the first of a series of fortnightly talks reporting progress in the National Service Campaign in so far as it concerns Wales, on May 1st. J. Bowen Evans, Editor of a North Wales group of newspapers, will in his talk, report progress in North Wales generally and will give the latest information concerning enrolment at the various depots and centres of the different services in North Wales towns and rural areas. A second talk will be given later in May by a speaker who will describe the progress made in South Wales.

# ROUND the WORLD of WIRELESS (Continued)

## A Broadcaster on Wheels

A MOBILE radio transmitter installed on a railway truck capable of being taken to various parts of the Northern Island, where the reception of the New Zealand main programmes is difficult, is now being used in this manner for the relay of the Auckland station studio entertainments. When stationary at a siding, the transmitter is also brought into action for the broadcasts of local news bulletins and official announcements.

## Increased Power to Polish Stations

IT is stated that the power of the main Polish broadcasting transmitters are to be greatly increased; Warsaw will be made to radiate on 300 kilowatts, and the



*A fund organised by the Bristol Channel district of the National Seamen's Union has raised enough money to provide 20 six-valve radio sets to British steamers. The first public presentation of one of these sets has been made to the crew of the steamer "Bristol City," at the Alexandra Docks, Newport, by Mr. W. Jones, the district secretary. The illustration shows members of the crew listening to the set in their quarters aboard the "Bristol City," in Newport Docks.*

output of Lodz and Katowice is to be raised to 50 and 10 kilowatts respectively.

## Germany Bans Reception of Foreign Broadcasts

ACCORDING to the official German organ *Deutsche Justiz*, any German person repeating to others information culled from foreign broadcasts which is considered derogatory or prejudicial to the welfare of the Third Reich, or of the Nazi Party, is liable to a two-year term of imprisonment. If the information is circulated publicly up to five years detention in a gaol may be inflicted by the Courts. Communal listening to a Moscow broadcast constitutes high treason for which the penalty is capital punishment!

## A New Transmitter for Tunis

IN view of the popularity of radio programmes in North Africa, the French authorities have decided to rebuild the Tunis P.T.T. transmitter with a view to increasing its power to 120 kilowatts. Work is to be put in hand at once, and it is hoped to complete the new plant, without

## INTERESTING and TOPICAL NEWS and NOTES

interference to existing broadcasts, within six months. The Tunis station works on 345.6 m. (868 kc/s).

## Interesting Statistics

ACCORDING to Geneva (Switzerland) it is computed that without counting the U.S.S.R. and Spain, from which figures are not obtainable, Europe now possesses 35,129,448 registered owners of wireless receivers. As it is customary to assume

## Light Music from Cheltenham

ON May 4th, Jan Berenska and his Orchestra will be heard in a light programme from the Town Hall, Cheltenham. George Lakin will be solo trumpeter for "Roses of Picardy."

## "Northern Music Hall."

FURTHER "Northern Music Hall" broadcasts on the way include relays from Hull's Alexandra Theatre on May 3rd and a relay from the Lyceum Theatre, Sheffield, on May 5th. The Alexandra is to have two broadcasts—the first a "Rehearsal" about noon. Both this and the evening's variety excerpt will be in the main Regional programmes as well as on the Northern wavelength.

## Lawn Tennis Championships

A COMMENTARY during one of the final matches in the Hard Court Lawn Tennis Championships of Great Britain will be broadcast on May 6th by F. H. Grisewood, from Melville Park, Bournemouth.

## Bands from the Seaside

THURSDAY evening, April 27th, will bring to Northern listeners music played by two seaside orchestras, one on the West coast and the other on the East. First comes half an hour by Norman Newman and his Band from the Tower Ballroom at Blackpool; and later in the evening Reginald Stead and his Orchestra will be broadcasting from the Spa at Scarborough.

## Toscanini at Queen's Hall

THE first of the Beethoven cycle, in which the B.B.C. Symphony Orchestra will be conducted by Arturo Toscanini, will be broadcast from Queen's Hall on May 3rd. The programme will consist of Overtures "Egmont" and "Prometheus" and Symphonies Nos. 1 and 2. Nine concerts are to be devoted to works by Beethoven, seven of which will be conducted by Toscanini, and two by Sir Adrian Boult.

# SOLVE THIS!

## PROBLEM No. 345

Masters built an A.C./D.C. mains receiver following the more or less standard practice. When completed he connected the mains and aerial and earth leads but obtained no results. Reaction was also dead. After various attempts to obtain results he tried the effect of connecting various points to earth and found that when he joined the metallised surface of the detector to the chassis signals came in in the normal manner. What was wrong? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 345 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, May 1st, 1939.

## Solution to Problem No. 344

When Wheeler connected a 2 mfd. fixed condenser between the anode of the H.F. valve and earth he effectively short-circuited this valve so far as H.F. was concerned and thus obtained no signals. The instability ceased because the H.F. was bypassed and was not getting into the remaining stages, and he could no doubt have cured his trouble by increasing the decoupling components in the H.F. stage. The following three readers successfully solved Problem No. 343 and books have accordingly been forwarded to them: C. Wooldridge, 6, Emerald Terrace, Campbell Street, Hull; J. Harbisher, 21, Thomas Street, North Ormesby, Middlesbrough; N. Whyvel, 245, Geneva Road, Darlington, Co. Durham.

## Australian Short-wave Transmission Schedule (May, 1939)

VK2ME (Sydney) 31.28 m.: Sundays (Sydney time), 4 p.m. to 6 p.m. (06.00-08.00 G.M.T.); 8 p.m. to midnight (10.00-14.00); Mondays, 1.30 to 3.30 a.m. (15.30-17.30).

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

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

# The S.S. One-valver

A Simple but Very Efficient Receiver Designed for the Beginner who Wishes to Construct His Own Coil, and Make a Receiver at Little Cost

THE name given to this receiver might be rather misleading. For example, S.S. could stand for super-sensitive, super-selective or even single signal; therefore, to avoid any such

utmost efficiency is obtained. That forms the true pleasure of home construction and should be the keynote of every constructor.

Bearing all this in mind, and the fact that everyone cannot afford to purchase components *ad lib.*, the S.S. One-valver was produced to try and satisfy many demands. The letters S.S. are intended to convey the fact that it is about the *simpler*

selectivity: From the results obtained under normal conditions, one might also add even another S and call it super.

## Circuit

This calls for little comment. It is an orthodox triode arrangement employing the leaky-grid system of rectification. The only feature which might be called unusual in the light of the average modern circuit is the method of obtaining reaction.

It will be seen in the theoretical circuit, Fig. 3, that the old form of *swinging coil* or inductive coupling, is used to feed back sufficient high-frequency currents from the anode to the grid circuit to provide the required reaction, so essential in this type of receiver, to increase sensitivity and selectivity.

This system, in spite of its age, is still very efficient, provided care is taken with the design of the coils, the selection of the valve, and the applied anode voltage. It also saves the cost of a reaction condenser.

## Construction

A wooden baseboard and panel are used, the sizes in each case being  $5\frac{1}{2}$  in.  $\times 8\frac{1}{2}$  in.

The .0005 mfd. tuning condenser, of the solid dielectric type, is mounted a little above the centre of the panel to allow ample room for the reaction control strip which projects through a small slot.

The valveholder, an ordinary four-pin mounting type, is fixed on the right-hand side of the baseboard, while the coil assem-

(Continued overleaf.)

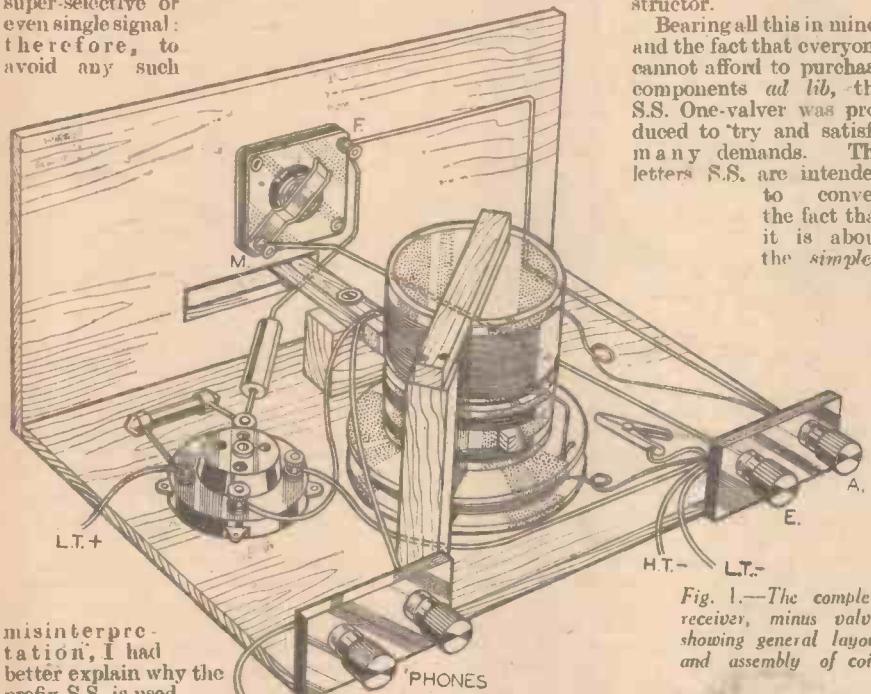


Fig. 1.—The complete receiver, minus valve, showing general layout and assembly of coil.

of the simple one-valvers possible to make, consistent with sensitivity and

H.T.+

misinterpretation, I had better explain why the prefix S.S. is used.

Most beginners are, naturally, most anxious to get the utmost satisfaction and experience from their first constructional effort, and they like to produce as much of the required gear as possible with their own hands. This procedure is most commendable; it is one of the finest ways of gaining valuable practical experience, and if a certain amount of time has already been devoted to the theoretical side of the subject, it enables the beginner to obtain actual proof of many fundamental theories and thus get a far better grip on the subject.

There is also another side to this constructional idea. The mere assembly of certain components can be very uninteresting to the enthusiast who is keen enough on the subject to want to know why this or that is used, and why and how different effects are produced by different arrangements of coils, condensers and resistances. When, for example, a receiver is built which employs a coil made by the constructor, a far greater thrill and a feeling of satisfaction are experienced when stations are tuned in, than if a commercial product had been used. Unfortunately, however, it is not always possible to make in the average constructor's den many of the components required for a modern multi-valve receiver. In such instances, it becomes essential to purchase reliable precision-made commercial products, but even so, there is no reason why those parts required for the more simple sets should not be tackled by the enthusiast, and, by experiment, modified until the

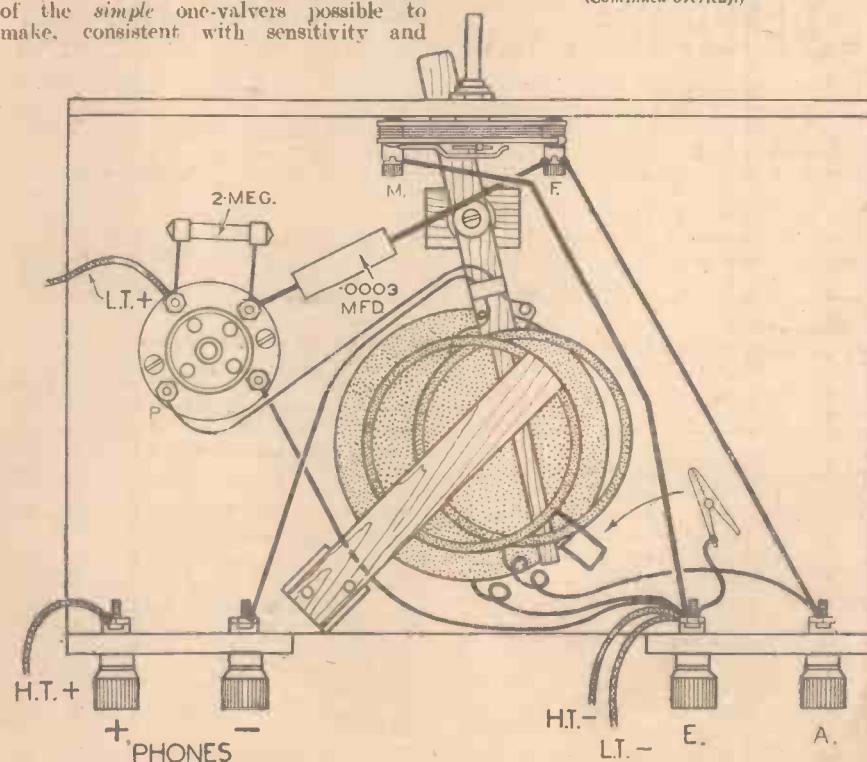
H.T.-

E.

A.

+ PHONES -

Fig. 2.—All wiring can be followed from this plan view. Keep components in the positions shown, as additions will be made next week.



## THE S.S. ONE-VALVER

(Continued from previous page)

bly comes in line with and to the rear of the tuning condenser (Figs. 1 and 2).

Two simple terminal or plug and socket strips are fixed to the rear edge of the baseboard to enable connections to be made to the aerial and earth and headphones. The grid-leak (2 megohms) can be of the  $\frac{1}{2}$ -watt type, and the grid condenser (.0003 mfd.) an ordinary paper tubular or whatever type happens to be to hand.

## The Coil

This component is the vital part, and although its design is such that no difficulty should be experienced with its construction, every attempt must be made to wind the three separate sections as evenly as possible, and to make the formers clean, rigid, and secured firmly in the manner described and illustrated. The general assembly is shown in Fig. 4. The bottom coil former, which is fixed to the baseboard with a slight smear of glue or other adhesive, holds the long-wave winding, and this consists of 130 turns of 34 S.W.G. enamelled wire.

Above that is the reaction coil. This is wound on a plain former with 27 turns of 34 S.W.G. enamelled wire. The former is fixed to a narrow wooden strip which, in turn, is pivoted on a small wooden block so that the coil can be moved over and away from the L.W. coil. The wooden strip must not be screwed too tightly to the block, or else smooth movement will not be possible; it is advisable to place a small washer on each side to provide an even bearing.

The top former carries the medium-wave section, and this consists of 43 turns of

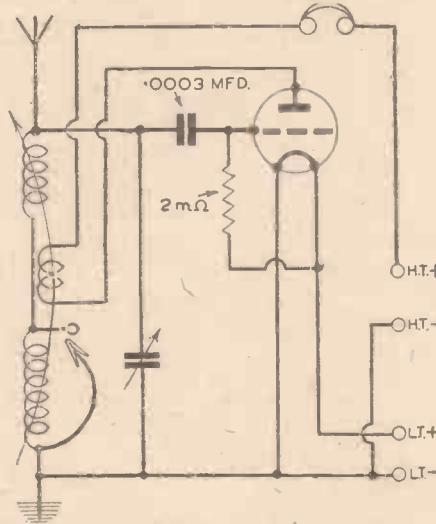


Fig. 3.—The theoretical circuit. An ordinary 2v. H.F. triode will be quite satisfactory.

26 S.W.G. enamelled wire, a tapping connection being made at the twelfth turn from the upper edge. This is best formed by twisting a small loop in the wire when reaching the specified turn during the actual winding of the coil, removing the enamel coating from the loop with a sharp penknife or a piece of fine sandpaper.

The former is held in position by an upright piece of wood which is fixed to the baseboard by means of a screw passing up through the base. Take care to ensure that it is firm. Inside the coil former is fastened another strip of wood, by means of adhesive, and this enables the coil to be supported by means of the horizontal

strip which is fixed to the top of the vertical wooden post. A spot of glue will form a firm joint without any risk of damaging the coil or the former.

It is essential to see that the space between the medium- and long-wave coils is just sufficient to allow the reaction coil to move freely in between.

## Formers

These can be made from 2in. diameter Paxolin tubing or ordinary cardboard tubes. If the latter is used, as in the case of the

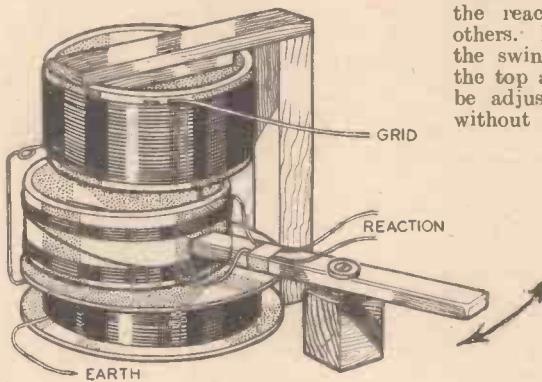


Fig. 4.—The general assembly of the coil unit. The medium-wave section is at the top, reaction in the middle, and the L.W. at the bottom. All windings are in the same direction.

model being described, they should be dried in a gentle heat to remove any trace of moisture, and then cut to size with a sharp knife or a fine-toothed saw, the edges being cleaned up afterwards with suitable sandpaper.

The medium-wave requires a length of  $1\frac{1}{2}$  ins., the reaction  $\frac{1}{2}$  in., and the long waves  $\frac{1}{2}$  in. The first two are just plain pieces, but the last one has to be fitted with cardboard cheeks. These can be cut from thin stiff board, their diameter being  $2\frac{1}{2}$  ins. Before cutting them out, a circle equal to the diameter of the tube should be drawn (2ins.), and then the outer, or cutting circle, can be marked off. The object of the 2in. circle is to enable the tube to be stuck to the cheeks in the correct central position. Let the adhesive set hard before attempting to wind the coil.

The start and end of each winding

control may seem a little touchy at first, but a little experience with it will soon enable the correct handling to be obtained.

Wave changing is effected by means of the crocodile clip.

When the long waves are required the clip is removed, and left free, while for medium waves it must be clipped on the junction formed by the connection between the end of the medium and the start of the long-wave windings.

An aerial of medium length should be used. If too long, the damping will stop satisfactory reaction; therefore, it is well worth while trying the receiver on an efficient form of indoor aerial. It will be noted that no "extras" are fitted, such as by-pass condensers, H.F. choke, or on-off switch, but next week I will explain how the circuit can be "hotted-up" if so desired.

## TELEVISION OUTSIDE BROADCASTS

THIS year's televising of the University boat race was very disappointing. The early morning mist failed to clear satisfactorily, with the result that picture quality suffered materially, and both at the start and finish the boats could not be distinguished with any degree of clarity. Three London cinemas showed the actual transmission—Marble Arch Pavilion, Monseigneur, and Tatler News Theatre—but after the race the opinion was expressed that there was a need for the swift introduction of competitive television broadcasts if the present television lead is to be maintained in the face of American competition. Mr. Isidore Ostrer declared that what British television needs more than anything is a transmission by a number of private commercial companies instead of the single B.B.C. monopoly, the companies working in the very closest collaboration with the B.B.C. It is known that the Postmaster-General is very shortly going

to meet representatives of the cinema exhibitors, and film producers, to discuss television, for it has been made clear that cinema owners who want to install big-screen receivers are at the moment rather worried over the monopoly question. The inadequacy of the arrangements made for the boat race was apparent, for the pictures that mattered were limited to those at the start and finish, with a map being shown in between. It was stated that a commercial enterprise would have covered the whole of the race with cameras along the entire course, just the same as a news reel service covers any event of topical public interest. Given satisfactory radiated pictures there is no doubt as to the excellence of big-screen reproduction; a point that was substantiated most forcibly by the pictures of Miss Jasmine Bligh seen at the conclusion of the race on the Baird equipment at Marble Arch Cinema.

# Bad Contacts

## And Their Effects on Receiver Efficiency

Some Unusual Results of Defective Connections; "Dry" Soldered Joints; Efficient Soldering; Cleaning Switch Contacts; Preparing Flex Leads and Fitting Connectors; Accumulator Terminals

EVERY reader knows that an intermittent contact in the receiver wiring or power-supply connections will cause crackling noises in certain circumstances. There are, however, some faulty connections which often produce more annoying troubles, far more difficult to diagnose. For instance, a poor connection to the H.T. secondary winding of a mains transformer will often produce a loud "sizzle" as a background, due to arcing between the two parts which are supposed to be soundly connected together. The same kind of trouble might result from the use of a low-grade mains switch, or one which has become faulty, or from a bad connection to

joint the solder makes perfect contact with the two parts to be joined together; the solder running right into the fine irregularities in the surface of the metal. To ensure that the solder does this it is essential that the metal should be perfectly clean—chemically clean—and that it should not

by The Experimenters

oxidise when heat is applied by means of the soldering iron. The method of cleaning need not be explained, but it should be pointed out that the method of keeping the metal clean is by the use of a flux, or anti-oxide preparation. In radio and electrical work one of the best fluxes is Fluxite, although resin is very satisfactory if the work is first cleaned thoroughly.

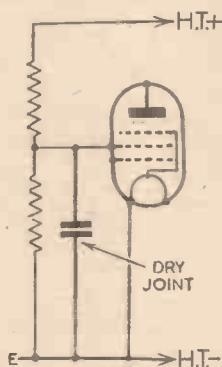
### Efficient Soldered Joints

It can now be seen that if the parts to be joined, or the solder itself, are dirty, or if they are not protected by a flux when the soldering iron is applied, the solder will be prevented from making close contact; the joint is then "dry." A test is to attempt to pull the parts away from each other. Even a thin copper wire soldered to a terminal tag cannot be tugged away if the joint is properly soldered. In fact, the wire would probably break before the solder did.

Fluxes, such as hydrochloric acid (spirits of salts), zinc chloride (killed spirit), and sal-ammoniac, although efficient are inclined to corrode the joint after a very short time, even if the joint is wiped with a damp rag after soldering. That is why they are deprecated for radio work.

### Cleaning Contacts

Bad connection between the contacts of push-pull battery switches and of certain



almost any component in the H.T. or anode circuits.

Not long ago, for instance, we traced a remarkable "humming" noise to a dirty contact between a mounting clip and a tubular fixed resistor which was carried in it. Due to the high frequency at which the contact was interrupted, and to the low current passing through the resistor, an ordinary voltage or current test did not reveal any fault. In this case the trouble was overcome by cleaning the metal end of the resistor and the clips of the holder with emery cloth and slightly bending the clips inward.

### "Dry" Joint Caused Instability

Badly soldered joints can produce all kinds of surprising effects, since the contact might be entirely absent, or there might simply be a high resistance through the joint—and probably a resistance of fluctuating value. Surprising as it may seem, an instance once came to light where a "dry" soldered joint acted as a (very inefficient) form of "crystal" detector; presumably the oxide film separating the solder from the metal served as the rectifying medium!

In another case where an H.F.-Det.-Pen set was very unstable the fault was eventually traced to a "dry" joint between the screening grid by-pass condenser and earth, as shown in Fig. 1. This time, despite the presence of a blob of solder, the dirt and oxide film provided complete insulation.

There might be some readers to whom the term "dry" as applied to a soldered joint or connection is not clear. It is best explained by stating that in a well-soldered



Fig. 5.—Some methods of making good connections to wander plugs and other types of connecting device.

types of wave-change switches can cause a variety of crackling noises, as has been mentioned in these pages many times before. Cleaning can generally be carried out satisfactorily with fine glass paper, but where access is difficult, carbon tetrachloride can be used with success. This is a liquid with a smell not unlike that of chloroform, which is obtainable for a few pence for a two-ounce bottle from most chemists. It is non-inflammable and soon

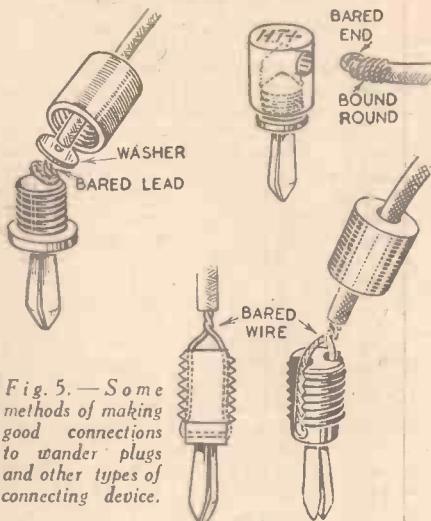


Fig. 5.—Some methods of making good connections to wander plugs and other types of connecting device.

evaporates, leaving a clean surface. It should be applied with a small brush or a pipe cleaner.

Some of the general-purpose household cleaners contain this chemical, and they can be used. Additionally, there are fluids on the market made especially for cleaning contacts. Another method of cleaning is by the use of one of the very light lubricating oils sold under various names; when these are used it is, of course, necessary to remove all traces after the contacts have been cleaned, because oil is a better insulator than a conductor!

The methods of cleaning, which have just been described, are equally applicable to the pins of valves, coils, wander plugs and all similar devices, although in those cases it is sometimes necessary also to open out the split pins, where they are provided. But exercise great care if an attempt is made to open the banana-type pins of valves and coils where the connecting leads run down the centre and are soldered to the tips.

Soldered connections tend to deteriorate more quickly than usual in many battery-operated sets when the accumulator is kept inside the case. This is because the fumes from the acid attack the metal, especially just after the accumulator has been charged, or when it is being trickle-charged while in the case. For this reason it might be considered worth while, once very occasionally, to wipe over the soldered joints with a rag moistened with very dilute ammonia. The slightest trace of one of the special light oils previously mentioned will assist in preventing further attack.

### Baring Flex

It is surprising how many constructors make a bad job of fitting connecting devices such as wander plugs and spade terminals, with the result that proper contact is not obtained—or, if it is, deterioration quickly sets in. Thus, when baring the end of a flexible lead, several strands of the fine wire are severed by carelessly scraping away the rubber covering. The point is illustrated in Fig. 2, where it will be seen that the extent of the damage might not be easily recognised due to the fact that all the strands are twisted together. After a short time a small amount of corrosion might well take place which is sufficient to break the joint or set up a high resistance (see Fig. 3).

A good method of baring the end of flex is as follows. First push back the cotton (Continued overleaf)



Fig. 2.—When baring flex care should be taken that none of the strands is cut.



Fig. 3.—Corrosion of wire near a connector might cause the contact to be broken.

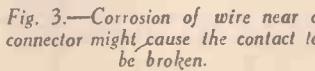


Fig. 4.—How to make a neat looped connection on a length of flex.

Fig. 4.—How to make a neat looped connection on a length of flex.

**BAD CONTACTS**

(Continued from previous page)

sleeve and then carefully pierce the rubber with the point of a knife blade. The rubber covering can then be pulled off by gripping with the finger nails. It is true that an experienced electrician would not use this method—he would scrape the insulation with the edge of a blunt knife blade—but a certain amount of practice is required before this can be done successfully.

**Flex Connections**

When flexible leads have to be attached to terminals the best method is to solder a connecting tag to the end of the wire, but another method is that shown in Fig. 4. First a length of wire is bared, and then the strands are twisted tightly together. After that a loop is formed by curving the wire round a pencil point or a piece of rod; this is left within the loop until the end of the wire has been twisted, as shown. The rod can then be removed, a trace of flux applied to the loop and a little solder run over the wire with a hot iron. Soldering should be done quickly to avoid softening the rubber or burning the insulation. It is best to make the loop of such a size that it fits fairly closely round the terminal to which it is to be attached.

**Fitting Plugs**

Wander plugs and spade terminals are

often badly fitted, due to either carelessness or lack of appreciation of the importance of good connection. The actual method to be followed must be governed by the type of connector used, but three typical varieties are shown in Fig. 5. In every case the method of baring the wire is as explained above. Another point to bear in mind is that the length of bared wire should be no more than is absolutely necessary, because it is desirable that none of it should be exposed after the connector has been fitted. One type of plug has a small washer inside. The wire should be threaded through this and then formed into a small helix. Both wire and washer will be firmly gripped when the two parts of the plug are screwed together.

In the type of plug with side hole, the metal part usually has a pointed end to pierce the insulation and grip the wire. The end of the wire should be bared for a short distance, after which the bared portion should be bound round the insulation at the end of the lead. This not only ensures a good, direct contact, but prevents the cotton sleeve from fraying. In another type of plug the threaded part of the metal portion is fluted at two ends of a diagonal, whilst a small hole runs between the lower ends of the two flutes. The bared wire is run down one flute, through the hole and up the other flute, and then it is twisted.

**Aerial and Earth Connections**

Bad connections outside the set itself are often responsible for trouble. A usual point is between the earth lead and the buried earth plate or the terminal of the earthing tube. When the connection is soldered, the joint should afterwards be cleaned and then painted with a cellulose enamel for protection. Joints in the aerial should be avoided wherever possible, but if they are used they should be treated in the same manner as those in the earth lead. If a lead-in tube is used the wire and terminal should occasionally be inspected and cleaned; a tight binding of insulation tape will help to protect the connection against oxidation, but should be removed periodically and the surface cleaned.

Another source of bad contact is at the terminals of the accumulator, when these are neglected. If they are wiped each time the battery is connected they will keep clean almost indefinitely, especially if a light smear of vaseline is applied. Should the terminals corrode, any encrustation can be removed by dipping a rag into hot water containing a little ammonia and wrapping this round them. After a few minutes the sulphate will be soft enough to be wiped and scraped away. The contact faces of the terminal should be rubbed clean with fine glass paper and then smeared with vaseline.

**IMPORTANT BROADCASTS OF THE WEEK****NATIONAL (261.1 m. and 1,500 m.)**

Wednesday, April 26th.—World's Professional Billiards Championship: a commentary on one of the semi-final heats from Thurston's Hall.  
Thursday, April 27th.—London Music Festival Concert, part 2, from Queen's Hall.  
Friday, April 28th.—The Huguenots in England, a play by D. F. Aitken.  
Saturday, April 29th.—F.A. Cup Final and Community Singing from Wembley.

**REGIONAL (342.1 m.)**

Wednesday, April 26th.—One Night of Love, film musical.  
Thursday, April 27th.—Crazy Quilt, variety programme.  
Friday, April 28th.—Ours is a nice 'Our ours is, comedy programme.  
Saturday, April 29th.—Behold the Judge, a play by John Brophy.

**MIDLAND (296.2 m.)**

Wednesday, April 26th.—I Make—Movies, a talk by H. N. Blinkhorn.  
Thursday, April 27th.—British National Songs and their stories—1, The National Anthem.  
Friday, April 28th.—Original Compositions for pianoforte duets.  
Saturday, April 29th.—Industry Entertains: From the Potteries.

**WEST OF ENGLAND (285.7 m.)**

Wednesday, April 26th.—The House and the Man—2, Sir Redvers Buller at Doune.  
Thursday, April 27th.—Benedict, a play.  
Friday, April 28th.—Western Magazine.  
Saturday, April 29th.—Your Form of National Service in Plymouth.

**NORTHERN (449.1 m.)**

Wednesday, April 26th.—The First Five Years: a dramatised discussion on nursery schools.

**"Built to Last"**

THE second talk in the series entitled "Built to Last," dealing with the preservation in the important cities of the West Country of buildings of outstanding historical or architectural interest, will be broadcast on May 1st in the Western programme, and on May 2nd in the Regional programme. The talk will deal with Bristol, and John Betjeman will interview representatives of the city's policy of preservation and will discuss this with several local citizens.

**Sound Picture of a North-East Market**

NEWCASTLE will provide on April 30th, for Stagshaw and Northern listeners, a sound picture of a well-known North-East market. "A Story of Trading" is the title of the feature, which is by Patricia Docksey and Cecil McGivern, and it will deal with the Grainger Market, Newcastle-on-Tyne, one of the largest covered markets in the country and one which, for a hundred years, has been a centre for the buying and selling of varied kinds of merchandise. It is expected that the Markets Superintendent, Mr. L. Walker, will be among those relating the story of the varied activities and the organisation of the place.

**Covent Garden Opening Night.**

ACT I of "The Bartered Bride," by Smetana, will be broadcast from Covent Garden on May 1, in the Regional programme, the performance forming part of the London Music Festival.

Thursday, April 27th.—Manx Music Guild Festival.

Friday, April 28th.—An instrumental recital.

Saturday, April 29th.—Saturday Concert Hall: a choral and orchestral concert from the Assembly Hall, Blackburn.

**WELSH (373.1 m.)**

Wednesday, April 26th.—Cyfarth o Lydaw (Greetings from Brittany), a programme of gramophone records.

Thursday, April 27th.—The Splendid Quest, a radio panorama of the last days of the Civil War.

Friday, April 28th.—Dic Tryfan, storyteller, a Welsh dramatic feature by T. Rowland Hughes.

Saturday, April 29th.—Cardiff Orchestral Society Concert.

**SCOTTISH (391.1 m.)**

Wednesday, April 26th.—Scottish dance music.

Thursday, April 27th.—Nor' East Side-lights (fifth flash), a "sound" magazine of entertainment.

Friday, April 28th.—National Service: Volunteers at Work.

Saturday, April 29th.—Brass Band concert.

**NORTHERN IRELAND (307.1 m.)**

Wednesday, April 26th.—Irish Rhythms: orchestral concert.

Thursday, April 27th.—Stop Dancing: light programme.

Friday, April 28th.—An organ recital from St. Comgall's Parish Church, Bangor, County Down.

Saturday, April 29th.—Association Football: a commentary on the Final of the Irish Cup.

# ON YOUR WAVELENGTH

## The Latest Figures

DURING March 715,825 wireless receiving licences were issued by the Post Office, representing a net increase of 25,208 in the number of licence-holders during the month after making allowance for expired licences and renewals. The approximate total number of licences in force at the end of March, 1939, was 8,968,600, as compared with 8,588,676 at the end of March, 1938, an increase during the year of no less than 379,924. During the month there were 432 successful wireless prosecutions.

Manufacturers take heart from these figures, for it indicates that the absorption point has not yet been reached.

## Television in the Provinces

DEALERS in the provinces have rallied to the support of the Television Extension Committee which I announced last week. Dealers are organising local meetings, and approaching their local members of Parliament. Thus, provincial readers should rest assured that everything is being done to extend the service beyond the present local area. Midland dealers, for example, have stated that television would appeal to more people living in Leicester, Wolverhampton, Coventry, and adjacent districts, than it does within the present service area of Alexandra Palace. They say that there is not the great number of counter attractions in the Midlands as there is in London.

I am glad to note that dealers all over the country are taking the advantage of the special training classes inaugurated by manufacturers to ensure that the public is adequately served, and not misled, as it was in the early days of radio.

## Telephone Radio

RECENTLY wrote a paragraph with my tongue in my cheek drawing attention to the newspaper paragraph which said that in times of emergency the Post Office proposed to commence a series of broadcasts via the telephone, and that this would not interfere with the normal use of the telephone. Such is an utter impossibility, and I thought it obvious that I was writing facetiously, for even a schoolboy knows that such a scheme could not be carried out without



By Thermion

special apparatus, and in any case it would not be possible also to use the telephone at the same time. One manufacturer, however, has taken the remark seriously! Which only goes to show!

## "They Do Not Always Put It Nicely"

ONE of the least intelligent sections of the community is that of the genus coroner. These curious creatures, who operate in an office which should have been abolished centuries ago, preside over equally curious coroners' courts, and they seem quite outside the law. I suppose that no one with a grain of intelligence would apply for such a job, for it does not demand intelligence, as is obvious from the remarks they frequently make on a wide range of subjects concerning which they know precisely nothing.

The other day a coroner was investigating the death of a woman who had committed suicide, it was said, because of the war news broadcast by the B.B.C. The coroner said that the B.B.C. "does not always put these things nicely". A coroner is not in a position to make such a remark, and in any case it is untrue. The B.B.C. very impartially, and certainly very fairly, presents the news. Some time ago the Home Office warned coroners and magistrates that they must confine their remarks to the case, and not embark on silly remarks with the idea of gaining a little fleeting publicity.

## Move Against Electrical Interference

THE British Standards Institution has introduced a standard mark for electrical appliances which are so manufactured that they will not interfere with radio reception. It was two years ago that the Institute published its standard specification for the frequency, magnitude, and

duration of interference caused by electrical apparatus.

This new mark has been registered under the Trade Marks Act, and its use will be permitted to manufacturers to indicate that apparatus bearing the mark is interference-free within the limits specified in the standard. This is number 800, and has just been published.

## What He Would Do With a Crooner

J. T., of Ormskirk, in the course of an interesting letter in which he makes some useful suggestions, states that he would pick the best out of the whole bunch of crooners, give him £5 a week, and sack the rest. I am not aware that any crooner is worth £5 a week.

## Bound Volumes of "P. and A. W."

ONLY twelve sets of Volumes 1, 2, and 3 of PRACTICAL AND AMATEUR WIRELESS remain. As I mentioned a few weeks ago these are rare volumes, and will be absolutely unobtainable in a few months' time. Whilst the stock lasts you may obtain them for 12s. 6d. each volume. Send remittances to The Publisher, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

## Catalogue of Technical Books

WE have produced a small catalogue of our wireless and technical publications. This is available free of charge to any reader who sends a postcard marked "Catalogue" to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

## The Forthcoming Wavelength Changes

IF a war hasn't intervened and supervened, in March of next year there will be certain wavelength rearrangements which will affect every listener. Those with station-engraved dials will thus experience a difficulty unless the manufacturers come to the rescue with replacement dials. This seems to suggest that as finality in wavelength arrangements has by no means been reached, manufacturers should introduce some system whereby the listener could adjust his receiver when such changes take place.

If nations are at war the changes

will not be made, for I expect all of them will be busy pumping out war news and hatred against one another. In this respect England has adopted a clean policy. Foreign countries, however, have been using the air for a considerable period to foment hate against us. Whilst we have been breathing peace, they have been taking the pieces—of other peoples' land.

### New Balance and Control Department

I AM informed [by the B.B.C. that, with the object of consolidating and reinforcing one of the important links between artists in the studios and the listeners in their homes, a Programme Engineering Department, centralising the technical balance and control of London programmes, will come into operation on May 15th.

Head of the new Department will be Dr. F. W. Alexander, who joined the B.B.C. Research Department six years ago, and was responsible for the design of the "ribbon" microphone, now used almost exclusively in the B.B.C. studios. He has for some time been engaged in making a special study of the technical problems of balance and control. His assistant will be Mr. A. W. Parish, who has been for many years associated with outside broadcasts. The organisation will consist of all the balance and control technicians hitherto attached to each of the Programme Departments, and the whole of the "effects" staff.

"Balance" can be described as the skilled technique by which microphones are placed in relation to the artists, and their output so mixed and varied that the best possible effect is obtained in accordance with the wishes of the artistic producer or musician. "Control" mainly consists of electrically adjusting the volume of sound in an artistic way to prevent on the one hand the sound being too weak for the listener to hear, or so loud that the transmitter is overloaded. The correct performance of these two functions enables the listener to hear a faithful sound-picture of the actual performance in the studio.

The formation of the new Department has for its objects the closer co-operation between the men respon-

## Notes from the Test Bench

### Screened Leads

*I*N certain receivers where valves with a top anode cap are employed, it is generally specified that the lead to the cap be screened. Special screening braid is generally used for this purpose, but we have seen many attempts by constructors to save expense by making their own screening. One very popular idea is to use the spring curtain rod material for a screened lead, and in other cases wire has been bound round and round to form a screen. These ideas are useless, as will be all similar schemes where the screening is inductive. A coil of wire forms an inductance, and although the spring curtain rod material is of bare metal, corrosion can effectively insulate adjacent turns and give the same effect as a spiral of insulated wire. The only thing to do where inductive effects are likely to be present in this form of screening is to solder all turns together so as to short-circuit any inductance which may be present.

### Earth Connections

*W*HEN using a wooden or metal chassis a common practice is to make use of a bolt passed through the chassis as an anchoring point for earth connections. It is sometimes found that one set of connections is made on one side of the chassis and another set on the other side, the same bolt serving as the anchor point. This is quite good in theory, but a recent case came to our notice where the earth connection so made was of high resistance, owing to the fact that the soldering tags were bent and did not make good contact with the lock-nuts. A good plan where connections are found on both sides of the chassis is to make a separate hole in the chassis and take all connections to one point, using either a multiple soldering tag or a large tag anchored to the chassis by the bolt in the usual manner.

### Push-button Four

*S*EVERAL cases recently reported of failure to obtain results on the Push-button Four receivers have been found to be due to carelessness in connecting the leads from the coil unit to the remainder of the circuit. The leads projecting through the metal plate of the coil unit should be carefully traced out before making the connections, and the filter coil must, of course, be joined to the lead projecting from the bottom left-hand side of the switch plate when viewed from the front of the chassis, when the chassis is viewed from the underside.

sible for this work, the co-ordination of technical methods, and provision of a means of pooling knowledge and overcoming common problems. Intensive technical and artistic courses of instruction will be provided, but, above all, the chief aim of the new organisation is to establish a relationship as close as possible between the Programme and Engineering Divisions of the B.B.C.

The personnel of the Department will be divided into sections to correspond with five Programme Departments—Music, Music Productions, Variety, Features, and Drama, and Overseas. Each section will be in charge of a senior Programme Engineer.

### Televising the Derby

*I*T is interesting to note that, conditions permitting, the Derby will be televised on May 24th from start to finish. If visibility is good, it is hoped that viewers will be able to follow the horses from the starting-point on one camera until Tattenham Corner is reached, when a second camera will take over to show the run-in to the winning post. Cinemas will be permitted, by arrangement with the Epsom Grand Stand Association, to reproduce the B.B.C. television transmission on large screens.

Two television cameras will be erected in the Grand Stand to give a general view of the racecourse, and a third will be mounted on the scanning van near the enclosures. It is hoped to show close-up shots of many typical racecourse characters as the television cameras are slowly "panned" across the "Hill" and racecourse. These pictures will be accompanied by a special television commentary. During the actual race the National commentary will be taken.

Good pictures should be obtained as the horses round Tattenham Corner and come into the finish. It is hoped to show the weighing-in and saddling, and viewers will see close-ups of the owner leading in the winning horse.

It is expected that even better results will be obtained than last year, as the new B.B.C. receiving station at Swain's Lane, Highgate, will be in operation.

NOW READY!

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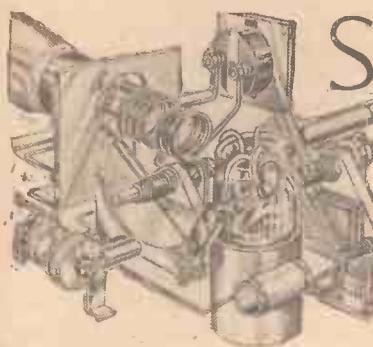
By F. J. CAMM

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# SHORT-WAVE SECTION

## TUNING SHORT-WAVE AERIALS

A. W. Mann Gives Some Practical Pointers for Increasing Selectivity and Signal Gain

**T**HE chaotic conditions prevailing on the amateur bands call for receivers of the variable selectivity and crystal gate types, in order to reduce the effects of QRM to the minimum.

There are comparatively few experimenters who are in such a fortunate position as to be able to choose their receiving equipment from amongst the so-called communication types, and must therefore remain satisfied with something less ambitious, and which is in effect a compromise between price and efficiency.

A well-designed receiver of the O.v.l. type is capable of really good average performance, within defined limits, especially if fitted with band-spread tuning. A T.R.F. receiver will provide higher sensitivity and selectivity, and consequently superior performance.

### Essential Factors

Where amateur 'phone reception is the chief interest, the need for increased selectivity is apparent, and for this reason comparatively short aerials are favoured in some instances. The essential factors of an aerial system are many. One of the most important is pick-up. The greater the pick-up, the greater the signal input to the receiver.

With an aerial of extreme length and average height the signal pick-up will be high, so also will the level of background noise, and in addition, tuning will be comparatively flat and selectivity poor.

On the other hand, if we make the aerial extremely short, with a view to greater selectivity as the motive, we find that signal pick-up, and consequently, signal output, is reduced, and additional amplification at high frequency is necessary if the minimum of noise is to be obtained.

### Eliminating Background Noise

In some instances low-frequency amplification is resorted to, with the result that background noise is increased beyond the permissible level.

Where a powerful receiver of the two H.F. type, and with one or more L.F. stages, is used on a half-wave type aerial, it is usually found that the ratio of signal to noise is well balanced and selectivity of a reasonable order.

If, however, an attempt is made further to improve selectivity by means of a shorter aerial, the reduced pick-up and resultant decreased output calls for a readjustment of the pre-detector volume control in order to increase the input. Here again we find that the background noise is above permissible level.

A considerable improvement can be effected by means of an external tuned circuit, which enables the operator to tune the aerial in harmonic relation and sub-harmonic relation to the received frequency.

Such arrangements whilst comparatively simple in design must be carefully designed

and constructed to meet individual requirements, and are a subject for careful experiment in order to obtain the maximum of efficiency.

### Rotary Aerials

This applies especially where used in conjunction with rotary receiving aerials, as the correctly designed tuner, whilst

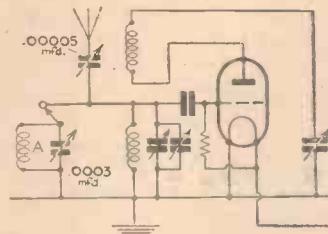


Fig. 1.—A simple method of aerial tuning.

providing additional gain, will also increase the over-all sensitivity of the aerial system so that the increased voltage set up by directional alignment will result in peak volume being obtainable simply by rotating the aerial system. Unsuitable tuners provide considerably less gain than the recommended types.

Whilst the foregoing example gives an idea as to the importance of correct tuner design, we are only concerned in this article with tuners suitable for use with single wire aerials.

### Details of Tuner

Fig. 1 shows a very simple method of aerial tuning. It will be noted that the aerial coupling is of the series capacity type, a .00005 mfd. preset condenser being used in series with the aerial. The coils are of the four-pin type.

The tuner can be built up as a separate unit, consisting of a coil tuned by a .0003 mfd. condenser in parallel. This coil is wired across the aerial and earth terminals of the set, the lead on the aerial side being broken by a switch.

Coils of various diameters and numbers of turns, but of stout gauge wire, and spaced one diameter of wire can be tried, the number of turns being varied to suit the ranges covered by the receiver. Three inches diameter is suggested as a basis of experiment. Turns two, four, six and eight spaced as previously outlined.

### Operating Notes

The operating procedure is as follows. With the switch open tune in the desired

signal on the receiver. Follow this by closing the switch and tuning the coil A of the aerial tuner unit until the absorption point is reached. The signal will be absorbed, as in the case of an absorption wavemeter. The tuner condenser should be backed off just below the absorption point, and the necessary adjustments made to the receiver tuning to bring in the signal with maximum volume and lowest noise. Arrangements of this type can prove tricky at first in operation, but this is due to mal-adjustment causing interlocking and instability.

A little practice and the logging of various tuning positions and tuner coil combinations, etc., will enable the operator to derive full benefit from this simple arrangement, such as stability, increased volume, and improved selectivity with minimum background noise.

### Link-coupled Tuner

Fig. 2 shows a more complicated link-coupled arrangement. This consists of a series-aerial tapped coil tuned by a .0003 mfd. condenser in parallel, and with the coupling link between it and the grid coil of the receiver.

This arrangement offers considerable scope for experiment and requires very careful adjustment for optimum results. A 2½ in. diameter former with 28 turns of 16 gauge tinned copper wire, spaced ¼ in., is suggested as a basis of experiment, and the link coupling coils should consist of two or three turns of 28 d.c.e. wire, interwound at the aerial end of the former with the main coil.

The link, however, should not be of twisted flex as this would cause the adjustment of the tuned circuits to be very critical, and prone to instability.

Hamrad twin-feeder line is most suitable for this purpose. Link lines may be of any reasonable length, which thus allows tuners to be used under circumstances in which the receiver is located some distance from the aerial.

Correct coil tap adjustment, and also link adjustment is essential. If this is done by means of adjustable primary couplers to the receiver grid coil, as described

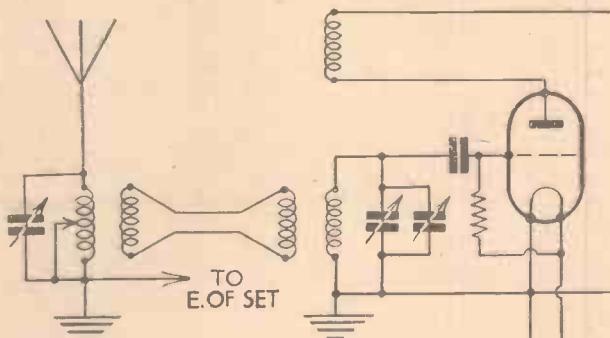


Fig. 2.—A link-coupled aerial tuning arrangement.

in a previous article, the link to the grid-coil coupling can be varied, and some similar form of variable coil-coupling is applied to the tuner tapped coil, an adjustment which will provide a high signal ratio with low noise component, and improved selectivity will be possible.

Experiments of this nature are unsuitable for the half-an-hour lash-up type of experimenter, as they require patience, careful construction and adjustment in order to achieve the most satisfactory results.

The use of link coupling definitely increases the selectivity factor, but the possibilities of interlock are also increased.

(Continued overleaf)

**SHORT-WAVE SECTION**

(Continued from previous page)

**Maximum Signal Gain**

Where additional signal gain is the ultimate objective, experimenters in some instances go all out for the tightest possible coupling between the aerial and grid coil respectively, thus obtaining maximum volume. In doing so however, selectivity is decreased and instability introduced.

On the other hand, where sufficient amplification at high and low frequency

is available and increased selectivity is desired, the coupling between the additional resonance tuner and the receiver is slackened to the extreme limit, and thus the noise level is increased beyond practical limits.

This state of affairs prevents the advantages of additional sensitivity, as derived by the use of resonance aerial tuning, from being used to advantage.

It is necessary to keep in mind that as we increase selectivity, some decrease is to be expected in output signal volume; therefore it is necessary to strike a compromise

between signal output, selectivity and sensitivity.

When six-pin type coils are to hand the link system can be used to considerable advantage, as the primary winding can be used as the link to the grid coil, this system of coupling combining the advantage of tuned doublet coupling to single-wire aerials of the Marconi type.

Generally, where tuners are built as separate units, it is advisable to use metal panels at earth potential in the interests of stability. With careful design increased gain equal to that of a stage of H.F. is possible.

## Leaves from a Short-wave Log

**New Call from Montevideo**

**C**ALLING Say Aykis ah seis (CXA6), a station has been heard in the early hours of the morning broadcasting electrical recordings on 31.41 m. (9.55 mc/s). This would appear to be a new transmitter at Montevideo (Uruguay) operated by the Servicio Oficial Difusion Radioelectrica, which also owns CXA18, 19.61 m. (15.3 mc/s); CXA10, 25.22 m. (11.895 mc/s); CXA8, 31.12 m. (9.641 mc/s), the last being situated at Colonia (Uruguay), and occasionally relaying programmes from LR3, Radio Belgrano, Buenos Aires (Argentine Republic).

**Changes in Havana**

**C**OCE, Havana (Cuba), which had moved up from 24.49 m. (12.25 mc/s) to 34 m. (8.823 mc/s) has now definitely settled on 24.54 m. (12.23 mc/s), having made room for COCQ, Havana, previously on 33.52 m. (9.85 mc/s), recently reported on 30.9 m. (9.71 mc/s), and since self announced as working on 33.98 m. (8.83 mc/s). COCE relays broadcasts from CMC (1,530 kilocycles), uses various interval signals including chimes and a railway engine whistle. Always couples the two calls: *CMC y COCE, La Corona, Habana (Cuba)*. COCQ relays CMQ (1,010 kilocycles), and broadcasts a news bulletin in English at G.M.T. 00.55 nightly. Since its association with the N.B.C. (New York) it has been heard to give the latter's 3-note interval signal.

COJK, Camaguey (Cuba), the short-wave outlet of CMJK, on 34.63 m. (8.663 mc/s) is stated to be considering the relay of the General Electric Company's Schenectady Latin-American broadcasts from G.M.T. 15.00 daily on 13.95 m. (21.5 mc/s).

**Radio Saigon Calling**

**O**N April 1st last the French Colonial authorities inaugurated a new short-wave station at Saigon (French Indo-China). It operates daily on 49 metres (6.122 mc/s) at the following times: G.M.T. 23.45-00.15, 04.45-05.45, and from 12.00-14.30. Standard time is 5 hours ahead of Greenwich Mean Time.

**Swiss Concerts Through Prangins Station**

PENDING the completion of the construction of the new Schwarzenburg (Switzerland) short-wave transmitter, special programmes from Basle, Zurich, Berne, Lausanne or Geneva will be broadcast through the League of Nations station at Prangins. The schedule is as under: On every first Sunday in the month from G.M.T. 05.45-07.30 simultaneously through

HBJ, on 20.64 m. (14.53 mc/s), and HBO, 26.31 m. (11.4 mc/s) for Australia and New Zealand; from G.M.T. 12.45-14.30 through HBF, on 16.26 m. (18.45 mc/s), and HBO for Asia and the Far East; from G.M.T. 16.45-18.30 through HBJ and HBO for Africa. In addition to these broadcasts a transmission is made every Sunday from G.M.T. 23.45-00.15 through HBJ for North America, and through HBO for the Latin-American States.

**New Venezuelan Station**

**A**CORRESPONDENT informs us that YV3RA, Barquisimeto, on 51.02 m. (5.88 mc/s) has suspended its broadcasts, and that in its place a new 2-kilowatt station YV3RX is now heard on 60.12 m. (4.99 mc/s). It has retained the slogan *La Voz de Lara*, and uses a bugle call as a signal before announcements. Times of transmission: G.M.T. 17.00-18.00 and again at G.M.T. 22.00-01.40.

**Alter in Your Lists**

**Y**VIRL, Maracaibo (Venezuela), formerly on 50.59 m. (5.93 mc/s), has vacated this channel to settle on

61.86 m. (4.85 mc/s). On its former wavelength you may now pick up the call YV1RK of the same city. The station in its announcements makes a regular reference to *Radio Popular*.

**New Schedule of South African Broadcasters**

**W**ITH the allotment of new call-signs, certain alterations in the timings of the South African broadcasts are officially notified. From April, ZRK, Cape Town, on 49.2 m. (6.1 mc/s), 5 kilowatts, is on the air daily from G.M.T. 17.00-21.00, and ZRL, on 31.23 m. (9.61 mc/s), 5 kilowatts, from G.M.T. 04.45-05.50; 08.30-12.00 and from 14.00-16.45. ZTD, Durban, on 61.5 m. (4.88 mc/s), 300 watts, works on Sundays from G.M.T. 17.00-20.20, and ZRO, in the same city, on 30.75 m. (9.75 mc/s), 300 watts, from G.M.T. 04.45-05.50; 08.30-12.30 and from 14.00-16.45 on week-days; Sundays: from G.M.T. 10.30-12.00, and from 14.00-16.30. ZRJ, Johannesburg, on 49.2 m. (6.1 mc/s), 200 watts, is on the air daily from G.M.T. 08.15-12.30, and from 14.00-16.30, and ZRH, on 49.94 m. (6.007 mc/s), 5 kilowatts, from G.M.T. 04.45-05.50; and from 14.30-20.30 on weekdays; Sundays: G.M.T. 14.00-20.15 only. ZRG, Pretoria, on 31.5 m. (9.52 mc/s), works daily from G.M.T. 10.00-12.30. All reports should be addressed to the South African Broadcasting Corporation, P.O. Box 4559, Johannesburg, Union of South Africa.

**Those Colombian Puzzles**

**T**HE number of broadcasting stations in the Republic of Colombia has greatly increased during the last three months, and so many alterations of call-signs have been made that it is now a difficult matter to secure accurate identification. At Bucaramanga we find two transmitters, namely HJ7GAB (formerly HJ7ABB), now operating on 62.7 m. (4.785 mc/s), and HJ7GAH (formerly HJ7ABD), which has been heard on 62.24 m. (4.82 mc/s). Both advertise a power of 5 kilowatts. This latter station gives the address: Apartado Postal, 37, Bucaramanga, and possesses a peculiar bird call as interval signal. On 62.18 m. (4.825 mc/s) we find HJ5EDE (formerly HJ5ABD), *La Voz del Valle*, of which the address announced is Apartado Postal, 27, Cali (Colombia). HJ3CAF (formerly HJ3ABF) is a 750-watt installed at Cundinamarca in the vicinity of Bogota; it works on 61.79 m. (4.855 mc/s). HJ3CAH (formerly HJ3ABH), also at Bogota, *La Voz de la Victor*, owned by Sr Manuel J. Gaitan, whose address is Apartado Postal, 565, works on 61.29 m. (4.895 mc/s). Other alterations of call-signs and wavelengths will be notified in these columns as and when they are received.

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## A PAGE OF PRACTICAL HINTS

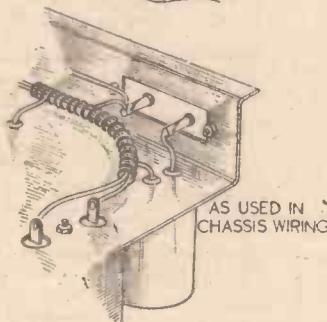
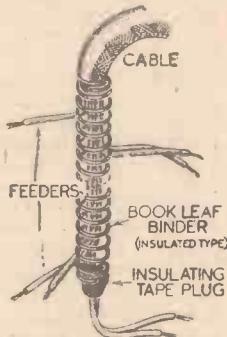
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# READERS WRINKLES

THE  
HALF-GUINEA  
PAGE

## A Neat Wiring Accessory

HAVING a few spiral type book leaf binders at hand, I recently put these to good purpose in the manner illustrated in the accompanying sketches. The binders were of different sizes and colours, some being of thick celluloid composition, some of wire, and others of bone. It is the latter type which I have found very useful for chassis wiring owing to its insulation



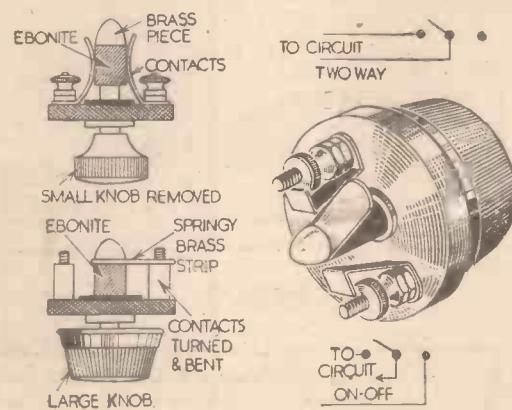
A novel wiring accessory.

property, but various ideas suggest themselves with regard to the other types.

To arrange neat battery connections from a multi-wire cable, bringing the feeders through the most convenient points, the cable wires should be "worked" along as each feeder is "hooked" out, this operation being assisted by slightly bending the binder. Finally, to retain the binder in position, insulated-tape plugs may be bound at the extremities of the free wires, as shown.—E. C. WEATHERCOTT (Southend-on-Sea).

## Converting Old Switches

REQUIRING a modern type of switch, I hit upon the following dodge of converting an old push-pull switch. I took the push-pull switch, turned the contacts round and bent them as shown in the sketch. I then removed the small screw-on knob, and replaced it with a larger one, first pulling the centre rod down to the ebonite. A piece of springy brass from an old dry



A method of converting an old push-pull switch.

## THAT DODGE OF YOURS!

Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1.10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles," DO NOT enclose Queries with your wrinkles.

## SPECIAL NOTICE

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

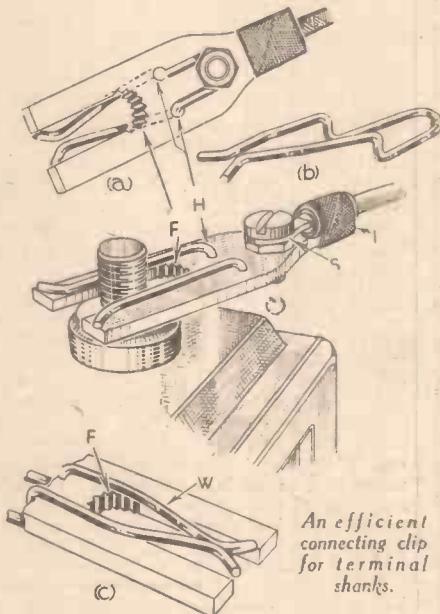
cell was inserted between the metal and the ebonite by unscrewing the brass piece, and drilling the strip to fit. It was arranged so that when the knob was turned to the left it contacted the left contact, and when turned to the right, the right was connected. The switch can be used as an on-off, the middle and one side being connected in the circuit, or, as a two-way, the middle and two sides connected, as shown in the inset diagrams.—D. E. WINTER (Hampton, Middlesex).

## A Useful Connecting Clip

I GET a great deal of pleasure in making up small radio accessories for facilitating experiments, and the sketches depict one of my attempts in this direction. In the pictorial diagram, the clip is shown fitted to an accumulator terminal stem, whilst the inset diagrams (a), (b) and (c) show the assembly details. The galvanised iron wire is of a heavy gauge and mounted by means of the spade terminal connecting bolt (S) and by threading through two holes (H) in the heavy brass mounting base. The connecting lead spade terminal is secured to the shank

of the brass mounting base by insulation tape (I).

The wire formation is shown in the inset (b), and when fitting this to the brass base, the "U" form which is anchored under the bolt clamping nuts should be made first; then the two arms (W), which are straight to commence with, can be worked through the holes (H), the splayed



An efficient connecting clip for terminal shanks.

ends and bending to the clip shape being done finally. The inset (c) shows the spring fitment, also the filed "U" base in the cut-out portion of the brass mount, depicted by "F."

This filed part assures a slip-free fitment to the largest size of terminal for which this clip was designed originally, and assists somewhat in this respect, even with smaller terminal shanks.—J. T. KNIGHT (Petersfield).

## THE WIRELESS CONSTRUCTOR'S ENCYCLOPAEDIA

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(Editor of "Practical and Amateur Wireless")

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In previous issues we have discussed the question of what is generally known as Contrast Expansion, but for new readers we may briefly explain that a gramophone record generally has an untrue balance between loud and soft passages. This is due to difficulties in the recording or to the necessity of keeping quiet passages loud enough to be audible above surface noise and the need to avoid loud passages from overloading the recording equipment. Consequently, when reproducing good orchestral records in the home there is an unreal balance which does not satisfy the critical musical listener. Various suggestions have been made for restoring the correct balance, but circuits so far described have suffered from various defects. A linear circuit must be used if best results are to be obtained, whilst the degree of contrast given by the apparatus must also be controllable for various recordings. Furthermore, valves in use must be capable of control so that a suitable operating point on the characteristic may be obtained. In a circuit arrangement developed by the G.E.C. a heptode valve is employed in conjunction with a triode and double-diode valve, the input being taken to the first mentioned valve and also to the triode. The heptode is provided with a positive bias on its first and second grids and the third and fourth grids are provided with a positive voltage in the usual manner. The signal is fed to the fourth grid, and that portion of the signal which is fed to the triode is amplified and fed to the double-diode which rectifies it and feeds it back to the first and second grids of the heptode —after the manner of normal A.V.C. circuits. As the heptode is of the variable-mu type the gain is controllable, and in the circuit to be described the gain is at a minimum when no signal or a very quiet one is applied, and it is at maximum when a loud signal is applied. Thus we can obtain the desired increase of contrast from a record played in the usual way.

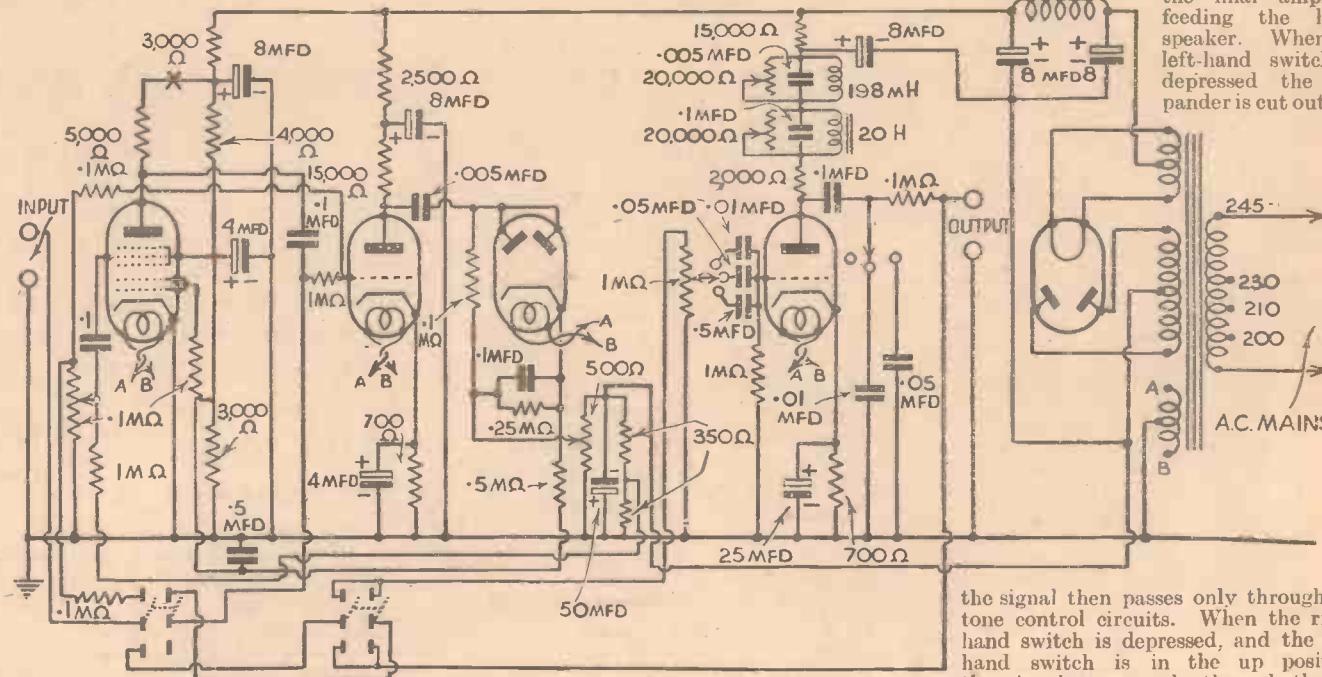


Fig. 1.—Theoretical circuit of the Combined Contrast Expander and Tone Control Unit. The grid leak for the first valve is incorrectly shown here, and should be taken direct to the grid, that is, to the other side of the .1 mfd. condenser.

# COMBINED CONTRAST TONE CO

## Tone Control

To enable the signal to be fed to the appropriate point on the curve of the valve certain controls have to be included, and these will be described subsequently. When adding realism by means of a unit of this type, it is found very desirable also to apply complete tone control, and the usual controls provided in apparatus are not sufficient to give the wide range of control which is desirable when obtaining the realistic results which a good contrast expander can provide. By using a simple stage of amplification, and providing bass and treble boosting controls, together with bass and treble reducing controls, we can, however, obtain any desired balance of tone, and, therefore, in this unit we have embodied this circuit. As the tone control is such an effective piece of apparatus, however, it is worth while including this when radio reproduction is being provided, although in this case the expander is not always satisfactory. On certain broadcasts, however, it may be used, and the control which governs the degree of expansion may then be set to a low position in order not to obtain an exaggerated effect. From the preceding remarks, therefore, it is obvious that we need two separate units, which may be used together or individually, and in the unit now to be described we have incorporated them with separate control switches so that the desired effects may be obtained.

## The Circuit

In Fig. 1 is the complete theoretical circuit, showing at the lower portion the two double-pole-double-throw switches which enable the desired switching to be carried out. When both switches are in the up position, both the expander and the tone control circuits are in action, and when a

How to Restore the Musical Records, or Effect Complete a Single Unit

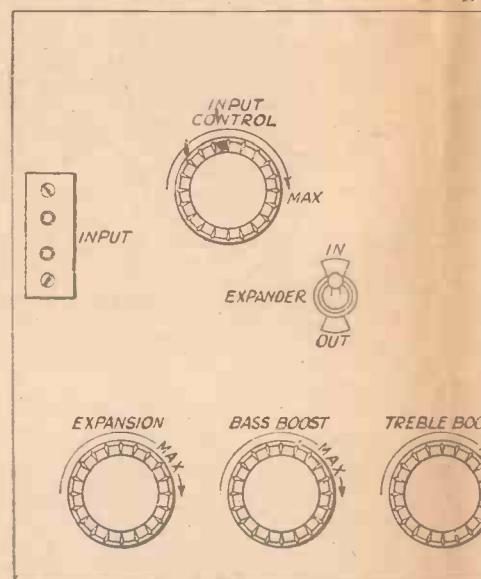
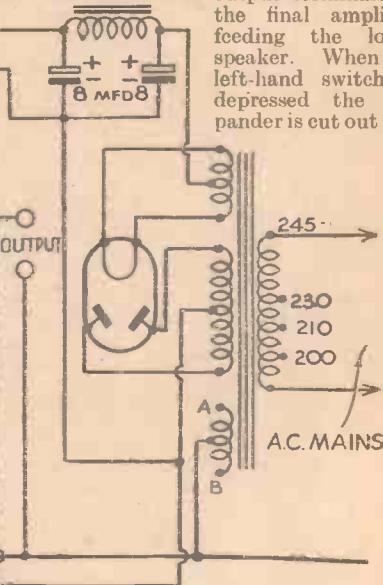


Fig. 2.—This view of the panel indicates the pur-

pick-up or the output from a smaller amplifier is fed to the input terminals the signal passes through the entire circuit and is then taken from the output terminals to the final amplifier feeding the loud-speaker. When the left-hand switch is depressed the expander is cut out and



the signal then passes only through the tone control circuits. When the right-hand switch is depressed, and the left-hand switch is in the up position, the signal passes only through the expander, and thus when both switches are

# EXPANSION AND TONE CONTROL-1

Balance of Gramophone Tone Control, or Both, in  
By W. J. DELANEY

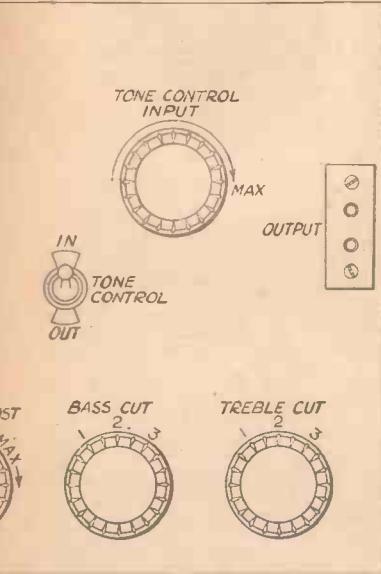
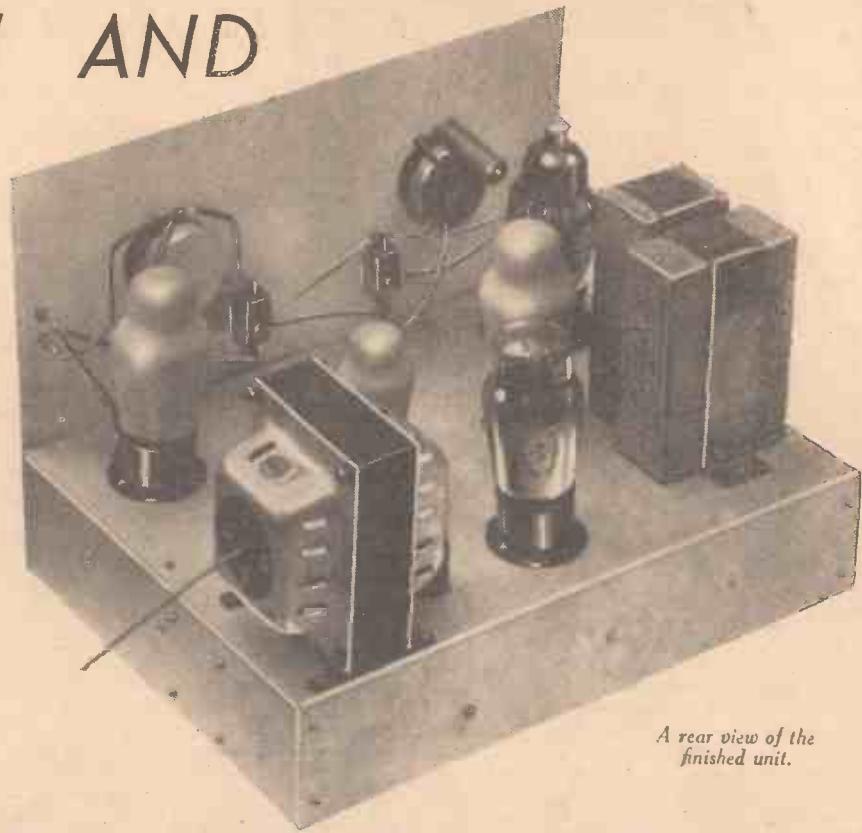


Diagram showing the arrangement of the various controls and switches.

depressed, the signal passes straight across from input to output terminals and the entire apparatus is out of circuit. The special requirements of the expander call for the inclusion of a biasing circuit in the H.T. negative lead and it is, therefore, difficult to make use of an existing power unit in order to supply the various voltages to this expander circuit. Accordingly the unit has been designed with its own power supply and the mains transformer primary may be joined to the normal receiver mains input circuit, and a separate mains on-off switch included to cut it out of circuit when required.

## The Controls

A word of explanation regarding the controls may be given here before detailing the constructional work. At the top of the panel are two volume controls, that on the left governing the signal strength fed to the heptode valve. It should be noted, however, that this does not affect the signal passed to the remaining portion of the expander circuit and in this respect is very different from the circuits which have been given previously. The main use of this control is to ensure that the signal applied to the heptode shall be of such a strength that it is brought to a straight part of the working curve of the heptode and this may be done conveniently by ear. When once set for the pick-up which is in use it need not be adjusted again unless the pick-up is changed. The control to the right of this is a normal volume control to avoid overloading the tone control valve and may



A rear view of the finished unit.

be used in the usual way according to the record or signal which is being received. The lower left-hand control governs the degree of expansion, and when set to minimum (anti-clockwise direction) the signal is more or less unaltered, whilst when in its maximum position expansion is at a maximum and on many records will give an unnatural effect. It is therefore adjusted to give the desired effects in use.

The next control gives bass boost, and this and the remaining controls is only in use when the tone-control circuit is switched in. The next control acts in a similar manner with treble, raising the pitch considerably. The next control gives three positions of bass cut, and the next three positions of treble cut, and obviously a judicious mixing of these four controls enables any

(Continued on page 161)

## LIST OF COMPONENTS.

One mains transformer, type EP.36 (Varley), 22s. 6d.	One 8-8-4-4 block condenser, type 317 (Dubilier), 7s.
Three chassis type 5-pin valveholders, type VI (Clix), 1s. 6d.	Two 350 ohm $\frac{1}{2}$ -watt resistors, type RMA9. (Erie), 6d.
One four-pin valveholder, type VI (Clix), 5d.	One 700 ohm $\frac{1}{2}$ -watt resistor, type RMA9. (Erie), 3d.
One seven-pin valveholder, type V2 (Clix), 9d.	One 500 ohm $\frac{1}{2}$ -watt resistor, type RMA9. (Erie), 3d.
Two two-pin socket strips (Clix), 1s.	Five 100,000 ohm $\frac{1}{2}$ -watt resistors, type RMA9. (Erie), 1s. 3d.
One type L.F.14.S choke (Bulgin), 9s. 6d.	One 250,000 ohm $\frac{1}{2}$ -watt resistor, type RMA9. (Erie), 3d.
One type L.F.16 choke (Bulgin), 8s. 6d.	One 500,000 ohm $\frac{1}{2}$ -watt resistor, type RMA9. (Erie), 3d.
One type H.F.8.S choke (Bulgin), 2s.	Three 1 megohm $\frac{1}{2}$ -watt resistors, type RMA9. (Erie), 9d.
Two type S.117 switches (Bulgin), 2s. 6d.	One 2,500 ohm 1-watt resistor, type RMA8. (Erie), 6d.
Two type S.98 switches (Bulgin), 5s.	One 2,000 ohm 1-watt resistor, type RMA8. (Erie), 6d.
Two type K.16 knobs (Bulgin), 9d.	One 5,000 ohm 1-watt resistor, type RMA8. (Erie), 6d.
One 500 ohm potentiometer, type TW/p. (Reliance), 4s. 6d.	Two 15,000 ohm 1-watt resistors, type RMA8. (Erie), 1s.
Two 20,000 ohm potentiometers, type TW/p. (Reliance), 9s.	Two 3,000 ohm 3-watt resistors, type RMA1. (Erie), 3s.
One 100,000 ohm potentiometer, type SG/p. (Reliance), 4s. 9d.	One 4,000 ohm 5-watt resistor, type RMAO. (Erie), 2s. 6d.
One 1 megohm potentiometer, type SG/p. (Reliance), 4s. 9d.	One MX40 valve (Osram), 11s. 6d.
Two .005 mfd. fixed condensers, type 4601/S. (Dubilier), 2s.	One D41 valve (Osram), 5s. 6d.
Two .05 mfd. fixed condensers, type 4602/S. (Dubilier), 2s. 6d.	Two ME4 valves (Osram), 15s.
Two .01 mfd. fixed condensers, type 4601/S. (Dubilier), 2s.	One MU.12/14 valve (Osram), 9s.
Three .1 mfd. fixed condensers, type 4603/S. (Dubilier), 4s. 0d.	Thirty-one $\frac{1}{4}$ in. 4 BA bolts with nuts.
Two .3 mfd. fixed condensers, type 4608/S. (Dubilier), 4s.	One $\frac{1}{4}$ in. 4 BA bolt with nut.
Two .1 mfd. oil condensers, type 950A. (Dubilier), 8s. 6d.	Eight soldering tags.
One 25 mfd. electrolytic condenser, type 3016 (Dubilier), 1s. 6d.	Insulated sleeving, wire.
One 50 mfd. electrolytic condenser type 3016 (Dubilier), 1s. 6d.	Chassis, 12in. x 9in. x 2 $\frac{1}{2}$ in. (runners all round).
One 8-8-8 block condenser, type 312 (Dubilier), 7s. 6d.	Panel 12in. x 8in.

# RADIO IN AVIATION—2

**T**HE subject of aerials is intimately linked with that of the earth system on aircraft. In the early days of wooden aircraft the aerial was balanced by means of a counterpoise which consisted of a network of insulated wires supported inside the fuselage and wings. The larger masses of metalwork in the aircraft, engine, tanks, etc., were brought into the counterpoise system by means of bonding wires and so started the thorough bonding system which is now so familiar to aircraft constructors.

With the advent of all-metal aircraft the usefulness of the counterpoise, which can now take the name of "earth," increased very considerably and it was possible to dispense completely with supplementary earth wires. But this improvement was not an unmixed blessing, for on short waves it was found that with the apparatus then current the counterpoise could not be treated as a simple capacitance. Its dimensions were such as to cause prohibitive impedance, and on certain frequencies the oscillating system was so far mismatched that the efficiency was extremely low. With a self-oscillating direct-coupled system it was frequently impossible to maintain oscillations over the whole of the required waveband. Various ways of overcoming this were tried; these included small insulated counterpoises, which were brought into use over the critical wave-bands, and alternatively series condensers to reduce the coupling to the aircraft earth. This latter system was electrically satisfactory but it brought in its own troubles.

The problem of providing a satisfactory "earth," on aircraft, quite apart from its mechanical difficulties, is a serious one. The impedance of the system varies with frequency between very wide limits, and under no conditions can it be safely regarded as having the distributed inductance and capacitance of an infinite surface. No doubt, good adjustments can be provided in the aerial-circuit-earth system such as to bring about efficient conditions, but such adjustments have to be varied with substantial changes of wavelength, thus occasioning design and operational complications. Further reference to the earth system will be made later.

## Bonding

Bonding may be said to have made its first appearance in aircraft when the counterpoise system was augmented by the addition of the engine, tanks, and other large masses of metal, with the object of increasing the electrical capacitance of the earth or counterpoise. But its development to its present state of thoroughness has been due to two other causes. In the first place, it was decided to bond together and to earth all lengths of wire and extensive pieces of metal, in order to eliminate the possibility of the occurrence of large potentials between parts and so reduce the fire risk arising from sparking. This condition had been found to arise in aircraft fitted with powerful transmitters operating on a wavelength of about 12 metres generated by a valve circuit taking 2 kW at an anode supply of 5,000 volts. In the second place, the introduction of high-gain receivers of the superheterodyne type in which the aerial circuit was in an oscillating condition had resulted in a severe form of interference due to a number of causes. The most fruitful source of noise was the

## This Week We Deal with the Subject of Earth Connections and Power Supplies

existence of bad contacts between rubbing parts, such as cross-over points in the straining wires and cables and between control cables and their guiding tubes and supports.

Bonding noises in the fuselage structure and in the control wires were eliminated by a comprehensive system of bonding by means of which all parts in sliding contact were connected together by a bridge piece or short loop of copper wire securely attached and soldered across the contact. In other cases, where bonding was not permissible on account of the extent of the relative motion of the parts concerned, recourse was had to the provision of good and permanent insulation. Cross-over points in landing and flying wires were separated by means of insulating acorns or discs, which prevented the wires coming into accidental contact with one another.

more acute, for it was found that tubular joints were frequently electrically unsatisfactory when new, and almost invariably became very bad after a period in service. The chief trouble was the presence of enamel on surfaces in mechanical contact, which even with careful cleaning still occasioned poor electrical contacts. The defect was finally cured by the simple process of leaving the enamel on the surfaces and of providing sharp points on one of the members whereby the enamel was perforated during assembly and a good contact secured.

To avoid the fire risk which might arise through brushing or sparking at the metallic nipples of wire-reinforced petrol tubing, a special form of bonding was devised; this consisted of a single length of wire laid during manufacture under the reinforcing helix surrounding the tubing proper. This wire was securely bonded or soldered at each end where it was joined to the metallic nipples. All these features remain to the present day where they are appropriate. In wooden machines the complete bonded system is connected to the main earth strip at frequent intervals.

Although the cure for contact noises is to bond all parts together and connect them to



*During a recent television broadcast from Hanworth, the television announcer in the autogyro, seen in the illustration, spoke to radio viewers by means of a short-wave transmitter.*

This bonding requirement was a source of considerable trouble and expense both during erection and in maintenance. Efforts were constantly being made on all sides to reduce the very great number of points affected, but, except as regards the bonding of very small parts such as bolts and small brackets, complete bonding had to be insisted upon. Even under those conditions it was generally found that at the end of 2-3 months in service it was necessary to overhaul the aircraft to repair faults in parts not accessible during ordinary maintenance.

## All-metal Aircraft

The advent of all-metal construction, far from simplifying the problem, made it

the earth system, there remained at one time one source of noise which could not be located but which was traced quite accidentally. When oscillating aerial circuits were common, such as in the early forms of superheterodyne receivers, it was frequently found that a continuous noise occurred in flight, reminiscent of bad commutation. Careful attention to the commutator produced no improvement and the noise remained when the generator, which was fixed on the wing, was disconnected and, therefore, not excited. While work was being done on the aircraft on the ground to search for the cause, the windmill, which was, of course, stationary, was accidentally moved and the elusive noise reappeared. The

cause was the rubbing contact between the commutator and brushes, the noise being independent of speed and of the voltage generated. Insulating the generator from earth only afforded a partial cure, and it was necessary for some time to add a remote-controlled brake to the windmill so that it could be stopped during reception. This state of affairs disappeared with the introduction of non-oscillating aerials for receivers.

### Power Supply

There are three types of power supply to be considered, namely, H.T. for the transmitter, L.T. for filaments, and H.T. supply for the receiver. It is not proposed to go back to the period of spark transmitters, although this class of apparatus was quite interesting in itself, especially in view of the small amount of data then available and the very sketchy rule-of-thumb technique that was applied to aviation radio-communication problems. Reference will, therefore, be made to valve-type apparatus only.

### Transmitter H.T.

The earliest form of supply for the transmitter valve anodes was the air-driven generator type. Direct-current generators of light weight and high rating were designed for use in the conditions of excellent cooling obtained in the slip-stream. These generators were mounted either on the wing, where they remained permanently in the slip-stream, or on the side of the fuselage, by means of a retractable bracket. The latter form enabled the operator to rotate the generator on a vertical axis, at the same time pushing it into stronger winds so as to increase the torque on the windmill; by this means he was able to regulate the speed of the generator and thus had a certain measure of control on the output voltages. This, together with the input current, was measured by means of a control box comprising an electro-static voltmeter, to which was later added a field regulator for finer control.

The windmills used were a constant source of trouble from the point of view of speed constancy. From the earliest days, therefore, attempts have been made to produce speed regulators which would be automatic in action. One of the earliest forms, originated in France, was a windmill comprising a single blade capable of rotation on its axis and opposed by a pair of weights not in the same plane of rotation. Centrifugal force produced in the weights caused the complete blade to rotate on its axis against a spring of suitable characteristics, thus providing an isochronous governing action through automatic adaptation of the pitch to the airspeed. This type of governor was fairly successful, but was not capable of accurate mechanical and aerodynamic balance at all speeds. Although it was never much used in British aeroplanes, it was highly favoured in France where it is believed it is still occasionally used at the present day.

An improved type came from America; it was based on the same principle of balancing a centrifugal force against a spring, but an attempt had been made to keep it mechanically balanced by providing two blades. It was extensively used in the U.S.A. but never found favour in England. It was not capable of perfect aerodynamic balance, and its drag was considerable owing to the size of the governor mechanism. It was followed by a much improved version of British origin in which the governor mechanism was of considerably reduced dimensions. Its action was excellent, although aerodynamic balance was still

limited to a certain range of speed. It is still in use at the present day where air-driven generators are employed.

### An Improved Governor

A form of governor which gave very good results was of the friction-drive type. A clutch operated from the armature end was incorporated in the drive between the windmill and the generator. This clutch was designed to release its pressure by centrifugal action, as the speed of rotation reached a certain figure. With slight increase of generator speed the pressure fell off very rapidly, thus allowing slip to take place and so preventing a further increase. It was capable of dealing with a windmill speed ratio of about 2:1 (2,400-4,500 r.p.m.) with a transmitted speed-change of only 20 r.p.m. in 2,400 when in proper adjustment.

Other forms of regulation were provided by means of contacting or relay devices acting on the field of the generator. Apart from their special features associated with aircraft designs, these regulators were of normal type. There were also other forms such as self-regulating machines deriving their regulation from a floating battery and compound fields, and such machines gave very satisfactory results.

But whereas fair regulation is sufficient for H.T. supplies, much greater constancy was found essential for the filament supplies provided by double-purpose generators, and it is perhaps this requirement which was instrumental in causing such careful attention to be paid to speed constancy.

In recent years the aerodynamic objections to air-driven generators have caused engineers to concentrate on the use of motor-generators or dynamotors driven directly from the central battery on the aircraft. This class of power supply offers many advantages, but the disadvantages should not be lightly set aside. In general the regulation of these machines is poor and is insufficient to permit of their being used for L.T. supply for filaments which must, therefore, be derived either directly from the central battery or from a separate battery (of which more will be said later). In the case of the central battery the L.T. supply suffers from voltage variations as the various loads are switched on throughout the aircraft.

It is, of course, well known that variations of H.T. supply cause variations of transmitter frequency, and when C.W. is employed these variations cause unpleasant keying chirps which may be very disturbing to the receiving operator on the ground.

### Transmitter and Receiver L.T.

Until recent times it has been the practice to employ accumulators for supplying filament heating both for the transmitter and for the receiver. This has ensured a steady emission from the filaments with only a gradual falling-off with time. A great deal of study has been devoted by battery manufacturers to obtaining a maximum ampere-hour rating with minimum weight and bulk. A special feature which arose from the use of batteries in aircraft is the provision of non-spill devices. Some of these are very simple and take the form of special vents which allow gases to escape, but which, when inverted, retain the electrolyte. In other types, the battery container is made sufficiently tall to allow the electrolyte to fill the upper portion when the battery is inverted, without allowing it to reach the level of the vent, which projects well down into the container. There are many intricate designs

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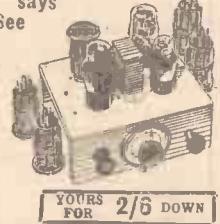
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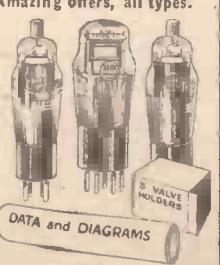
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# NOTES from the TRADE

## New Marconiphone Receivers

TWO spring releases are announced by Marconiphone, one being illustrated below. The first is a Console model, for A.C. operation, incorporating 5 valves in a 3-waveband push-button circuit. The arrangement is the conventional superhet, but the oscillator inductances are permeability tuned. Pressing any of the buttons automatically switches on the set. Controls have been reduced to three, the usual volume and tone controls being combined and operated by concentric knobs. The wavelength ranges are from 726 to 2,000 metres, 195 to 580 metres and 13.8 to 50 metres. Sockets are provided for pick-up or record player, and there is also an extension loudspeaker socket switch of the type which enables the self-contained speaker to be silenced when desired. The output is rated at 3 watts and the mains consumption is 65 watts (75 volt-amps. at 225 volts). The price is 17 guineas.

The second model is a table version of the same receiver possessing the same circuit and characteristics, and the price is 13 guineas. Mains consumption is, of course, identical. Both receivers offer a choice of eight stations by push-button control.

## McCarthy and Hartley Turner

H. McCARTHY, LTD., have taken over the goodwill and assets of the Hartley Turner Radio company, and a new company is now being formed and the manufacture of Hartley Turner quality radio apparatus and the Hartley Turner loudspeaker will continue under the new arrangements. The first of a series of new Hartley Turner tuning units and amplifiers

is announced and a small illustrated leaflet describing these may be obtained on application to the company at 92, Queensway, London, W.2. The tuner covers five wavebands from 6 to 10, 12.8 to 51, 65 to 230, 200 to 550 and 900 to 2,100 metres, and has an H.F. stage operating on all bands except the first. Four valves are used in a superhet circuit, and the parts are assembled on an 18 S.W.G. cadmium plated steel chassis. An 8 in. by 4½ in. floodlit glass dial, calibrated in metres and station names, is fitted. There are six controls: selectivity, tone and on/off switch, waveband selector, volume, variable selectivity and gramophone, and tuning.



The new Marconiphone Model 878

## RADIO IN AVIATION

(Continued from previous page)

of passing interest, but in general it can be said that the reversible-vent type is the one most widely utilised.

In recent times there has been a pronounced tendency to discard accumulators and to substitute a low-voltage winding on the motor-generator. This arrangement, however, is not of universal application, for, on an unbalanced keying-load, filament fluctuations arise which cannot always be tolerated.

## Receiver H.T. and Grid Bias

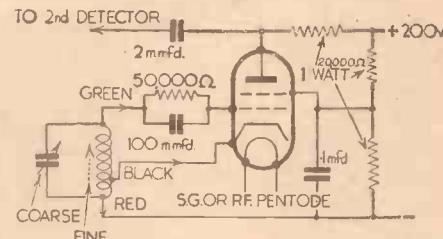
This supply has perhaps been the cause of more trouble than anything else in connection with power supply. The necessity for a perfectly smooth voltage has, from the earliest days, established the use of dry batteries. These, however, have been troublesome owing to their poor performance and life, and also on account of their bulk and weight. Their storage characteristics were originally indifferent to definitely bad in tropical climates, and would warrant a thorough and independent treatment. A great deal of work has been done by battery manufacturers to produce improved cells, which in their "inert" form have been fairly successful. These, as is well known, are perfectly dry cells which are moistened only when about to be put into service. A great deal remains to be done in this direction from the point of view of storage.

Of recent years a determined effort has been made to do away with these dry cells by arranging the provision of a separate output from the generator. This has been rendered possible by improved design of the generator windings and commutation, with consequent considerable reduction in generator ripple.

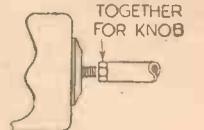
## Separate Batteries

It has been suggested at various times and in various quarters that the whole question of power supply could be considerably simplified by making use of alternating current. The question has received considerable attention in various countries and particularly in the U.S.A., but so far nothing much has been done towards applying this mode of supply. The introduction of separately-heated cathodes has perhaps simplified the problem somewhat, but it still remains essentially only a proposal. Factors mitigating against the use of alternating current are those relative to transformation, regulation, and smoothing. The latter point in particular involves such an increase of weight in the form of smoothing chokes and condensers as to warrant a retention of the D.C. form of supply. But it can be confidently expected that within the next few years alternating current will make its practical appearance in aircraft radio-communication equipment, and within a very short period it may well render other forms obsolete.

A point worthy of mention in connection



A B.F.O. stage built around the new Varley coil unit and the method of adjustment for panel control.



## New Varley B.F.O. Unit

MESSRS. VARLEY announce a new Beat Frequency Oscillator Unit, comprising a tapped coil fitted with a semi-variable condenser. This is intended for the standard electron-coupled circuit using a mains S.G. or H.F. pentode valve. The connections are shown in the accompanying illustration, which also shows the method of obtaining two adjustments. The coarse setting is carried out by means of the bottom trimmer screw situated in the centre of the bottom fixing nut. Fine adjustment is carried out by means of the screw at the top which gives a range of approximately 10 kc/s each side of zero beat for 180° rotation. A special bracket and shaft adaptor kit enables the unit to be mounted above or below the chassis in a horizontal position and the beat frequency controlled from the front of the panel. For varying the pitch of the note a 15 to 20 mmfd. condenser is required, joined between the green lead and earth. The price of the coil is 5s. 6d. (for 1,600 kc/s) and for 465 kc/s the price is 6s. 6d. The special shaft adaptor and mounting bracket costs 6d.

with the battery-driven generator is the fact that power is available when the aircraft is at rest on the ground or on the water. When the engines are not running and the central battery is not on charge the voltage of the latter is low and the generated frequency may be seriously off its allotted value. Further in the case of a forced landing, it is not unusual to find that the battery is discharged flat in attempting to restart the engines. The safer, but not popular way, is to provide a special battery for use in connection with the radio-communication equipment only.

Battery-driven generators are frequently fitted with interrupter discs for I.C.W. transmission and other purposes. This fact adds importance to the question of speed constancy, especially for military purposes, where the exact value of the interruption frequency is a matter of considerable importance. Another form of power supply, which is not yet fitted as a regular practice, is the D.C. vibrator-rectifier type. Of recent years this class of power supply has received considerable attention in connection with broadcast reception and the like. It would not be strictly true to say that it is completely reliable, but it has made considerable progress. Perhaps its chief objection in connection with aircraft use is the difficulty of reducing vibrator spark disturbances to a sufficiently low level to be received without interference. Its compactness and other properties make it worthy of careful consideration for the future.

## COMBINED CONTRAST EXPANSION AND TONE CONTROL—1

(Continued from page 157)

desired tone of reproduction to be obtained. The lower socket on the input and output strips are common to earth, and therefore when connecting this unit to existing apparatus it may only be necessary to make connection to one of these—this depending upon the general design of the complete apparatus. Similarly, the input "live" socket may be connected to one side of a pick-up or to the output from a transformer or resistance-capacity coupled stage. Many listeners have a radio unit in which an L.F. stage is included, the pick-up being switched in this unit, and the output being then taken to the input circuit of a powerful amplifier feeding a speaker. In this case, of course, the unit is included in the L.F. circuit and operates in exactly the same manner without difficulty.

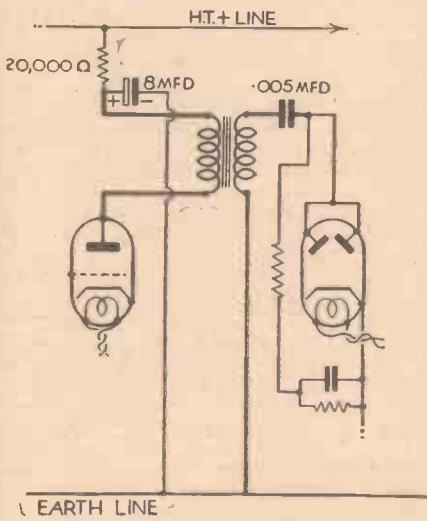


Fig. 3—Modifications necessary when using an insensitive pick-up.

### L.F. Coupling

Certain makes of pick-up give an output in the neighbourhood of 1 volt and the unit as described is intended for these or for the case where an L.F. stage precedes the unit. In this case the control voltage from the diode will be adequate. If, however, an insensitive pick-up is in use, or no L.F. stage precedes the unit, the signal may require additional boost in order to obtain sufficient control over the heptode. For this purpose transformer coupling should be used between the amplifying triode and the diode in the expander circuit, as shown in Fig. 3, the ratio of the transformer being about 4 or 5 to 1. A small component should be used and there is ample room between the valve holders to accommodate it. No screening has been found necessary in the combinations with which the unit has been tried, but if a long lead is called for on the input side to the unit it may be desirable to screen this, as any hum induced in that lead will be subsequently amplified as it passes through the unit and it will then give rise to trouble in the output stage. If the unit is to be used with symphony records, with which it gives the best results, it is imperative that the output stage of the final amplifier is of the super power type, preferably with a push-pull circuit as otherwise the peaks on loud passages will not be handled and distortion will be obtained. A full list of components is appended, and full constructional details will be given next week.

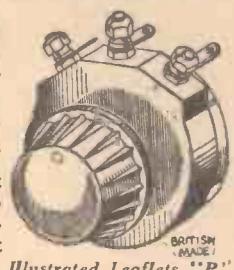
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### A New Committee

THE Cinematograph Exhibitors' Association, in the light of recent events, has lost no time in setting up a committee of fifteen members to watch television development and report to the General Council. This is an admirable move, for it is certain that a careful investigation will bring to light many ways in which co-operation can be undertaken. The technical department of the association have met with some opposition to their considered views that mechanical means of reproducing television had reached their upper limit as far as large viewing screen projection was concerned. The protagonists of mechanical methods have already issued a challenge for the production of facts to support the statement. Due tribute by the same committee was paid to the new form of projection cathode-ray tube which was used at both the Marble Arch Pavilion and Tatler cinemas for the Boon-Danahar fight. It was thought that the greatest measure of success for big-screen work would accrue from a cathode-ray tube, whose screen image in relative opacities would serve to modulate, or work as a relay shutter to, an external high-intensity arc. This would, it is claimed, enable a screen 25ft. wide to be illuminated with the same degree of brightness as an ordinary cinema screen. Whether this line of research will ultimately provide the most satisfactory solution to all big-screen television problems is at the moment simply a matter of conjecture.

### Improving Camera Performance

AS a result of continued research work the actual operation of an iconoscope type camera has become better understood, and concurrently many suggestions have been advanced for improving the overall performance when generating picture signals. The signal-to-noise ratio can be improved by reducing the electron scanning beam current, but this cannot go beyond a certain point because of the necessity for discharging each element of the signal plate. To meet these conditions one idea proposed is to make a mosaic screen of small capacity and use a relatively low density electron beam, but replenish signal strength through the medium of electron multipliers. The tube follows somewhat on conventional lines, but the electrons released from the mosaic surface during the televising operation are attracted by metal anodes so that they pass into twin

April 29th, 1939.

Vol. 4.

No. 149.

multiplier assemblies. These are connected in parallel and the resultant amplified signal is then fed into the usual form of head amplifier for subsequent handling in the usual manner.

### A Tube Difficulty

WHEN television receivers have been in use for a very long time—something of the order of a thousand hours—it is occasionally noticed that a somewhat large coloured spot appears on the screen after the set has been switched on. Assuming that the screen powder is free from any impurities during the course of a tube's manufacture—a defect which evidences itself as coloured patches on the large glass face—it is very probable that the defect observed arises from what is often termed an ion spot. For some reason or another a slight trace of gas has manifested itself and this becomes ionised. Due to internal electron collisions positive molecules are formed and these, due partly to their slow velocity and charges, are not

influenced by the focusing arrangements. A central diverging beam is, therefore, brought into being, and this shows on the fluorescent powder surface as a circular area at the points of impact. It assumes the shape of the anode orifice, and this accounts for the circular boundary limits which are observed in those cases where the effect occurs. It is known that cathode-ray tube manufacturers are paying careful attention to this question, and there is no doubt that in due course the trouble will be eliminated completely.

### Camera Manipulation

IN order to give the maximum amount of entertainment value for a televised programme, the producer has under his control three or four cameras so that he can fade from one to the other to suit the action of the artistes. It also frequently becomes necessary to make a fairly quick changeover to a close up. This can be undertaken by means of lens changes on a turret mount, if provided, or by using a second camera placed in position for this purpose. A suggestion has now been made whereby this camera change of picture size can be carried out electronically. The idea is optically to focus the scene being televised on to a photo-electric cathode, and the electron image produced is then made to pass through an electron optical focusing arrangement before reaching the plane where scanning is undertaken to produce the necessary signal currents. By altering the magnitude of the current passing through the external solenoidal focusing coil any section of the scene can be enlarged or "picked out," and a close up provided on the screen of the camera prior to scanning. The idea was first employed in the image dissector tube but is now applied to other electron cameras.



A television camera, electrically controlled, is suspended above the operating table at Israel Zion Hospital, New York, during an abdominal operation. This was the first time that television was used in this manner. Students and doctors in a room 500 feet away were able to see the surgeon's hands, and hear his comments as he performed the operation.

# 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.

## THE CROYDON SOCIETY

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

THE Croydon Radio Society's session ended on Tuesday, April 4th, with a selection of gramophone records played on Mr. S. F. Webster's high quality apparatus. The event took place in St. Peter's Hall, Ledbury Road, South Croydon, with Mr. P. G. Clarke presiding, and the items played were all those selected from members' own records. Concluding, the Chairman said to-night's programme had resulted in a very happy spirit preponderating. High notes might disappear, bass notes never appear, and transients could be mutilated, yet he hoped that this friendly spirit would always be with the society. The next session will commence on the first Tuesday in October.

## SLough AND DISTRICT SHORT-WAVE CLUB

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

At the last meeting of the club held at headquarters the chief item of interest during the evening was a talk given by the secretary, Mr. R. J. Sly, on "The Ultra-high Frequencies." The speaker dealt very thoroughly with all aspects of this very interesting subject, and described his own particular receiver for use on 56 mc/s in great detail.

The discussion on conditions brought forth much comment on 2FAU's excellent log for the past fortnight, and many members came to the conclusion that they would have to rebuild their receivers and really get down to DX listening on the amateur bands.

Morse practice followed, and members were given hints on how to become first-class operators by two local amateurs G3GZ and G3XJ.

The agenda for the next meeting, to be held on April 27th, 1939, includes the ever popular discussion on conditions, and also Morse practice. New members will be welcomed, and will certainly find some item of interest to them as the agenda is drawn up to meet the tastes of all short-wave enthusiasts.

## EDGWARE SHORT-WAVE SOCIETY

Headquarters : Constitutional Club, Edgware.  
Secretary : F. Bell, 118, Collin Crescent, Hendon, N.W.9.

On March 22nd, Mr. Hardy (G4GB) gave an interesting lecture on direction finding, and landing equipment fitted to aircraft.

Examples and demonstration of certain parts of equipment were explained. G2IM discussed his aerial experiments and DX on March 29th, and explained his outlook regarding the separating of the bands for CW and 'phone.

On April 5th, Mr. Rice, of Messrs. Mullards, described his firm's oscilloscope and signal generator, and explained the main details of the different cathode-ray tubes. Examples of the apparatus were then demonstrated.

Guest Night on April 12th was a great success, many amateurs coming a considerable distance.

On April 26th an R.S.G.B. Field Day discussion on proposed equipment will be held, and on May 3rd there will be a junk sale.

Two members are shortly obtaining their full licences, having passed their Morse test.

## BRADFORD SHORT-WAVE CLUB

Hon. Sec. : G. Walker, 33, Napier Road, Thornbury, Bradford, Yorks.

ON Friday, April 14th, Mr. Fraser, of Ambassador Radio Co., Brighouse, gave a very interesting lecture on short-wave receiver design. The meeting was well attended and nearly everybody present obtained information on the finer points of receivers. The lecture was supported with a demonstration of their new addition to the already existing range of all-wave receivers.

The club has obtained new clubrooms at 1, Fernhurst Buildings, Baildon Road, Baildon, Yorks. The first official meeting will be held at these new premises on Friday, May 5th. A new transmitter has been built, and it is hoped to be able to obtain more contacts than was possible with the old gear.

The last meeting to be held at Bradford Moor School will be Friday, April 28th. Any further information regarding the club's activities may be obtained from the secretary.

## WATFORD AND DISTRICT RADIO AND TELEVISION SOCIETY

Hon. Sec. : R. T. Sharp, 11, Nightingale Road, Bushey, Herts.

A VERY successful meeting was held on April 15th, when there was a very good discussion on receivers for use with amateur transmitters. The next meeting will be held on May 18th, at the

Carlton Tea Rooms, 77a, Queen's Road, Watford, commencing at 8 p.m. There will be a junk sale, and all members are invited to bring their surplus gear.

All interested readers in the district are cordially invited.

## DAVENTRY SHORT-WAVE RADIO CLUB

Headquarters : Waggon Court, Sheaf Street, Daventry, Northants.  
Meetings : Tuesdays.  
Hon. Sec. : L. W. Bazley (2FIF), 66, Warwick Street, Daventry.

DURING the past few months reports have not appeared in PRACTICAL AND AMATEUR WIRELESS but the club has been progressing favourably.

Talks have been given by Mr. T. Douglas (G3BA), Mr. A. Venness, of the Northampton Electric Light and Power Co., Ltd., and members. The past few months have been devoted to practical work. Thanks are due to Mr. C. W. Morse, who helped the club during his stay in Daventry.

Mr. F. N. Calver has consented to be president.

Next month it is hoped to make up a party to visit the Empire Station here. If any clubs would like to attend please get in touch with the secretary.

New members are required to make the club a success, so if you live in Daventry or district, call any Tuesday, and we can guarantee you an interesting evening.

Subscription rates : Entrance fee 1s., 1s. monthly.

## ASHTON-UNDER-LYNE AND DISTRICT AMATEUR RADIO SOCIETY

Headquarters : Commercial Hotel, 86, Old Street, Ashton-under-Lyne.  
Secretary : K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne.  
Meetings : Alternate Wednesdays.

THIRTY members attended the annual dinner on April 2nd, when an interesting debate took place on the respective merits of superhets and straight receivers. Two S.W.L.s won the prizes in the raffles (Mr. W. Hattersley—6L6, and Mr. J. Spence—set of plug-in S.W. coils). Mr. Spence also later in the evening won one of the transmitting neutralising condensers, presented by G3BY. A competition on amateur prefixes was won by G3NX, who identified PX, although he has not worked this country! Music was provided by two audio-amplifiers loaned by G2BK, of Royton, and Mr. Leslie Gordon.

The officials are now looking round for a club room where gear can be installed, and it is intended to provide each member with his own key.

## KILMARNOCK AND DISTRICT SHORT-WAVE SOCIETY

Headquarters : Wardneuk Receiving Station, Glasgow Road.  
Hon. Sec. : R. Mitchell (2FSD), 151, Bonnyton Road, Kilmarnock.

WE have now got the club rooms into order, the front room being arranged as lecture room, complete with blackboard and seats. The back room will be used as a workshop, in which there is a bench 25ft. long, with 3 power points installed on it.

The society had a visit from four amateurs, viz., GM3HY, GM4BK, 2DCY and 2BUD, on Thursday, April 6th, when GM3HY brought along his Harvey UH1X10 portable transmitter and demonstrated it to the members, after which GM4BK gave a short but very interesting lecture on "The Beginner and Short-Wave Transmission"; also a brief sketch of his previous club activities which was enthusiastically received by his audience. The Society has now about 30 members, but have room at headquarters for many more.

## TUFNELL PARK RADIO CLUB

Hon. Sec. : J. G. Wright, 78, Gladsmuir Road, Highgate, N.19.

A CLUB has been formed at 33, Pemberton Terrace, Tufnell Park, N.19, to be known as the Tufnell Park Radio Club. Anyone interested is cordially invited to pay the club a visit, any Tuesday or Friday evening at 8 to 10 p.m.

## PERSONAL PARAGRAPHS

Mr. E. E. Morey has left Belling and Lee, and Mr. E. J. Wylie will now cover the whole of Berkshire, Surrey, the London S.W. postal area and S.E. Hampshire.

Mr. R. J. Morton, late of Burndept, has joined the staff of Cyril French and will be representing him (for Celestion loudspeakers and Rex switches) in the territory previously covered by A. G. Scott.

Mr. R. E. German has been appointed by the Postmaster-General to be his Assistant Private Secretary.

Sir Adrian Boult has accepted an invitation from the organisers of the New York World Fair to conduct two concerts there with two of the leading American Symphony Orchestras on June 9th and 10th.

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# TELEVIEWS

## A Big Screen Effect

WHEN observing large size television pictures at fairly close range, as would be the case in the front seats of a cinema provided with television reception facilities or when seated near the set in the case of a projection tube model domestic receiver, there is a tendency for the observer to be given the impression of line movement on the screen which appears as a form of inter-line shimmer when the picture is bright. This will arise in an interlaced picture although the object of interlaced scanning is to reduce or eliminate flicker. There are various ways in which this can be overcome, but one of the most interesting suggestions put forward is to alter the depth of each scanning line. Normally, the odd and even line frames cover half the picture in turn and by inter-leaving them the whole picture is covered but the line depth is adjusted so that there is no overlap. In the case of large size pictures, however, the proposal is to double the depth of each set of scanning lines, so that for each frame the whole of the picture area is covered. Through the medium of this exaggerated line overlap it is claimed that the effects of inter-line movement are eliminated, although it is possible that a certain amount of picture detail will be lost in the process.

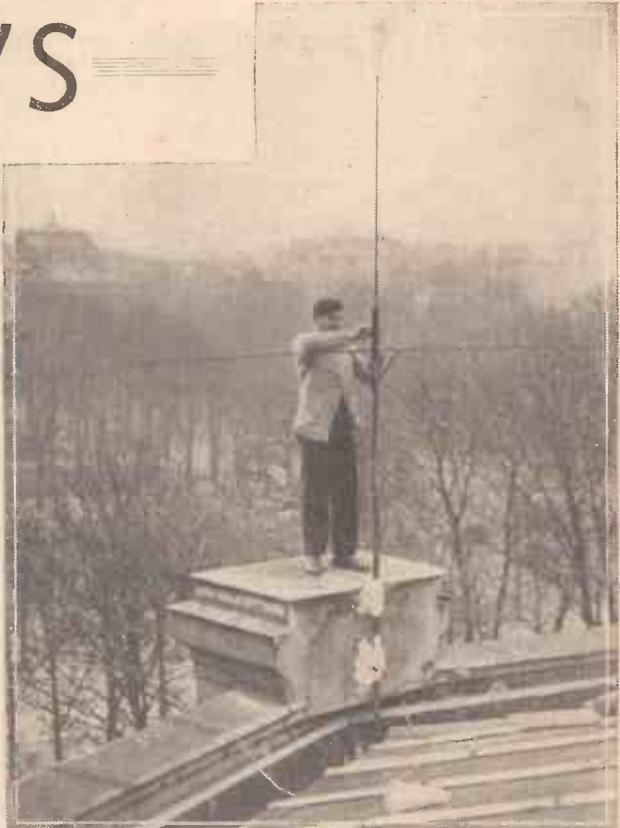
## A Simple Matter

IN many cases where details of new cinemas are furnished a paragraph states that the theatre has been "wired for television" so as to be in readiness for signal reception when general rediffusion becomes possible. To what extent the architect has made provision in his plans it is difficult to say, for the events of the past few weeks have shown very plainly that but little alteration is needed in a cinema when it is proposed to equip it with apparatus for showing television pictures on a big screen. In the case of the Scophony equipment, space behind the screen is required to accommodate the projector which works on the principle of mechanical optical picture reconstitution. With the Baird system a small area has to be roped off in the auditorium, while the E.H.T. unit is housed in any small convenient room from which cables can be run for supply purposes. In both cases a suitable dipole aerial on the roof in a position free from any form of electrical interference is essential, and from here a feeder cable is led to the vision receiver which is integral with the projector itself. Structural alterations are therefore negligible, and it has been shown quite clearly that the period of time necessary for installation is only a matter of two or three days at the very outside.

## Pictures by Incandescence

IN the continued research which is being undertaken with a view to providing television pictures of adequate brightness for either home viewing or big screen working, many attempts have been made to substitute the principles of incandescence for that of fluorescence. There is no doubt that a satisfactory incandescent picture gives the degree of brightness desired, but it brings in its train several other disadvantages which must be offset before real

success can be claimed. As a general rule the necessary temperature changes are brought about by the impact of the modulated electron stream on a very thin sheet of metal, but it is obvious that if the picture detail is to be adequately preserved then the heat and incandescence produced must not be allowed to spread over the metal sheet, otherwise each scanning line will be blurred and ruin the result. One method which has been suggested to overcome this defect brings into play an auxiliary screen. This is first of all coated with an emissive substance, and then heated to a temperature which allows it to produce secondary electrons as a result of the modulated electron beam impact. Thus the emission is in accordance with the light and shade of the picture producing the original signal. The secondary electrons are then directed towards an incandescent screen, being correctly focused to maintain their relative positions one to the other. This screen is



For the first time in Paris, a public demonstration of television will be given in a theatre. The moving pictures film "Knock" is going to be televised, and spectators will watch it in the Marigny Theatre in the Champs Elysées Avenue, projected on a television screen of four square metres. This first public television show is due to the fact that for the first time it is possible to use such a large screen. Our illustration shows the television mast being placed on the roof of the Marigny Theatre.

## TELEVISION PROGRAMME FEATURES

### LAWRENCE OF ARABIA

A TELEVISION programme dealing with Lawrence of Arabia has been arranged for the evening of April 30.

Touching upon many aspects of the life of this great, and now almost legendary, character, the programme will bring to the television studio some of Lawrence's friends and associates. His amazing variety of activities—the conduct of military operations during the war, life afterwards as a private in the Royal Air Force, experiments with speed boats, literary work, drawing, motor cycling—will be reflected in what will amount to a television "documentary."

It is hoped to show photos taken by Lawrence himself in Arabia. Towards the end of his life Lawrence was interested in a campaign for the abolition of the death penalty—another phase in his many-sided career which will be brought out in this programme. The producer will be Stephen Harrison.

### THE CONDUCTOR SPEAKS

SIR ADRIAN BOULT, the B.B.C.'s Director of Music, has consented to be televised in the series called "The Conductor Speaks" on the afternoon of May 14th. Sir Adrian, who was formerly conductor of the City of Birmingham Orchestra, joined the B.B.C. in 1930. Under his direction the B.B.C. Symphony Orchestra of 119 players grew, and it is now recognised as one of the finest orchestras in Europe, if not in the world.

Presentation will be in the hands of Philip Bate.

made from a thin layer of lampblack, and a film of finely powdered tungsten, and it is claimed that the resulting picture gives satisfactory incandescence in accordance with all the tonal values, but without any spreading effects due to heat.

## Television Advertising

ALTHOUGH the Federal Communications Commission in America has not yet licensed any television broadcasting station to operate commercially, it is known that many of the big companies are already drawing up plans to meet the day when certain hours on the air can be offered to the public as sponsored television programmes. Experiments are being undertaken with as much programme variety as possible with the idea of providing potential advertisers with a range of material to suit their own particular products. Dramatic, musical, novelty, and variety items have been used, together with film excerpts and shorts which can link up a programme and sustain interest in spite of the advertising atmosphere. Education has in no way been neglected, while science and dancing lessons add still more to the scope of the cameras' work. According to one prominent official of the National Broadcasting Co., who are among the leaders in this field, their intention is to see that the public will have paraded before them on their television screens programmes of a variety and scope, and entertainment and education, beyond that which any other entertainment medium has been able to offer civilisation to date.



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).

#### Amateur Radio and A.R.P.

SIR,—It is somewhat surprising to note that radio as a means of communication in A.R.P. work has been relegated to the background by the authorities. The official communication system relies upon the telephone network, supplemented by messengers. As, however, telephone cables are often rendered inoperative by such disturbances as storms, floods, etc., they are not likely to prove immune from modern high-explosive bombs. Surely amateur radio could be usefully employed in an A.R.P. radio network.

In one or two districts amateur transmitters are already co-operating with police radio, and there seems no reason why the idea should not be carried further. Two of the amateur bands are adjacent to those used by the police, and in many cases both police and amateurs are using similar apparatus. It would be useful, too, if A.R.P. wardens could be provided with portable transmitters which would enable them to communicate with their headquarters without reliance on other means of communication.

By slight adjustments to the amateur transmitter's equipment it would be possible for each local authority to broadcast information which could be picked up by every householder with a broadcast receiver.

In view of the satisfactory response to the call for Civilian Wireless Reserve recruits, I feel sure there would be a satisfactory response in the case of a similar scheme for A.R.P. What do other readers think?—“AMATEUR” (Rossendale, Lancs.).

#### S.W. Superhet for Overseas Use

SIR,—Being a subscriber to your paper for more than two years, I thank you for the information it gives, and the practical way it deals with problems. I made a request some time back about the publication of designs for receivers that would cover 13 to 550 metres, or to cover 13 to 125 and 200 to 550 metres, so that the receivers can also receive broadcasts on the 60-metre band on which Indian stations are now transmitting, and also cover the 90-metre band on which the Indian stations propose transmitting. I once again make the request to you to publish designs of superhet receivers employing four or five valves to work on (1) A.C. mains, (2) A.C./D.C. mains, (3) battery (H.T. and L.T.), (4) six-volt car battery. In your issue of PRACTICAL AND AMATEUR WIRELESS dated March 4th, 1939, I find on page 629 mention of a battery short-wave superhet, and if that will cover up to 90 metres, or at least up to 70 metres, further details would be useful.

The American receivers sold here cover 13 to 550 metres, and they are having good sales. If you publish designs for such sets, they will greatly help amateurs residing in India, Burma, and in other parts of the Empire.—P. GANESA IYER, B.A., Devokotta (Ranmad Dist.), India.

#### A Fine Log from Cheltenham

SIR,—Perhaps some of your readers will be interested in the log covering March 18th-26th which we have added below. All stations were received on L.S., using a home-constructed three-valve battery set and an inverted-L aerial 75ft. long pointed N.E.-S.W. The stations listed were on 14 mc/s, and were heard at our receiving station at Prestbury, nr. Cheltenham. The numbers bracketed indicate the number of stations in that particular zone.

CT1 (14); CN8 (7); FA (4); SV1 (6); SU1 (7); LY (6); HA (3); F (7); I (8); HB9CD; LAISA, G; YR5AA, PB; YU5AB; ES5CK; OZ7PB; OH2QM, SNEW; LU1QA; SM6WE; ZBIL; FM8MY; SP (3); W1 (43); W2 (52); W3 (28); W4 (26); W5KBG; W8 (8); W6ARL; W9 (5); VE1 (8); VE2 (3); VE4 (4); VE5VT; CO2WM, RG, 7ES, 6YM; VP6MR, FO; VP7X; VP2AV; VQ4SA; CX2OO; KA1ME; CT2BC, BP, AB, AP; ZS2X, 5BJ; VK2AGU; HI3N; K4ENG; HH2B; YV5AVE; PY5 (2), PY2 (6), PY7AY; CE3AT, and CP8T.

We should like to get into touch with another of your readers, preferably abroad,

CUT THIS OUT EACH WEEK.

#### Do you know

—THAT special circuits may be employed to avoid key-clicks in transmitting circuits.

—THAT aluminium solder is not suitable for making connections to aluminium chassis or screens.

—THAT the question of the phase of a signal is not normally important in a broadcast receiver, but there are arrangements where it is of great consequence.

—THAT when using certain anti-interference aerial systems the lead-in provided by the makers should not be cut or modified in any way.

—THAT a background of “atmospherics” from a small electric motor forms a good test for reading practice Morse signals.

—THAT test prods should always be insulated, and the thickness of the insulation (and, accordingly, the capacity to earth) may affect certain readings in modern apparatus.

*The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.*

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who is interested in short-wave listening, set construction, and aerial systems.

We should like to add that we have gained practically all our knowledge of radio from your excellent magazine, which we have been taking for the past twelve months.—G. J. OWEN, C. CLIFFORD, 18, Dagmar Road, Tivoli, Cheltenham Spa.

#### An Amateur's Complaint: Slow Morse Transmissions!

SIR,—Having been a reader of your instructive and interesting paper for many years, I would like to take this opportunity of complaining of the attention given by firms advertising in amateur wireless periodicals to amateur radio experimenters. Many have been the times, when carrying out a particular test or experiment, I have needed something urgently, and in many cases have had to wait two or three weeks for delivery. For instance, recently I ordered an essential part of an amateur transmitter by a reply-paid telegram. I received no reply, so telegraphed the firm again and still no reply. Now, over a week later, I receive a letter stating that the firm will be unable to supply for between a fortnight and three weeks. And this, quite a common component! I would appreciate other readers' experiences on this subject.

How many readers would appreciate slow Morse transmissions at, say, eight to ten words per minute? I would be quite prepared to do this if sufficient experimenters are interested?—ARTHUR GALE (G3XN), Alderney, Channel Islands.

#### Logged on a Two-valver

SIR,—May we encroach on your valuable space to answer Mr. B. N. Roberts' letter in the April 1st issue.

Without attempting to discourage him, we must say that his example of DX via an 0-v-1 falls short of even the medium standard. In the log he presents there are only two decent DX stations. They are FDC (19.8 metres) and VQ7LO (49.33 metres), with the latter outstanding. Of course, Mr. Roberts gives no details of his antenna and the conditions around him. They may restrain his capabilities somewhat. Our experiences show that it is best to send not more than half-a-dozen reports at a time, and to wait till a good percentage have replied. Working on this principle, we have an 80 per cent. reply, which is good going. The following is our log:

VP3, MR, BG, YDC (19.8 metres); XEWV (31.58 metres); JVP (39.95 metres); ZBW3 (31.49 metres); ZBW5 (16.9 metres); CFRX (49.42 metres); T14NRH (30.93 metres); VLR (31.32 metres); ZRK (49.2 metres); JZL (16.87 metres); HCJB (H.F. of 20 band); HS6PJ (15.77 metres); VQG4 (15.28 metres); KAY (20.03 metres); CR7AA (48.8 metres); VQ7LO (49.33 metres); ZRH (31.5 metres); ZGOY (31.6 metres); and 64 stations from Central America to South American CO5, HJ5, YV5, HL, HP, etc.

The RX is 0-v-1 (det. pen.) antenna 63ft. long, 25ft. high, direction from S.S.W. to N.E. It is an inverted-L type.

As regards ham bards, we have logged at present a total of 6,414—including Europeans, Yanks, etc. All Continents 14 mc/s and 7 mc/s have been heard, but not QSL'd.

In conclusion, may we ask if Mr. Roberts would like to write to us on S.W. reception? We guarantee 100 per cent. replies.—ROBERT and WM. IBALL, 1, Riddell Avenue, Langold, Worksop, Notts.

# LATEST PATENT NEWS

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

**CATHODE RAY TUBES.**—Lubszynski, H. G. No. 497,645.

An electron image from a photo cathode P, Fig. 1, is focused on to a mosaic electrode M by a frusto-conical electromagnet 4, which reduces the composite beam from the

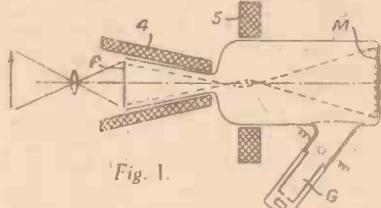


Fig. 1.

cathode P before it enters the field of a second focusing system; this may be an electromagnet 5 or electro-static means. The mosaic may be scanned by a beam from a gun G. The focusing means may be used in an electron telescope or microscope. Specification 442,666 is referred to.

**WIRELESS RECEIVING CIRCUITS.**—Marconi's Wireless Telegraph Co., Ltd. No. 497,798.

In a superheterodyne receiver having automatic control of frequency, a multi-grid valve combines the functions of the local oscillator and frequency control valve. In Fig. 2 the local oscillator is constituted by the electrodes 22, 23, 24 of valve 19 connected as shown to the tank circuit 18, while the anode circuit includes an inductance 28 connected to the tapping 30 on inductance 8' over blocking condenser 31. The bias of the outer grid 32 is varied in known manner in dependence on departure from exact tune by control voltage derived from the error detector 6', 8, 9, 9' whereby the oscillatory anode current develops a potential across inductance 28 which is in

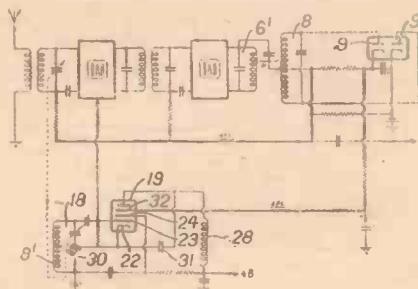


Fig. 2.

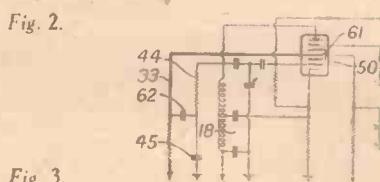


Fig. 3.

phase-quadrature with the voltage across tank circuit 18 and which varies the effective inductance between tapping 30 and earth. The frequency of circuit 18 is thus varied in dependence on departure from tune of the intermediate frequency. In Fig. 3, the combined oscillator-frequency control valve is a heptode, the tank circuit 18 of the oscillator being shunted by the network 44, 45 whereby the voltage across condenser 45, which is in phase-quadrature with that across the tank circuit 18, is applied over condenser 62 to the grid 61 of valve 50; this grid is variably biased

over lead 33 from the error detector circuit. A virtual inductance is thus reflected across circuit 18, which varies with the mutual conductance of valve 50, and therefore with sense and magnitude of departure from exact tune. Specifications 445,350 and 487,687 are referred to.

**OPTICAL SOUND RECORDING ; MODULATING LIGHT.**—Scophony, Ltd., and Wikkenhauser, G. 498,146.

A variable-width sound or like record is made by generating a train of mechanical waves modulated in accordance with the sound, utilizing the diffraction effect of said waves on a beam of light to produce a light spot of varying width, and recording the variations in width on a moving light-sensitive surface. In the apparatus shown in plan in Fig. 4 high-frequency mechanical waves modulated in accordance with the sound are generated by a piezo-electric crystal P and passed through the cell A bounded by cylindrical lenses L<sub>2</sub>, L<sub>3</sub>; this cell is situated between two cylindrical lenses L<sub>1</sub>, L<sub>4</sub>, the cylinders of which are at right-angles to the cylinders of the lenses L<sub>2</sub>, L<sub>3</sub>; light from a source S is

passed through these lenses and cells and converged on to an opaque stop B; and an image of this stop is thrown by a lens system L<sub>5</sub> on a film F moving vertically. This produces a record in which both bounding edges have a wave form corresponding to the sound, and one bounding edge is a mirror image of the other edge. In a modification, the stop B and the lens system L<sub>5</sub> are removed, and the film F is placed in the plane occupied by the stop B in the arrangement above described. To reduce noise level at low sound amplitudes,

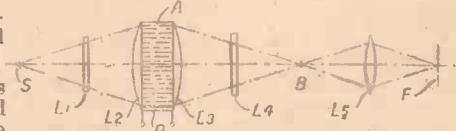


Fig. 4.

the crests of the recorded waves are brought always near the outer edges of the record strip by increasing the mean high-frequency output of the oscillator when the sound amplitude decreases, this control being obtained by rectified current derived from rectification of the sound oscillations. Specification 439,236 is referred to for a different manner of making use of light modulated by means of a cell through which sound-modulated high-frequency waves are passed.

## NEW PATENTS

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

### Latest Patent Applications.

9138.—Baird Television, Ltd., and Baird, J. I.—Colour television systems. March 23rd.

9139.—Baird Television, Ltd., and Jones, V. A.—Circuit arrangements comprising electronic scanning devices. March 23rd.

9649.—Bulgin, A. F., and Bulgin and Co., Ltd., A. F.—Screened connectors for thermionic valves. March 28th.

9132.—Cole, Ltd., E. K., and Kennedy, F. W. O.—Tuning mechanism for radio receivers. March 23rd.

9131.—Ferranti, Ltd., and Hall, G. A.—Supports for wireless aerials. March 23rd.

9256.—House, A., and Read, J. K.—Clock control for wireless receivers, etc. March 24th.

9324.—Kolster-Brandles, Ltd., and Smyth, C. N.—Superheterodyne receivers. March 24th.

### Specifications Published.

502,562.—Meyer, L. W. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken).—Radio receiving circuits.

502,696.—Traub, E.—Stationary mirror rings for television scanning devices.

502,706.—Cole, Ltd., E. K., Martin, A. W., and Hunt, H.—Automatic fine tuning in radio receivers.

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

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# QUERIES and ENQUIRIES

## H.F. or L.F.?

"At present I am using a single-valve (detector) receiver, but naturally I get a limited field of reception. I am prepared to go to the expense of adding one further stage of amplification, but I have been told that if I add L.F. I shall not get any more stations, whereas if I add H.F. I shall get more but not any louder. I should be glad to know exactly what will happen with either form of amplification and which is best for my purpose."—F. R. (Leigh-on-Sea).

**I**N theory the addition of an L.F. stage will merely increase the volume of signals received by the detector, whilst the addition of H.F. will increase the signals present on the aerial and thus give you a greater field of reception. In practice, however, there are differences in this. With your detector you will probably find that signals are present which are extremely weak and probably can only be discerned when you concentrate seriously—and in some cases they may be just inaudible. The addition of an efficient L.F. stage will bring these up to audibility and thus you will probably hear stations at present not received if you add L.F., in addition to the obvious strengthening of those signals which are now heard. The fitting of H.F. will, besides bringing in stations not now received, often so increase the strength of those stations you do hear that they may be put on the speaker without L.F. amplification. Overloading must, however, be considered when strong signals of this type are available.

## Smoothing Bias Circuit

"I recently built a powerful A.C. mains amplifier with a push-pull output stage using directly heated valves. In spite of endless attempts I am unable to obtain hum-free results. I have tried screening, altering the position of components and valves and increasing the smoothing, and send you a circuit with notes on it as to the alterations and tests I have made."—L. W. T. (Palmer's Green).

**T**HE circuit you send is quite standard and if the extensive smoothing you indicate has been ineffective we think the trouble must be in the biasing circuit. We suggest that you include a fairly large smoothing choke in series with the bias resistance, with a condenser on the transformer (L.F.) side of the choke to earth. Failing this, then the rectifying valve, etc., should be tested in case this part of the circuit is unable to supply the current called for by the amplifier.

## Split Valves

"I am sending you a cutting from an American book showing the circuit of a well-known commercial set which I happen to possess. You will note, however, that although the set is known as an eight-valver, there are 12 valves in the theoretical circuit and I should be glad if you could explain what the special additional types are. I cannot read a circuit very well and

am therefore unable to translate it for myself."—P. W. (Birmingham).

**T**HE circuit is quite correct, but a practice has been adopted in drawing this which is increasing in many American circuit designs, namely, the showing of the separate sections of multiple valves as separate valves. You will note, however, that these are distinguished by failing to complete the circle or envelope round the electrode symbols for the valve. The only difficulty which this introduces is, where more than one multiple valve is employed, in knowing which are the separate sections of individual valves.

## Colour Code

"I have a resistance which has a brown body, a green tip and a black dot and I am unable to find the value of this. Could you explain the value—that is, whether it is 150 or 15,000 ohms?"—G. L. T. (Basingstoke).

## RULES

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

- (1) Supply circuit diagrams of complete multi-valve receivers.
  - (2) Suggest alterations or modifications of receivers described in our contemporaries.
  - (3) Suggest alterations or modifications to commercial receivers.
  - (4) Answer queries over the telephone.
  - (5) Grant interviews to querists.
- A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.
- Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

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

**T**HE value of the resistance in question is 15 ohms. A black dot on a resistance indicates .0, or, in other words, nothing. Therefore, reading the resistance in the standard manner, the body indicates the figure 1 and the tip indicates 5. Adding .0 does not, of course, increase the value, although if you wish to place the value down in a strictly mathematical form you would write it 15.0.

## Potentiometer Connections

"I am including a potentiometer in a test circuit, but only require to use the unit as a variable resistance. One side of the element is joined to earth, but I am uncertain whether I should join the arm of the control also to the other end of the element or whether this latter point should be left unconnected."—T. U. B. (Andover).

**I**N most circuits it is unnecessary to connect one side of the element to the arm when using a potentiometer as a variable resistance. The "dead end" will be of no consequence, and the only effect of connecting both together is to short-circuit the unused portion of the element. In some special circuits it might be desirable to do

this, especially if a wire-wound component is employed, but for all general purposes the two connections alone will suffice.

## Accumulator Charging

"I recently put my accumulator on charge for about 5 hours, and noted that current fell, so I decreased the variable resistance. I suddenly noticed that I had connected it up the wrong way round, so I changed the connecting wires and set the charger going again. Since the charge it has been charged for 5 hours, then after a break of about 19 hours it had another 5 hours, both at 1 amp. but the hydrometer shows that the accumulator has not started to rise again. Have I spoilt the cell or will it come right again?"—R. G. (Weybridge).

**A**S the initial charge in the reverse direction was only for 5 hours you have probably not seriously damaged the cell, although some slight damage to the plates may have taken place. However, the cell should eventually regain correct working conditions if it is used carefully and put on charge with a slightly reduced charging rate for a time.

## REPLIES IN BRIEF

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

**J. H. S. (Teignmouth).** We have not described a set round the type of coil mentioned and regret that we have no details now available concerning the connections.

**L. W. (M.17).** Generally it is not possible to modify the unit for A.C. Additional parts could be used, but we would need full details of the unit before constructional data could be given.

**A. S. B. (New Thundersley).** It would be desirable to communicate with the makers in your special case. They may be familiar with the particular servicing difficulty you are experiencing.

**A. F. (Cambridge).** We have not described a unit giving the output mentioned and the 2½ watt amplifier could not be modified to give the increased volume.

**J. R. (Stirling).** You cannot convert a receiver and before any experiments in this direction are carried out you must obtain a transmitting licence.

**R. S. D. M. (Cambridge).** We regret that we have not described a set of the type mentioned.

**W. F. (Carshalton).** We have not described a unit of the type mentioned, and it would be difficult to use it with battery valves. You can, of course, use such a device for A.C. valves.

**F. M. E. (Sheerness).** Write to Henry Ford Radio, of 22, Howland Street, Tottenham Court Road, London, W.1.

**A. C. (Hadleigh).** The Encyclopedia or Everyman's Wireless Book would be suitable for your needs.

**J. F. B. (Waterfall, Cork).** We suggest you try Messrs. T. W. Thompson, of 176, Greenwich High Road, S.E.10.

**T. A. (Bradford).** The makers are B. T. S., 77, City Road, London, E.C.1.

**F. B. (Gravesend).** Blueprints are 1s. each and will be sent upon receipt of your remittance. We cannot supply a print for an amplifier of the type mentioned, but have a 5 watt A.C. amplifier if this would be suitable.

**W. G. (Barry).** We wonder whether results are obtainable in your district from the station in question. Can you check with neighbours or a local radio dealer? Can you receive any amateurs on the 10 metre band?

**H. M. (Market Harborough).** The trouble may be that valve overloading takes place when correctly tuned and that you have to de-tune to avoid this. We would not suspect the switch in a trouble of this nature.

**F. D. C. (Lewisham).** We have already pointed out in these pages that the Bulgin component L.F.10 is to be used in place of the component specified.

**W. C. (N.18).** We hope to design a receiver of the type mentioned in the near future. In the meantime there is the Hall Mark Four, which employs a push-pull output stage.

**L. S. A. (S.E.6).** In re-trimming you may have upset ganging and this could cause the trouble. Failing this, the detector valve should be suspected as it may be losing emission.

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

# Practical and Amateur Wireless BLUEPRINT SERVICE

## PRACTICAL WIRELESS Date of Issue. Blueprint. CRYSTAL SETS.

Blueprints, 6d. each.  
1937 Crystal Receiver  
The "Junior" Crystal Set . . . . . 27.8.38

**STRAIGHT SETS. Battery Operated.**

One-Valve : Blueprints, 1s. each.  
All-Wave Unipen (Pentode) . . . . . 19.2.33

Beginner's One-Valver  
The "Pyramid" One-valver (HF Pen)

Two-valve : Blueprints, 1s. each.

Four-range Super Mag Two (D, Pen)

The Signet Two (D & LF)

Three-valve : Blueprints, 1s. each.

The Long-range Express Three

(SG, D, Pen)

Selectone Battery Three (D, 2 LF Trans)

Sixty Shilling Three (D, 2 LF (RC & Trans)) . . . . .

Leader Three (SG, D, Pow) . . . . . 22.5.37

Summit Three (HF Pen, D, Pen) . . . . .

All Peutode Three (HF Pen, D (Pen), Pen) . . . . . 29.5.37

Hall-mark Three (SG, D, Pow) . . . . . 12.6.37

Hall-mark Cadet (D, LF, Pen (RC)) . . . . . 10.3.35

F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three) . . . . .

Cameo Midget (D, 2 LF (Trans)) . . . . .

Genet Midget Three (D, 2 LF (Trans)) . . . . . 13.4.35

1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) . . . . .

Battery All-Wave Three (D, 2 LF (RC)) . . . . .

The Monitor (HF Pen, D, Pen) . . . . .

The Tutor Three (HF Pen, D, Pen) . . . . .

The Centaur Three (SG, D, P) . . . . .

F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) . . . . .

The "Colt" All-Wave Three (D, 2 LF (RC & Trans)) . . . . .

The "Rapide" Straight 3 (D, 2 LF (RC & Trans)) . . . . .

F. J. Camm's Oracle All-Wave Three (HF, Det., Pen) . . . . .

1938 "Triband" All-Wave Three (HF Pen, B, Pen) . . . . .

F. J. Camm's "Sprite" Three (HF Pen, D, Tet) . . . . .

The "Hurricane" All-Wave Three (SG, D (Pen), Pen) . . . . .

F. J. Camm's "Push-Button" Three (HF, Pen, D, (Pen), Tet) . . . . .

Four-valve : Blueprints, 1s. each.

Sonotone Four (SG, D, LF, P) . . . . .

Fury Four (2 SG, D, Pen) . . . . .

Delta Universal Four (SG, D, LF, Cl. B) . . . . .

Nucleon Class B Four (SG, D (SG), LF, Cl. B) . . . . .

Fury Four Super (SG, SG, D, Pen) . . . . .

Battery Hall-Mark 4 (HF Pen, D, Push-Pull) . . . . .

F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) . . . . .

All-Wave "Corona" 4 (HF Pen, D, LF, Pow) . . . . .

"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B) . . . . .

The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) . . . . .

**Mains Operated.**

Two-valve : Blueprints, 1s. each.

A.C. Twin (D (Pen), Pen) . . . . .

A.C.-C.D. Two (SG, Pow) . . . . .

Selectone A.C. Radiogram Two (D, Pow) . . . . .

Three-valve : Blueprints, 1s. each.

Double-Diode-Triode Three (HF Pen, DDT, Pen) . . . . .

D.C. Ace (SG, D, Pen) . . . . .

A.C. Three (SG, D, Pen) . . . . .

A.C. Leader (HF Pen, D, Pow) . . . . .

D.C. Premier (HF Pen, D, Pen) . . . . .

Ubique (HF Pen, D (Pen), Pen) . . . . .

Armada Mains Three (HF, Pen, D, Pen) . . . . .

F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) . . . . .

"All-Wave" A.C. Three (D, 2 J.F. (RC)) . . . . .

A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) . . . . .

Mains Record All-Wave 3 (HF Pen, D, Pen) . . . . .

All-World Ace (HF Pen, D, Pen) . . . . .

Four-valve : Blueprints 1s. each.

A.C. Fury Four (SG, SG, D, Pen) . . . . .

A.C. Fury Four Super (SG, SG, D, Pen) . . . . .

A.C. Hall-Mark (HF Pen, D, Push-Pull) . . . . .

Universal Hall-Mark (HF Pen, D, Push-Pull) . . . . .

A.C. All-Wave Corona Four . . . . .

## No. of Blueprint.

## SUPERHETS.

Battery Sets : Blueprints, 1s. each:

5½ Superhet (Three-valve) . . . . . 5.0.37

F. J. Camm's 2-valve Superhet . . . . . 13.7.35

F. J. Camm's "Vitesse" All-Waver (5-valver) . . . . . 27.2.37

Mains Sets : Blueprints, 1s. each:

A.C. £5 Superhet (Three-valve) . . . . . —

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

Universal £5 Superhet (Three-valve) . . . . . —

F. J. Camm's A.C. £4 Superhet . . . . . 31.7.37

F. J. Camm's Universal £4 Superhet . . . . . —

"Qualitone" Universal Four . . . . . 16.1.37

Four-valve : Double-sided Blueprint, 1s. 6d.

Push-Button 4, Battery Model, } 22.10.38

Push-Button 4, A.C. Mains Model }

## SHORT-WAVE SETS.

One-valve : Blueprint, 1s.

Simple S.W. One-valver . . . . . 9.4.38

Two-valve : Blueprints, 1s. each.

Midget Short-wave Two (D, Pen) . . . . . —

The "Fleet" Short-wave Two (D (HF Pen), Pen) . . . . . 27.8.38

Three-valve : Blueprints, 1s. each.

Experimenter's Short-wave Three (SG, D, Pow) . . . . . 30.7.38

The Prefect 3 (D, 2 LF (RC and Trans)) . . . . . 7.8.37

The Band-Spread S.W. Three (HF Pen, D (Pen), Pen) . . . . . 1.10.38

## PORTABLES.

Three-valve : Blueprints, 1s. each.

F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) . . . . . —

Parvo Flyweight Midget Portable (SG, D, Pen) . . . . . 19.6.37

Four-valve : Blueprint, 1s.

"Imp" Portable 4 (D, LF, LF, Pen) . . . . . 10.3.38

## MISCELLANEOUS.

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

## AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

Blueprints, 6d. each.

Four-station Crystal Set . . . . . 23.7.38

1934 Crystal Set . . . . . —

150-mile Crystal Set . . . . . —

## STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.

B.B.C. Special One-valver . . . . . —

Twenty-station Loudspeaker One-valver (Class B) . . . . . —

PW92

Two-valve : Blueprints, 1s. each.

Melody Ranger Two (D, Trans) . . . . . —

Full-volume Two (SG det. Pen) . . . . . —

Lucerne Minor (D, Pen) . . . . . —

A Modern Two-valver . . . . . —

PW93

Three-valve : Blueprints, 1s. each.

Class B Three (D, Trans, Class B) . . . . . —

Fan and Family Three (D, Trans, Class B) . . . . . —

PW94

Two-valve : Blueprints, 1s. each.

£5. S.G. 3 (SG, D, Trans) . . . . . 25.11.33

Lucerne Ranger (SG, D, Trans) . . . . . 2.12.33

£5. 5s. Three: De Luxe Version (SG, D, Trans) . . . . . —

PW95

Lucerne Straight Three (D, RC, Trans) . . . . . —

Transportable Three (SG, D, Pen) . . . . . —

Simple-Tune Three (SG, D, Pen) June '33 . . . . . —

Economy-Pentode Three (SG, D, Pen) . . . . . Oct. '33

PW96

Four-valve : Blueprints, 1s. 6d. each.

£5. 5s. Three (SG, D, Trans) . . . . . Mar. '34

1935 £6. 6s. Battery Three (SG, D, Pen) . . . . . —

PTP Three (Pen, D, Pen) . . . . . —

Certainty Three (SG, D, Pen) . . . . . —

Minitube Three (SG, D, Trans) . . . . . Oct. '35

All-Wave Winning Three (SG, D, Pen) . . . . . —

PW97

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B Quadradyne (2 SG, D, LF, Class B) . . . . . —

PW98

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW99

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW100

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW101

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW102

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW103

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW104

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW105

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW106

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW107

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW108

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW109

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW110

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW111

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW112

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW113

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW114

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW115

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW116

Five-valve : Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans) . . . . . —

Class B (HF Pen, D, LF, Class B) . . . . . —

PW117

## Miscellaneous Advertisements

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

## RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance or Secondhand, etc.

### SOUTHERN RADIO'S Bargains.

**5/-** BARGAIN Parcels of Useful Radio Components, coils, transformer resistances, condensers, wire, circuits, etc., value over 20/-; 5/- per parcel.

**T**ELENS W349 Midget Iron Core Coils, 3/6; dual refuge coils, 2/6; with aerial series condenser W76, 3/3.

**A**C.D.C. Multi-meters, 5-range, 8/6; Ace "P.O."

A microphones, 4/-.

**2/6** ORMOND Loud Speaker Units, new and boxed, 2/6 each.

**36** ASSORTED 1-watt Wire-ended Resistances, 5/6; 24 tubular condensers, assorted capacities up to 0.5 mfd., 6/-; volume controls, assorted capacities (less switch), 7/6 dozen; with switch, 11/6 dozen; mica condensers, assorted, 1/9 dozen; Mainbridge type condensers, 1 mfd., 2 mfd., 4 mfd., 8 mfd., 8/- dozen; valveholders, 5-pin, 7-pin, 9-pin, 2/6 dozen; battery leads, multi-way, 6/6 dozen; parcel of assorted servicing components comprising resistances; tubular, mica, variable, electrolytic and block condensers; wire; sleeving; volume controls; valveholders, etc., etc., 10/- each; parcel containing at least 100 articles.

**S**OUTHERN RADIO, 46, Lisle Street, London, W.C. Gerard 6653.

**C**ONVERSION UNITS for operating D.C. Receivers from A.C. Mains, 100 watts output, £2/10/0. 150-watt Model for operating Radiogramophones, £3/10/0. Send for lists.—Chas. F. Ward, 46, Farriington Street, London, E.C.4. Tel.: Holborn 9703.

**V**AUXHALL—All goods previously advertised are still available; send now for latest price list, free.—Vauxhall Utilities, 163a, Strand, W.C.2.

**R**ESISTANCES !!—Parcels of 50, 1-watt to 2-watt consisting of 20 useful values, only 1/9 for 50.—Harrison & Co., 89, Great Portland Street, London, W.1. Langham 2471.

## VALVES

**A**MERICAN Valves in Sealed Cartons, all types 5/6 post paid.—Valves, 661/3, Harrow Road, N.W.10.

## LOUDSPEAKER REPAIRS

**L**OUSPESAKER repairs, British, American, any make. 24-hour service, moderate prices.—Sinclair Speakers, Alma Grove, Copenhagen Street, London, N.1.

**R**EPAIRS in Moving Coil Speakers, Cones and Coils fitted and Rewound. Fields altered. Prices Quoted including Eliminators. Loudspeakers Repaired, 4/-; L.F. and Speech Transformers, 4/-, post free. Trade invited. Satisfaction, Prompt Service, Estimates Free.—L.S. Repair Service, 5, Balham Grove, London, S.W.12. Battersea 1321.

## NEW LOUDSPEAKERS

**3,000** SPEAKERS from 8/6 each, P.M. and energised 4in. to 14in., including several Epoch 18in.—Sinclair Speakers, Alma Grove, Copenhagen Street, N.1.

## NEW RECEIVERS AND CHASSIS

**A**RMSTRONG IMPORTANT ANNOUNCEMENT: for the convenience of our customers we have moved to modern offices and showrooms at Walters Road, Holloway. Walters Road adjoins Holloway Arcade and is readily accessible from all parts of London. ARMSTRONG CO., will gladly demonstrate 1939 range of Radio chassis at the new premises. Kindly note in future all correspondence to Armstrong Manufacturing Co., Walters Road, Holloway, London, N.7.

## PREMIER 1939 RADIO

**ROLA M.G. SPEAKERS**, complete with Output Transformer, 8in. P.M., 15/-; 10in. P.M., 19/11; G12 P.M., 79/6; G12 energised, 1,250 or 2,500 ohms, 59/6.

### Premier Short-Wave Kits

Complete to the last detail including all Valves and coils, as well as theoretical and wiring diagrams and lucid instructions for building and working. Each kit is supplied with a steel Chassis and Panel and uses plug-in coils to tune from 13 to 170 metres.

1 Valve Short-Wave Receiver or Adapter Kit 17/6

1 Valve Short-Wave Superhet Converter Kit 20/-

1 Valve Short-Wave A.C. Superhet Converter Kit 22/6

2 Valve Short-Wave Receiver Kit 25/-

3 Valve Short-Wave Screen Grid and Pentode Kit 58/6

### PREMIER U.S.A. QUARTZ TRANSMITTING CRYSTALS.

7 mc Band, 10/- each, with Calibration Certificate Enclosed holder and Base, 3/-.

### Premier Moving Coil Meters

Guaranteed Accuracy within  $\pm$  2 per cent.

Model No. 21. Model No. 311.

3in. square case. 3½in. diameter round case.

0-1 mA .. 18/6 0-1 mA .. 22/6

0-10 mA .. 17/6 0-10 mA .. 20/-

0-50 mA .. 17/6 0-50 mA .. 20/-

0-100 mA .. 17/6 0-100 mA .. 20/-

0-250 mA .. 17/6 0-250 mA .. 20/-

Model 311. 0-1 mA. movement, with calibrated scale, volts-ohms-mA, 25/-.

### VOLTAGE MULTIPLIER RESISTANCES

guaranteed accuracy  $\pm$  2 per cent. All standard ranges, 1/3 each.

**T**APPED SHUNT to provide readings of 5 m/A., 25 m/A., 250 m/A., and 1,000 m/A., 5/6.

**P**REMIER S.W. H.F. Chokes, 10-100 metres, 9d. each. Pie-wound, 1/6 each. Screened, 1/6 each.

**S**HORT-WAVE COILS, 4- and 6-pin types, 13-26, 22-47, 41-94, 78-170 metres, 1/9 each, with circuit.

Special set of S.W. Coils, 14-150 metres, 4/- set, with circuit. Premier 3-band S.W. coil, 11-25,

19-43, 38-86 metres. Suitable any type circuit, 2/6.

**U**LTILITY Micro Cursor Dials, Direct and 100 : 1 Ratios, 3/9.

**P**REMIER Short-Wave Condensers, all-brass construction, with Trolitul insulation. 15 mmf., 1/6;

25 mmf., 1/7; 40 mmf., 1/9; 100 mmf., 2/1;

160 mmf., 2/3; 250 mmf., 2/6.

**T**ROLITUL DOUBLE SPACED TRANSMITTING CONDENSERS. 15 mmf., 2/9; 40 mmf., 3/6;

100 mmf., 4/6.

**N**EW TROLITUL SPLIT STATOR CONDENSERS, 50 x 50 mmf., 10/6.

**C**OIL FORMERS, 4- or 6-pin low-loss, 1/- each.

**A**MERICAN VALVES. We hold the largest stocks of U.S.A. tubes in this country and are sole British Distributors for TRIAD High-grade American Valves. All types in stock. Standard types, 5/6 each. All the new Octal Base tubes at 6/6 each, 210 and 250, 8/6 each.

**E**UROPA MAINS VALVES, 4 v. A.C. Types,

A.C./H.L., A.C./I.L., A.C./S.G., A.C./V.M.S.G.,

A.C./H.P., A.C./V.H.P., A.C./I., and 1 watt

D.H. Pentodes, all 4/6 each. A.C./Pens., I.H., 5/6;

A.C./P.X.4, 6/6; Oct. Freq. Changers, 8/6;

Double Diode Triodes, 7/6; Triode H. ex. Freq. Ch., 8/6; Tri. Grid Pen., 10/6; 33-watt D.H. Triode, 7/6, 350 v. and 500 v. F.W. Rect., 5/6,

13 v. 2 amps. Gen. Purpose Triodes, 5/6; H. F.

Pens. and Var.-Mu. H.E. Pens. Double Diode Triodes, Oct. Freq. Changers, 7/6 each. Full-wave

and Half-wave Rectifiers, 5/9 each.

**P**remier Mains Transformers

Screened primaries 200-250 volts. Fully guaranteed.

Wire end types.

S.P. 250. 250-250 v. 60 m/A. 4 v. 1-2 a., 4 v. 2-3 a., 4 v. 3-4 a., all C.T., 10/-.

S.P. 300. 300-300 v. 60 m/A. 4 v. 1-2 a., 4 v. 2-3 a., 4 v. 3-4 a., all C.T., 10/-.

S.P. 351. 350-350 v. 150 m/A. 4 v. 1-2 a., 4 v. 2-3 a., 4 v. 4 a., all C.T., 13/-.

S.P. 352. 350-350 v. 150 m/A. 5 v. 2 a., 6-3 v. 2 a., 6-3 v. 2 a., all C.T., 13/6.

The above can be supplied fitted with Panel and Terminals, at 1/6 extra.

S.P. 500. 500-500 v. 150 m/A., 15/-.

S.P. 501. 500-500 v. 150 m/A. 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 3-4 a., all C.T., 21/-.

S.P. 502. 500-500 v. 150 m/A. 5 v. 3 a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 3-4 a., all C.T., 25/-.

S.P. 503. 500-500 v. 200 m/A. 5 v. 3 a., 6-3 v. 3 a., 7-5 v. 3 a., or 2.5 v. 5 a., all C.T., 25/-.

The above can be supplied fitted with Panels and Terminals, at 2/- extra. Details of complete range available. Special Transformers wound to order.

Orders 5/- and over sent Post Free. Under 5/- please add 6d. Postage.

Have you had our 1939 Catalogue, Handbook and Valve Manual? 90 pages of Radio Bargains and Interesting Data. Price 6d.

ALL POST ORDERS TO: Jubilee Works, 167, Lower Clapton Road, London, E.5. Amherst 4723.

CALLERS TO: Jubilee Works, or our NEW PREMISES, 169, FLEET ST., E.C.4. Central 2833 or 50, High St., Clapham, S.W.4. Macaulay 2381.

## SITUATIONS VACANT

**R**YAL AIR FORCE. Men of good education required for enlistment and training as WIRELESS OPERATORS and ARMOURERS. Age limits 17½-35. Write or call: R.A.F. Recruiting Depot, Victory House, Kingsway, London, W.C.2, or any R.A.F. Recruiting Depot.

## TECHNICAL BOOKS

**T**HE Radio Engineering Library, the alpha and omega of radio technology, in six volumes made financially easy to own. Prospectus and details from, Phoenix, Chandos Place, W.C.2.

## MISCELLANEOUS

**V**IBRATOR H.T. Units; 2 to 6 volts input and specials. Lists, stamp. Trade and export supplied.—Simmonds Bros. Rabone Lane, Smethwick.

**W**ANTED—Console Cabinet for S.T. 900. Offers —17, Lucas Avenue, Harrow.

**T**HERE'S MONEY IN RADIO!—If you understand radio you can make substantial profits in spare time. For hints and ideas get MONEY-MAKING MADE EASY, by L. Harvey Wood. Available from all booksellers, 2/0 net, or by post, 2/10, from the Publisher, C. Arthur Pearson, Ltd., Tower House, Southampton Street, London, W.C.2.

**T**HE OUTLINE OF WIRELESS," by Ralph Stranger. Fifth Edition, 8s. 6d.—This book which covers the subject from A to Z, is to be recommended to all who desire to master the theory of Modern Wireless. At all Booksellers and Newsagents, or by post 9s. from George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, London, W.C.2.

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

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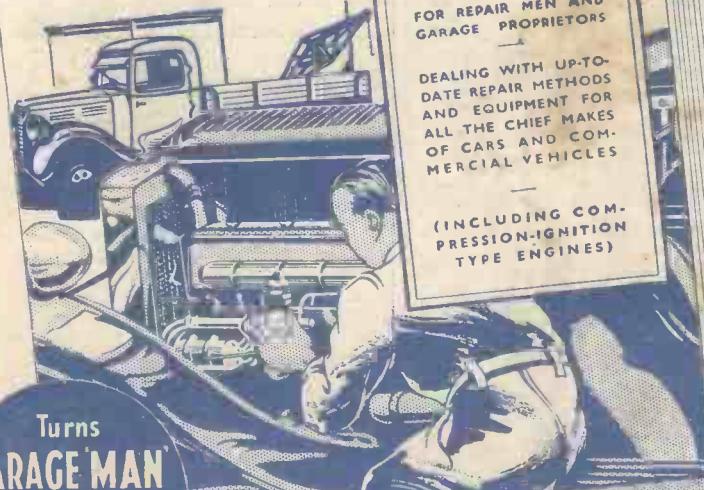
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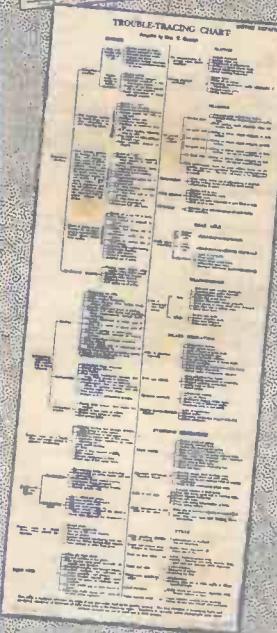
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Published every Wednesday by GEORGE NEWNES, LIMITED, Tower House, Southampton Street, Strand, London, W.C.2, and Printed in England by THE NEWNES & PEARSON PRINTING CO., LTD., Exmoor Street, London, W.10. Sole Agents for Australia and New Zealand: GORDON & GOTCH, LTD. South Africa: CENTRAL NEWS AGENCY, LTD. Practical and Amateur Wireless can be sent to any part of the World, post free, for 17s. 8d. per annum; six months, 8s. 10d. Registered at the General Post Office as a newspaper and for the Canadian Magazine Post.

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