

DESIGNING YOUR OWN RECEIVER!

# Practical and Amateur Wireless

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EVERY  
WEDNESDAY

Edited by F.J. CAMM

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NEWNES  
Publication

Vol. 6, No. 150.  
August 3rd, 1935.

AND AMATEUR TELEVISION

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**TUNING DEVICES**

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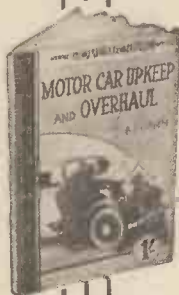
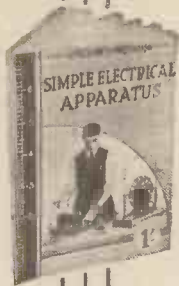
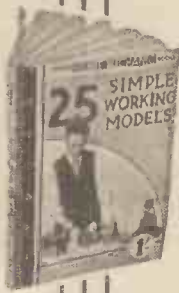
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# Practical and Amateur Wireless

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. VI. No. 150. August 3rd, 1935.

## ROUND *the* WORLD of WIRELESS

### Linking up Europe and the U.S.A.

THE visit of Mr. Royan, the Vice-President of the N.B.C., which now controls one hundred and twenty broadcasting stations in North America, may result in a closer linking of Europe with the United States, the outcome of which will spell a more frequent interchange of radio programmes.

### Danish Broadcasts by Submarine Cable ?

AT a recent conference held by the Scandinavian Telegraph and Telephone Administrations, the scheme put forward for the installation of a new pupinised submarine cable between Sweden and Great Britain was unanimously adopted. The cable would also connect with the German and Dutch networks, and would render possible relays of programmes from Norway, Sweden, Denmark, and Iceland, the last named being facilitated by the Reykjavik-Lyngby short-wave link.

### Another Polish Station

FROM Warsaw comes the report that the Polish Authorities intend to add a further relay to their network; the transmitter will operate on 224 metres (1,339 kc/s), a channel common to Lodz (Poland) and Montpellier (France).

### Leipzig's New Interval Signal

THE German station has adopted a new musical interval signal, consisting of three chords played on a musical box. Contrary to custom the melody is not taken from any old folk-song, but is an original combination of notes which it is considered may be quickly memorised by listeners. Cologne has also made a similar alteration.

### Synchronising Loud Speakers

A NEW method of synchronisation of loud-speakers in the public address system was recently used by the Berlin studio in the broadcast of a running commentary of the Schmeling-Paoli boxing match, fought out in the Post Stadium. The system adopted was very successful, inasmuch as listeners were not worried by troublesome echoes, as is frequently the case when several loud-speakers are simultaneously operated in a large covered enclosure.

### Germany's Pomeranian Transmitter

A FURTHER transmitter to take the Hamburg programmes is to be built in the neighbourhood of Stolp (Pomerania). No new channel will be required as the station will work on 225.6 metres (1,330 kc/s) which is common to all Hamburg relays.

### Holland's Super-power Station

LISTENERS may have already noticed the considerably increased power of signals received from the Kootwijk

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transmitter on 1,875 metres. Although already working on 120 kilowatts, the Dutch Authorities are contemplating a further "boost" of 30 kilowatts during the next few weeks.

### More Startling Television Developments

IT is reported that the Marchese Marconi will shortly carry out an interesting series of experiments in the transmission of television on micro-waves from his yacht *Eletra*, now in the Gulf of Rapallo.

### Ottoman Radio Censorship

IN Turkey, broadcasting encounters many difficulties, in view of the numerous regulations which govern the character of

the programmes. They veto any reference to suicide or, in general, criminal matters, and no play may be presented in which a character depicts an army officer. Moreover, no talk may have as its subject the history of the sultans, or include any comment on the old régime; propaganda of any description is also barred.

### More Stations for Finland

WORK has been started on the construction of two new transmitters at Uleaborg (Oulu) and at Vasa. The former, replacing the present plant, will be a 25 kilowatt, and the latter only 10 kilowatts. They are expected to be brought into operation in the early spring of 1936.

### From 16 to 100 Kilowatts

THE total population of Iceland is, roughly, 113,000 souls, of which nearly ten per cent. are radio listeners. The island, however, is thinly populated, and the present station only offers an inadequate service. Next year it is hoped to replace the 16-kilowatt transmitter by something more powerful, and the Authorities glibly talk of making it a 100 kilowatt.

### France's First High-power Medium-wave Station

P. T. T. LYONS (Tramoyes) on 463 metres (648 kc/s) may now be heard testing every morning between B.S.T. 07.30 and midday. This new high-power transmitter is expected to take over its regular duties shortly.

### Radio Vitus (Paris) to Move

THE Ile de France broadcasting station, which so far has been working on 700 watts, has now been authorised to operate a station of higher power which its organisers had built over a year ago. The studio will remain in Paris, and Radio Vitus may continue to retain *Poste de l'Ile de France* as its call. The new transmitter is at Romanville, some distance from the French capital.

### Radio on the French Railways

TO popularise broadcast entertainments a number of trains are now being equipped with a receiver, headphones and loud speakers. Carriages will, in future, be labelled: *Fumeurs* (Smoking), *Non-fumeurs*, *Dames*, and *Radio*.

# ROUND the WORLD of WIRELESS (Continued)

## Bank Holiday Fare

SOME bright and breezy musical fare will be included in the broadcast programmes for August Bank Holiday. The morning begins with a selection from "Chu Chin Chow," followed by "Little Grey Home in the West," played on the

## INTERESTING and TOPICAL PARAGRAPHS

Hongroise" from Berlioz's "Damnation de Faust."

## MODERN TRANSMITTING EQUIPMENT



The transmitting equipment for the new broadcasting station to be erected by the Government of Palestine is now nearing completion at the Marconi Works, Chelmsford, and this photograph shows fitters at work preparing the transmitter for its final tests before packing and despatch. The three main panels of the transmitter are shown, together with the control desk. The power of the station will be 20 kilowatts unmodulated aerial energy, and it is to be erected on a site about seven miles north of Jerusalem.

organ of the Regal Cinema, Torquay. A popular concert follows from The Spa, Whitby, played by the Whitby Municipal Orchestra. The B.B.C. Midland Orchestra, conducted by Leslie Heward, will then broadcast a popular concert during the luncheon hour, and this will be followed by a favourite with listeners, the Commodore Grand Orchestra, relayed from the Commodore Theatre, Hammersmith.

The Hotel Metropole Orchestra, under the direction of Emilio Colombo who, listeners will remember, directs the orchestra of "The Red Sarafan," will broadcast a popular concert from the Hotel Metropole, London, while Henry Hall and the B.B.C. Dance Orchestra will open their programme at 5.15 with a selection of dance music chosen especially for Bank Holiday.

## Well-known Tunes

FOR those listeners who like ballad concerts, at 4.45 some of the more popular ballads will be sung by Muriel Middleton (contralto) and Glyn Dowell (tenor). A favourite broadcasting orchestra is that directed by Reginald King, who will entertain listeners with a concert from 6.30. His programme will feature well-known tunes with plenty of melody and life. For listeners who like more serious music, Frank Bridge will conduct the B.B.C. orchestra in a delightful holiday programme which includes Wagner's overture "Rienzi," Weber's "Invitation to the Dance," and the "Danse des Sylphes," "Menuet des Follets" and "Marche

## "Northern Know-Alls"

IN the second of the "Northern Know-Alls" talks features for northern listeners on August 1st, those who are interested will be given practical hints on the art of taking a holiday by the seaside. Introduced and interviewed by "Uncle Caractacus" (patriarch of that ignorant but willing-to-learn family, the Gubbins's) various experts will give short talks on such aspects of holiday-making as boat-sailing, deep-water fishing, swimming, the collection of sea-shells and so forth.

## New Songs for Old

AN old favourite returns to the programmes on August 10th in the safe hands of Gordon McConnel—"New Songs for Old." Gordon McConnel is an expert in this type of programme, choosing his artists with great care and writing excellent connecting material. "In New Songs for Old" listeners hear an early version of a popular favourite and then how the same theme is treated to-day.

## B.B.C. Variety Orchestra

WHEN Henry Hall and his band go away for a well-earned holiday next month, their place will be taken by various famous outside dance bands. In addition to these dance bands, however, listeners this year will hear, on three consecutive Friday mornings (August 23rd, August 30th and September 6th) the B.B.C. Variety Orchestra, conducted by Kneale Kelley. This new departure should prove widely popular with the many listeners who

recognise how important a part is played in the Variety programmes by the excellent orchestra and its talented conductor. Kneale Kelley will present concerts of light music, and rhythm numbers will be included in his programmes.

## One Band to Another

ANOTHER interesting "One Band to Another" broadcast has been arranged by "Bill" Hanson for August 2nd, when listeners will hear the Rio Tango Band and Percival Mackey's Band. One of the great difficulties of producing these "One Band to Another" broadcasts is to get the microphones in exactly the right place for the various instruments. In studio BA at Broadcasting House there are several, some horizontal, some on movable tripods and others swung from the ceiling and walls.

## The Silver Spoon

ANOTHER production in the hands of Charles Brewer, to be broadcast on August 23rd and 24th, is "The Silver Spoon," a musical play. The book is by Henrik Ege, who has adapted so many musical comedies, including the last broadcast of "Bitter Sweet." The music is by Eric Ansell, son of John Ansell, who was in charge of the Theatre Orchestra for many years at Savoy Hill. The story centres round two night clubs, both fighting for the same artist. Humour, music and stage atmosphere will add to the strength of this production.

## "Shakespeare's Songs"

AN attractive Midland series is one of "Shakespeare's Songs" in settings by composers of different periods from his own day. The first three of these have been given by Cuthbert Ford, Geoffrey Dams and Mary Pollock, but the fourth, on August 6th, is to be confined to settings in parts and will be given by the B.B.C. Midland Singers. The presentation of the programmes by the Midland Music Director, H. Foster Clark, has greatly added to their interest.

# SOLVE THIS!

## PROBLEM No. 150.

Wilkin's superhet had broken down and a careful search had revealed the fact that the primary of the first I.F. transformer was broken. He wished to listen in, but had no spare transformer and could not obtain one without some delay and therefore thought out a method of using the set without a replacement. He reasoned that the signals in that stage were of the A.C. type and decided that, as a condenser offered no opposition to A.C. he could temporarily carry on with a condenser to complete the circuit. He therefore joined a .002 mfd. condenser across the terminals of the I.F. transformer primary, but found that the set was still dead. Where had he reasoned wrongly? Three books will be awarded for the first three correct solutions opened. Envelopes must be marked Problem No. 150 in the bottom left-hand corner, and must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Entries must be received not later than the first post Tuesday, August 6th, 1935.

## Solution to Problem No. 149.

The heaters of the I.H. A.C. valves were rated at 1 amp., whereas the universal valves had a much lower current rating. Consequently, when he fitted two of the new valves the whole heater circuit was unbalanced and none of the valves worked at the correct temperature.

The following three readers successfully solved Problem No. 148 and books are accordingly being forwarded to them: P. Hitchen, Enys Cottages, Pendec, Nr. Land's End, Cornwall; J. Halsall, 23, Heath Terrace, Square Lane, Lathom, Nr. Ormskirk, W. G. Painton, 270, Salmon Street, Kingsbury, N.W.9.

# SCREENS: Their Purpose & Application

Points to be Borne in Mind for Insuring the Effective Screening of a Receiver. By W. H. DELLER.

**S**TABILITY is the keynote in modern receiver design, and one of the factors contributing in no small measure to this object is the efficiency of the screening system. Almost every component or, for that matter, wire forming the circuit is surrounded by a "field." The intensity of these "fields" varies according to the nature of the components, and while in some instances their extent is negligible, in others the extremity reaches for some considerable distance from the component. Therefore, if components are placed too close together their "fields" will intermingle or couple. For certain purposes coupling is deliberately made use of, such as to provide reaction; on the other hand unwanted coupling is fatal. In the early days this disadvantage was usually countered by wide separation of components, with the result that a multi-valve set assumed gigantic proportions, but even if desirable such precautions to achieve this end would, with present day facilities, prove ineffective. Far from being spaced, modern demands for efficiency and compactness necessitate the components being crowded close together, and without proper screening such a procedure becomes a practical impossibility.



Fig. 1.—If an overlap joint of this nature is used, it must be soldered to be effective as a screen.

## Screens and their Purpose

Briefly, screening consists of surrounding or otherwise isolating the component or wire with a metal shield which is earthed. There is, however, more in it than this. In the first place wherever current is flowing there are two kinds of "field" present, electric and magnetic. The latter is predominant in coils of solenoid form, and at its greatest intensity is within the core of the coil. The purpose of the screen is to restrict the "field" to within the bounds represented by the walls of the screening material. This material may

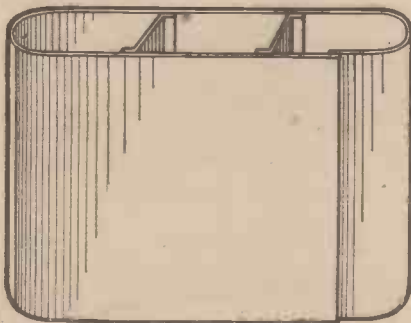


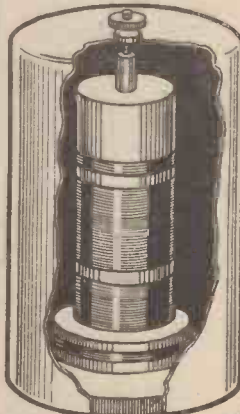
Fig. 2.—A single screen divided to enable individual screening of 3 coils to be effected.

be copper, aluminium or iron of a thickness which may vary according to the conditions. For the purpose of this article it may be

stated that copper or aluminium between 18 and 14 gauge is eminently suited for general purposes, and iron should only be used on the L.F. side, particularly for transformers. A heavy gauge iron should be employed effectively to screen mains transformers.

Although there is nothing against using iron for chassis construction—in fact this material is extensively used for the purpose commercially—the fact that some form of deposited surface protection against the formation of oxide is necessary to make the job serviceable, will convince the home constructor that for him any saving in raw material cost will be outweighed by the price charged for finishing.

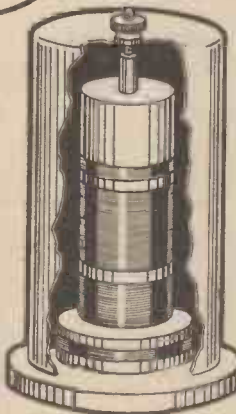
For a screen to be effective the requirements are that the metal of which it is composed shall afford a path of extremely low resistance in any direction. As for instance, the erection of a flat screen between a pair of coils may isolate them one from the other, this precaution will not prevent the same components from interacting with others on the same side of the screen. Therefore properly to



screen, say, a coil, it is necessary to enclose it completely in a metal case. The examination of a commercial "coil can" reveals the fact that it is a drawn or spun shell of fairly stout gauge aluminium sheet. This on first thought appears to be a wasteful method of

Fig. 3 (left).—The correct spacing between coil and screen.

Fig. 4 (right).—An incorrect arrangement. Here the screen is too close to the coil windings.



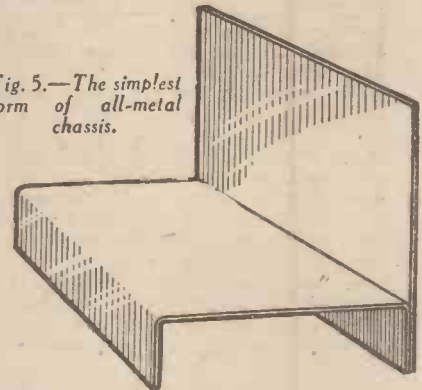
production; actually seamed construction would effect a considerable saving in material, but would produce an unsatisfactory result on account of the high resistance offered by the seams. Therefore, when employing this form of construction for making copper screening cans, see that the seams are afterwards properly soldered.

## Constructional Details

From the foregoing remarks it will be apparent that as an alternative to seaming, the overlap joint, as seen in Fig. 1, is worse in this respect unless the metal can be soldered. When screening ganged coils the most satisfactory method is to utilise individual screening cans for each coil. There is, however, nothing against building up a screen for such purpose in the form of

a rectangular metal box with subdivisions to give the required number of compartments. Where such a course is adopted, as in Fig. 2, in addition to observing the particulars already mentioned regarding the outside seam, make doubly certain that good joints are established between the edges of the partitions and the outside walls. Stress is laid on the importance of this point, as the presence of a bad joint will be equivalent to inserting a resistance in the screen, with the result that the coils on either side of the defective

Fig. 5.—The simplest form of all-metal chassis.



partition may interact by reason of the outside of the screen providing the easier path, so that the dividing plate is to all intents and purposes non-existent.

As regards the dimensions for making such screens, do not attempt to reduce them in diameter so that they are too close to the dimensions of the coil. A safe rule is to make the screen clear the coil all round by a distance at least equal to the radius of the coil. Further, it must be remembered that the presence of the screen will increase the self-capacity of the coil, and this is a factor that must be taken into account in the design of the coil. Fig. 3 shows the correct proportion of a screen in relation to the coil diameter, and Fig. 4 the incorrect proportion.

## Metal Chassis Construction

To derive the full benefit from all such screens earthing is essential. In doing so it has to be remembered that a long lead may render the screen ineffective, and for this reason a metal or metallised chassis form of construction is to be preferred. In this manner the screen can be mounted in direct contact with a common earth. With the type of commercial cylindrical coil-can illustrated, it is preferable to make use of the kind which are also fitted with a socketed metal base.

In adopting the usual



Fig. 7.—A metallised valve has the coating joined to a valve leg and this should be earthed to render the screening effective.

form of metal chassis construction, as shown in Fig. 5, to secure the advantages of greater mechanical

(Continued on page 546)

# CONDENSER VANES: STANDARD or SPECIAL SHAPES?

A Discussion on the Relative Merits of Two Systems of Securing Ganged Tuning in a Superhet. By "LAMBDA"

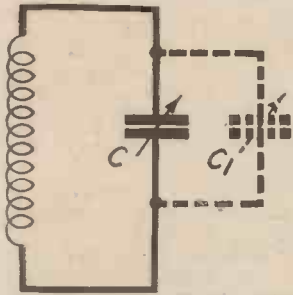


Fig. 1.—Standard signal frequency tuned circuit.

HERE are, no doubt, a number of constructors who, possessing a standard ganged tuning condenser, have contemplated the construction of a superheterodyne receiver. Unfortunately they have been deterred from so doing as they were not sure whether their tuning condenser would be suitable for use in such a circuit.

On the other hand, constructors sometimes desire to build a superhet but are undecided which type of ganged tuning condenser to employ. In other words, shall it be a condenser of standard plate shape, as used in the tuned radio-frequency receiver, or shall it be one which has a special plate shape section for tuning the oscillator circuit of a superhet.

Most constructors are familiar with the principle of the superhet receiver; how the locally generated oscillations are mixed with the incoming signal and a new frequency—the intermediate frequency—is produced and passed on to the grid of the second detector. This principle applies in all cases, whether a separate oscillator valve be used or one of the newer single-valve frequency changers. It is also common knowledge that the oscillator frequency should differ from the signal frequency by an amount which is equal to the peak frequency of the intermediate-frequency amplifier which is now standardised at 100 kc/s in this country.

A transmitter can be tuned in by adjusting the frequency of the oscillator circuit either 110 kc/s above or below the signal frequency, providing, of course, we are not employing ganged tuning control for the oscillator circuit.

Now it has to be borne in mind that, although no difficulty is encountered in obtaining this frequency sum or difference, when the circuits are only tuned to one wavelength or frequency, the position is vastly different, since when on the medium-wave band alone we have to tune in stations on frequencies from 500 to 1,500 kc/s representing 200 to 550 metres.

## The Oscillator Circuit

When the signal frequency circuits are tuned to any one station on the medium-wave band, the tuned oscillator circuit must be so arranged that the frequency generated by it is either more or less than the signal frequency by 110 kc/s, irrespective of the frequency of the station being tuned in within limits mentioned.

In practice, designers arrange the oscillator circuit to tune to a frequency higher than that of the incoming signal (that is, to a lower wavelength) consequently, the inductance of the oscillator coil must be lower than that of the inductances in the signal-frequency circuits. This gives us the required frequency difference at one point, but unfortunately does not permit of a constant frequency difference being maintained over the whole of the tuning scale.

Our object, therefore, is to devise some means whereby this frequency difference is maintained at all positions of the tuning condenser if we are to obtain satisfactory results.

Two methods are actually employed in practice to achieve this result, and these will now be discussed. An appreciation of their advantages and disadvantages will enable us to determine which system is the most suitable for the particular receiver we have in mind.

## Padding Condenser Method

With the padding condenser method a ganged tuning condenser is employed in which the capacity of each section is equal at all points in the tuning scale, and it has a maximum capacity in each section of 0.0005 mfd.

Let us examine the circuit arrangement shown in Fig. 1.

This shows the standard arrangement employed for tuning the signal-frequency circuit of either a tuned radio-frequency receiver or a superhet receiver. The tuning condenser in each instance is represented by C while C1 represents the usual trimming condenser in parallel with it.

The padding condenser in the oscillator circuit is represented by C2 (Fig. 2) and usually has a maximum capacity of 0.0025 mfd. It may be a fixed or semi-variable condenser.

This arrangement is quite satisfactory and will give quite good results, but, theoretically, accurate ganging over the whole of the wave band cannot be achieved. In practice the mistuning amounts to only about

2 or 3 kc/s and as this is only about 0.2 per cent. it is not appreciable.

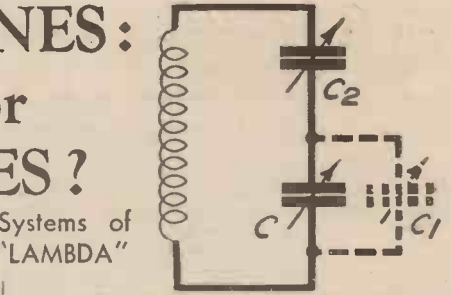


Fig. 2.—Oscillator circuit.

2 or 3 kc/s and as this is only about 0.2 per cent. it is not appreciable.

To align the circuits for accurate ganging, proceed as follows: first of all tune in a station transmitting on a wavelength of about 200 metres (1,500 kc/s) and adjust the trimmers in parallel with the oscillator tuning condenser. As the tuning condenser is at its minimum capacity any adjustment of the padding condenser, therefore, will not have any appreciable effect. This condenser is in series with the tuning condenser, and its capacity is many times that of the minimum capacity of the latter.

Now adjust the tuning condenser until a station at the top end of the medium waveband is received, say, 600 kc/s (500 metres). At this point the moving vanes of the tuning condenser will be nearly fully enmeshed and consequently near their maximum capacity. Do not touch the trimming condenser; its capacity is very small in comparison with the maximum capacity of the tuning condenser. At this point we adjust the series condenser C2 in the oscillator circuit; this will alter the maximum capacity of the tuning condenser. At the same time a slight adjustment of the tuning condenser should be made in order to maintain maximum sensitivity.

To obtain the best results it may be necessary to repeat this process several times; returning to the lower waveband, adjusting the trimmers, returning to the top end and adjusting the padding condenser.

Eventually it will be found that ganging will hold quite satisfactorily over the whole of the tuning scale. When coils are accurately matched, no adjustment is usually necessary on the long waveband. It is necessary, however, to employ an additional padding condenser to maintain accurate ganging on the long waves. This condenser is switched out when receiving medium-wave stations, and Fig. 3 shows the final arrangement of the oscillator circuit.

## Shaped Plate System

With the special plate-shape ganged condenser system only one padding condenser is required—for the long waveband. Theoretically perfect ganging can be obtained over the whole of the tuning scale. The inductance of the oscillator coil has now been standardised at 126.5 microhenries for the medium waveband when the coils in the signal-frequency circuits have an inductance of 157 microhenries.

If you examine a triple gang tuning condenser, which has specially shaped vanes for tuning the oscillator circuit, it will be noticed that the fixed vanes of the oscillator section have been cut away so that it follows a different law and so maintains a constant frequency difference over the whole of the waveband.

Practically the same methods should be adjusted to ensure perfect ganging as described for the standard plate shape system:—

(Continued on page 542, col. 3)

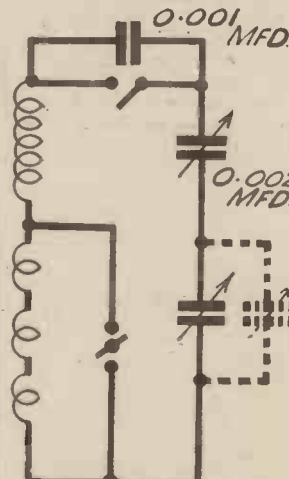


Fig. 3.—Oscillator circuit employing standard tuning condenser.

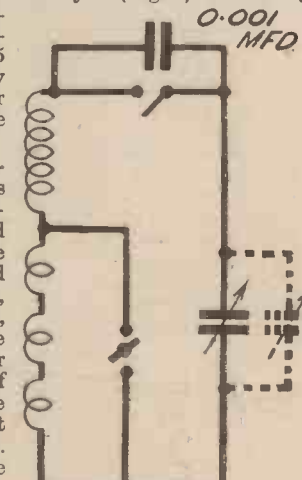


Fig. 4.—Oscillator circuit employing special-shape condenser vanes.

# THE NEW SEASON'S TUNING DEVICES

An Interesting Review of Some of the New Forms of Indicator Which are Now Being Produced to Assist in the Accurate Selection and Identification of a Station. By W. J. DELANEY

**A**LTHOUGH the main function of a wireless set is to reproduce speech and music, it is essential that there shall be some ready means of adjusting it to the desired station, and that a simple and precise indication shall be given as to the station which is being received. Probably no other part of the complete wireless receiver has received so much care and

similar control, again on the outside of the panel, but with the actual scale hidden, and only a small portion visible through a neat cut-out. Whilst this had a neater appearance, and afforded much better control owing to the indirect drive, it had the drawback that such a small portion of the dial was visible that it was not a simple matter to ascertain at once in which direction to turn the control to tune to another station. When the user had become used to the dial, of course, this difficulty was removed, but for a time one was liable to become lost for a moment or so. Then the control was introduced in a form which enabled it to be placed at the back of the panel, and on the front we had only the actual control knob and a metal escutcheon. The appearance was by this means greatly improved, but the difficulty of a greatly obscured dial still remained. In this form the slow-motion drive has been with us a long time, and in many sets at the last radio exhibition we saw that the principal drawback had been removed by using a very large escutcheon and thus rendering the entire scale fully visible the whole time.

### A Further Improvement

As a step further in the improvement of the control the dial was made a fixture, and a pointer became the moving element, which again afforded both neatness of appearance and simplicity of reading. Two or three manufacturers last year fitted a full circle for the dial, marking one half for the medium waves and one for the long waves, and using a long pointer for an indication on both bands and calling the device, from its appearance—"clock-face tuning." This did a great deal to



*Fototune—A Kolster Brandes device for easy tuning.*

thought as the design and operation of the tuning device. Not so long ago it was the custom to view a portion of a moving dial through a small cut-out window, in front of which was arranged a neat metal escutcheon, carrying either a thin wire or a pointed portion to act as an indicator. This arrangement is, of course, neater than a dial which rotates on the outside of the panel, but in the opinion of many listeners it is not nearly so useful.

For the first type of dial with which a wireless receiver was fitted we had a 3in. disc of ebonite or similar material, upon which was engraved a series of markings, sometimes corresponding to the actual degrees of a circle, and sometimes merely numbered from 0 to 100. To assist in location, a line was scribed on the panel or a small metal pointer was fitted to the panel. This type of dial was, of course, of the direct drive pattern, and operated on the actual spindle of the condenser. The advantage was that it was possible to see at a glance just which way to turn the knob to tune to another known station, as the whole of the scale was in view. The disadvantage was to be found in the rather "scientific" appearance of the knob, or the untidy layout of the complete panel.

### The Slow-motion Drive

Next we had the slow-motion drive, which took the form of a large ebonite or



*Escalator Tuning.—A novel feature of the Bush receiver.*

remove the "scientific" appearance from the wireless receiver, and made tuning a much simpler task; but at this year's exhibition we shall see some devices which have carried the various ideas even farther and have rendered the tuning of a wireless receiver so simple that the youngest child could tune to a desired station not only with speed, but with accuracy. The last-mentioned term probably needs a little explaining, but may be briefly stated to be due to the fact that with a receiver employing automatic-volume-control, it is not a simple matter, aurally, to ascertain whether a set is tuned to the exact frequency, as the amplification of the H.F. stages is increased when the input falls off, and thus on either side of a station the signal will appear as strong (or even stronger) than when on the exact tuning point, but the quality will not be so good.

### Fluid-light Tuning

At last year's exhibition we had a device introduced by H.M.V. known as fluid-light tuning, which consisted of a small illuminated panel carrying a thin glass tube and apparently filled with a column of glowing liquid. As the receiver was tuned this column rose and fell just like the mercury in a thermometer. The exact tuning point was indicated by the height of the column of light. It was, however, still necessary to look at a tuning dial in order to ascertain the frequency (or wavelength) to which the receiver was adjusted. This year you will see receivers in which the control of a light by the tuning of the receiver has been combined with the tuning light and thus, in addition to a moving ray of light across the dial you will notice that the width of the light ray changes and thus gives in one single indicator the setting of the condensers and the accurate location of a signal. You will see this device on the Alba stand.

### Thermometer Tuning

On the Cossor receivers you will see that the thermometer scheme has been incorporated as a tuning indicator in place of the scale and pointer. The wavelengths (and station names) are printed vertically, and a column rises and falls with the movement of the tuning control just as in the case of the mercury, and indicates readily the actual setting. In this case the makers have taken the precaution of printing the names of the stations on a separate panel

*(Continued overleaf)*



*Another type of tuning dial fitted to a Bush receiver.*

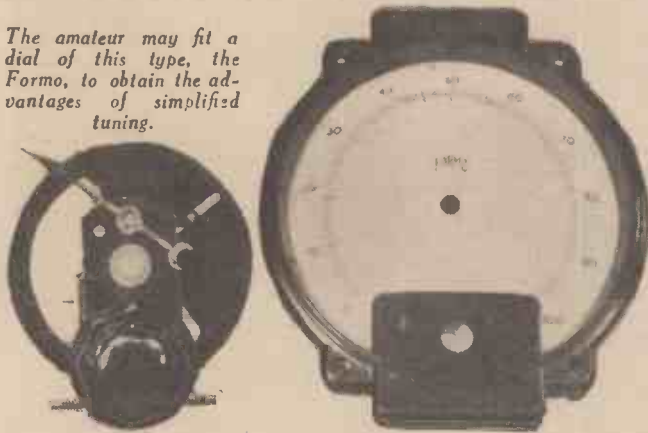
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which is removable, so that in the event of a wavelength re-shuffle a new list of names may readily be attached with the correct wavelength settings.

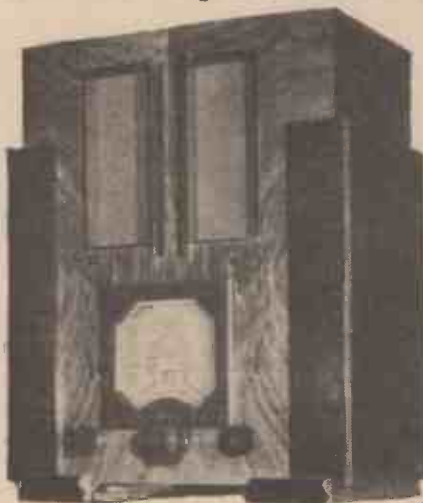
**Full-vision Dials**

A development of the full-vision dial is to be seen on the Ekco models, where the

*The amateur may fit a dial of this type, the Formo, to obtain the advantages of simplified tuning.*



dial takes the form of a semi-circular scale as large as the actual receiver. Here there is no thin moving pointer but a triangle of light which is not visible unless the receiver is switched on. This travels round as the control is manipulated and shows the correct tuning point. In the centre of the triangle is a small shadow



*In this Phillips receiver the tuning dial is on very unusual lines.*

to make the exact tuning point more critical, and thus the device is named by the makers: "Light beam and shadow tuning."

**Fototune**

The rather peculiar title of Fototune has been given to the new Kolster Brandes device, in which a large rectangular opening is provided with small cut-outs at either side. As the control is rotated the actual station name is projected through an optical system (after the fashion of a magic lantern) into the rectangular cut-out, and in a small opening close by the wavelength may be seen. One side is used for medium waves and the other for long waves. No doubt in time we shall see, as a development of this idea, a picture of the actual transmitter—and perhaps the chief announcer?

**The McMichael Dial**

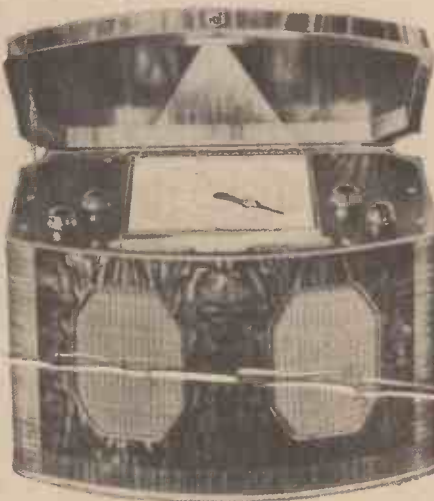
In the McMichael receiver the dial occupies practically the whole of the top

of the cabinet and is protected by a lid. When this is raised and the receiver is switched on a light inside the lid throws down a beam and illuminates the entire dial, thus giving rise to the name "Flood-lit tuning." The large size of this dial, coupled with the fact that a pointer is used in addition to fine lines on the scale, renders accurate tuning a simple matter, and furthermore renders the receiver less "scientific" in appearance when it is not in use.

Most receivers still carry all the controls in full view, and these, coupled with the loud-speaker fret, serve to give the complete receiver a rather laboratory appearance which is not exactly in keeping with the modern home furnishings. The piano has been modernised by removing the fret and candlesticks, and no doubt in time all the controls will be removed and the speaker fret disguised, so that the receiver will be more like a clothes cabinet or other article of ordinary home furnishing. The Pye receivers have been designed on these lines and are, no doubt, the forerunners of the set of the future. But, even so, some listeners will complain because a lid has to be raised to enable the tuning to be carried out!

**Escalator Tuning**

There is, of course, no reason why the pointer should make a semi-circular movement across a dial, and although there have been two or three dials in which a straight-line dial was employed, and the pointer passed straight across, maintaining a vertical position all the time, in the new Bush receivers the pointer passes diagonally from one corner to another. In view of this peculiar motion the makers have named this tuning "Escalator tuning" and thus gone one step further in the ingenious developments in this part of the wireless receiver. No doubt by the time the opening day at Olympia arrives we shall see even more novel schemes of this nature, and it only remains to be seen how many others are in existence at next year's Radio Exhibition. Although they may all be very efficient devices and serve the purpose for which they are designed, they may not appeal to individual tastes.



*Flood-lit tuning.—A large dial fitted to the McMichael receivers.*

**CONDENSER VANES**

(Continued from page 540)

Tune in a station on the lower medium waveband, and adjust oscillator trimmer so that about a half of its capacity is used. Then turn to the trimmer in the signal-frequency circuits and adjust for maximum response. Next tune in a station, as before, at the top end of the medium waveband, but as we have no series condenser to adjust, in this case we slightly adjust the oscillator trimmer.

In both cases discussed it will be noticed that the oscillator trimmer is the critical one, and the other circuits will appear relatively flat in comparison. In carrying out these adjustments it may be necessary to alter the tuning dial at the same time, to keep circuits in resonance.

When results are satisfactory on the medium waveband, switch over to the long waves. A long wave padding condenser is necessary, as with the other system and if this is of the semi-variable type, it may be advisable to make slight adjustment. Tune in a station at the top end of the waveband, and adjust padding condenser, at the same time rocking the tuning condenser backward and forwards very slightly. This completes the ganging and results should be quite satisfactory. Sometimes, however, it may be necessary to slightly adjust trimmer in the middle of the medium waveband.

Fig. 4 shows the circuit arrangement employed which differs from the previous circuit as no medium wave series padding condenser is employed.

It is essential to bear in mind that irrespective of the method employed, unless accurate ganging is achieved, many of the advantages of the superhet circuit will be lost. Second channel interference and whistles may become very troublesome.

We are now in a position to review the relative merits of the two systems; both have advantages and disadvantages. If the constructor possesses a standard ganged tuning condenser, there is no reason why it cannot be employed in a superhet receiver.

The advantage of this method is that the tuning condenser can be used in either a superhet or tuned radio-frequency receiver. An additional padding condenser is, however, necessary, and it is not quite so simple to adjust the circuits for accurate ganging.

The special plate shaped method is the ideal arrangement. Ganging is fairly simple to carry out and excellent results can be obtained without complications. Only one padding condenser is necessary for the long wave band.

There is only one disadvantage, and this does not affect the operation of the superhet concerned; the condenser cannot be used either in a straight receiver or in a superhet employing an intermediate frequency other than the intermediate frequency for which it was designed.

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# Designing Your Own Wireless Set

In this Fourth Article of the Series the Design of a Single-Valve High-frequency Amplifier is Explained. The Question of Variable-mu Bias Control is also Discussed

**L**AST week we considered the circuit details in respect of the simpler type of receiver suitable for modest requirements, and which could be built at little expense. We can now proceed to work out the design for a rather more elaborate receiver having one or more stages of high-frequency amplification, intended for reception over greater distances, and providing a greater degree of selectivity. The principal benefits conferred by the use of H.F. stages were detailed in the first of this series of articles, so that we can now confine ourselves to the matter of deciding on how many high-frequency

H.F. valves used in a "straight" circuit can give as great a degree of amplification as it is possible properly to employ. If a greater number of valves were employed it would be necessary to design the circuit so that they were not working at anything like maximum efficiency, if the receiver were to be reasonably stable and easy to operate. In other words, there is a definite practical limit to the amount of high-frequency amplification which can usefully be obtained without having recourse to a superhet circuit—which will be discussed in later articles.

volume control, besides being useful as a means of increasing the degree of selectivity to a certain extent. The connections for applying the variable bias voltage naturally depend upon whether the valve is of the battery type (directly heated), or of the mains, or indirectly-heated, pattern, and the two different sets of connections shown in Figs. 1 and 2 apply to the two arrangements.

It should be noted that, in the case of battery valves it is necessary to employ a three-point on-off switch, as shown, since if this were not done the grid-bias battery would soon be exhausted, due to its being in parallel with the variable-bias potentiometer both when the receiver was in use and after switching off. The resistance of the potentiometer is not usually very

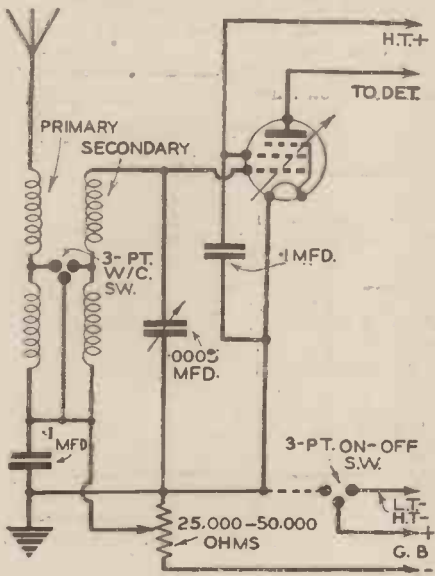


Fig. 1.—An H.F. circuit for battery operation, which shows the type of aerial tuner suggested, and also the method of applying the variable bias.

valves should be included in the receiver, and how these can be used to the greatest possible advantage.

### One or Two H.F. Stages?

If the chief object of the H.F. amplifier is to sharpen tuning or to compensate for the use of an inefficient indoor aerial, a single valve is almost certain to be sufficient; if, on the other hand, the chief aim is to ensure reliable reception in nearly all conditions of a number of long-distance transmissions, two stages are desirable, even if not essential. Incidentally, it might be mentioned here that the use of more than two stages is impracticable when employing modern valves, the amplification factor of which is tremendously high. We can go farther by stating that, as a general rule, two

### The Aerial-tuning Circuit

In the first place let us assume that it has been decided that a single H.F. stage will give the necessary increase in sensitivity. It remains then to determine the type of circuit which will be most suitable. When the object of the amplifier is merely to compensate for "difficult" reception conditions extreme selectivity is not required, so that a simple aerial-tuning circuit will suffice, and this should preferably take the form shown in Fig. 1, where it may be seen that the tuner is in the form of an H.F. transformer with untuned primary loosely coupled to a tuned secondary, a three-point wave-change switch being provided for short-circuiting a portion of each winding for medium waves. The latter is rather important, for it is seldom found that an untapped aerial-winding functions satisfactorily over the whole of both wavebands; in nearly every case there are "dead spots" at certain wavelength settings.

Another advantage of the H.F.-transformer type of coil is that it minimises the effect of the aerial on tuning, with a result that the tuning condenser can be ganged with that used in the second tuning circuit, without the circuits becoming "unmatched" at the ends of the wavebands. There are many coils on the market of the type shown in the theoretical circuit, and no difficulty will be experienced in choosing a convenient one.

### The Variable-mu Valve

That a variable-mu valve will be used goes almost without saying, since this provides the most-reliable form of input

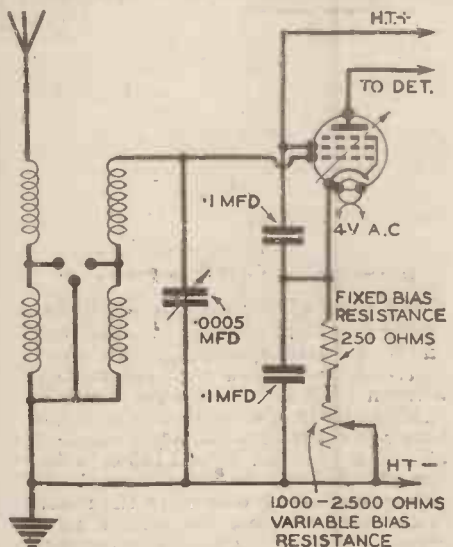


Fig. 2.—A similar circuit to Fig. 1 but for A.C. mains operation.

important, but it is generally best to choose a value between 25,000 and 50,000 ohms; the lower value can be used when the maximum grid-bias voltage applied to the valve is about 9, and the higher value when the voltage is increased to 16 or so, as when a long-base v.-m. valve is used.

With regard to the mains circuit, it will be seen that two resistances—one fixed and the other variable—are wired in series between the cathode of the valve and earth. The object of the fixed resistance is to provide the minimum bias voltage required, generally between 1 and 2 volts (with mains valves only), so that the resistance can nearly always have a value of 250 ohms. This figure is obtained, of course (using Ohm's Law), by dividing the average maximum

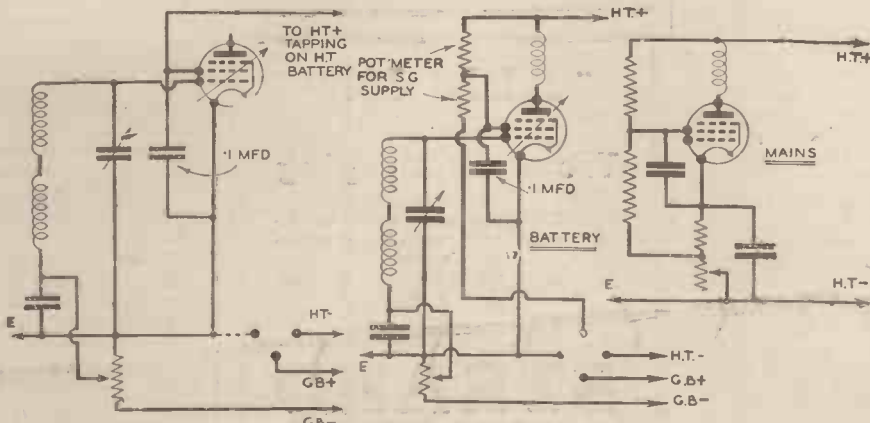


Fig. 3.—Showing alternative methods of applying the screening-grid voltage to the H.F. valve. Both have their relative merits, as explained in the text. The two circuits shown together on the right apply to a battery and a mains set, respectively.

(Continued overleaf)

DESIGNING YOUR OWN WIRELESS SET

(Continued from previous page)

anode-plus-screen current by the bias voltage and multiplying by 1,000. Thus, if the H.T.-current consumption were 8 milliamps and the voltage required 2, the resistance value would be 2 divided by 8 and multiplied by 1,000—which is just 250 ohms. It is generally found that when

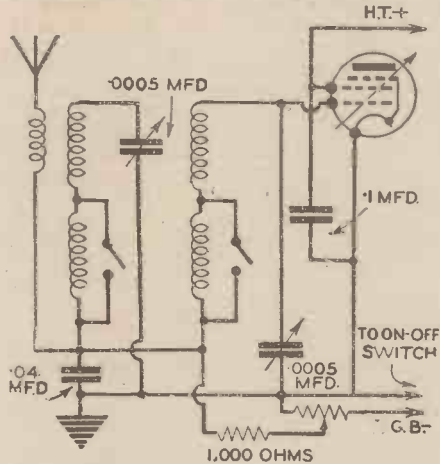


Fig. 4.—An aerial-tuning circuit comprising a band-pass filter of the "bottom-capacity" coupling type.

alternative working figures are taken into consideration the result is similar; in any case, the exact voltage is rarely at all critical.

The value of the variable resistance is largely dependent upon the particular make and type of valve employed, but for a single short-base variable-mu a resistance of between 1,000 and 2,500 ohms is suitable. In the majority of cases when using a short-base valve it is found that the smoothest control is provided by a 1,000-ohm component. A long-base valve is required in this type of circuit only when the receiver is used very near to a powerful station the strength of whose signals it is necessary to reduce to a considerable extent. In the rare cases when such a valve is employed the variable resistance might well have a maximum value of about 2,500 ohms.

The potentiometer or variable resistance used for variable-mu control should be of the graded type and should be connected so that volume is increased by turning the knob in a clockwise direction; this ensures that the tapered end of the resistance element is correctly and advantageously used.

Screening-grid Potential

The next point to consider is the application of the screening-grid voltage, and in the case of a battery receiver there are two possible methods of obtaining the necessary voltage, these being as shown in Fig. 3. In the first place the voltage can be provided by taking a tapping to the high-tension battery, and in the second use is made of a fixed or variable potentiometer. In many respects the former method is the better, but it has the disadvantage of calling for an additional battery tapping, and makes it necessary to alter the position of the appropriate wander plug as the battery begins to run down. The second method provides the correct potential irrespective of the battery condition once the correct values of resistance have been found, but entails the use of an on-off switch having an additional contact point as shown. The reason for

using the different switch is that if the potentiometer were simply wired in parallel with the H.T. supply it would cause a "drain" on the battery whether or not the receiver were in use, and this would result in the battery becoming exhausted very soon.

In the case of a battery receiver the values of the two fixed resistances (or of the two arms of the variable potentiometer) can be found after ascertaining the required screening-grid voltage and the maximum H.T. voltage. Thus, if the H.T. voltage happened to be 120 while the screen required 80 volts (two-thirds of the maximum) the upper resistance should have a value of one-half the lower one, or one-third the total. Strictly speaking, this is not quite correct because the small current passed by the screening grid is not taken into account; in the example being considered, however, it is quite in order to ignore this. The total resistance value of the potentiometer—fixed or variable—should be approximately 100,000 ohms, so that the upper resistance should be rated at about 33,000 ohms and the lower one at 66,000 ohms. In practice we should work to the nearest standard values of resistances, making one 30,000 ohms and the other 60,000 ohms, as indicated on the circuit.

The very same idea applies in the case of a mains receiver except that no special switching arrangement is necessary, and that it is generally better to work to a total potentiometer resistance of about 60,000 ohms. It should be added that most valve manufacturers give details on their instruction leaflet concerning the values of resistances which are most suitable, and it is then the wisest plan to follow the recommendations implicitly.

No matter what type of valve is employed a by-pass condenser is necessary from the screening grid to the filament or cathode, and the value of this can be taken as between .1 and 1 mfd., the lower value nearly always being adequate. The main

point to watch is that the condenser should be entirely non-inductive.

Band-pass Tuning

Up to this point we have assumed that moderate selectivity only is required, and when really sharp tuning is desired—such as when a good outdoor aerial is employed, and when the greatest possible useful range is wanted—it is definitely worth while to use a band-pass tuning circuit such as that shown in Fig. 4. In this example the two band-pass coils are coupled together by "bottom capacity," a .04-mfd. non-inductive condenser being used, and the grid-bias supply is taken through a 1,000-ohm non-inductive resistance. This is not a universal method, however, and certain coil manufacturers provide different methods of coupling. Quite often, for instance, inductive coupling is used, as shown in Fig. 5. Even then the bias feed can often be taken through a resistance wired between the lower ends of the coils and earth, but if the coils form part of a complete tuning unit (coils and gang condenser

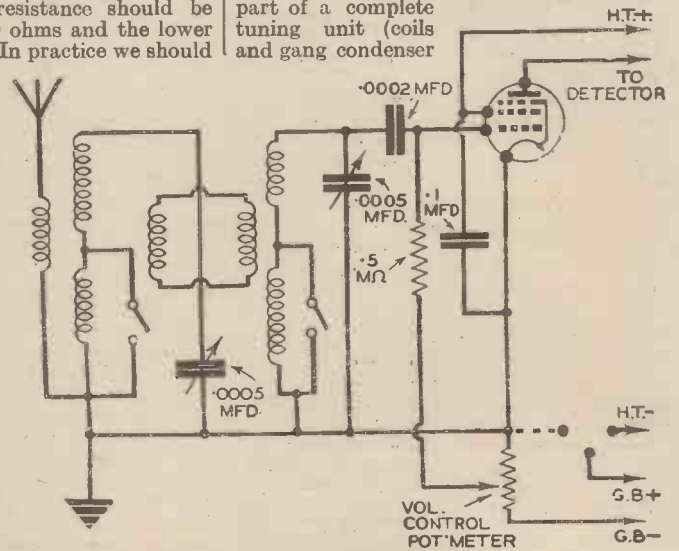


Fig. 5.—When certain types of complete tuning units are employed the methods of applying the variable bias shown in the other Figs. cannot be adopted. In such cases the arrangement shown above might conveniently be employed.

in one assembly) it might not be convenient to break the earth-return lead. A different method of applying the bias has then to be adopted in battery receivers, and the simplest of these shown in Fig. 5, where the lead from the top of the grid coil to the grid of the valve is broken by a .0002-mfd. fixed condenser, a .5-megohm grid leak being used to take the variable-bias voltage from the volume-control potentiometer to the valve. This method is not to be too strongly advised because if the grid leak is not an extremely good specimen it might give rise to a slight "hissing" noise due to its resistance not remaining quite constant. Nevertheless, the system has been used with complete success in more than one PRACTICAL AND AMATEUR WIRELESS receiver, which is sufficient proof of its generally satisfactory nature.

We must leave the question of choosing the inter-valve coupling until the next article, in which we will conclude the design of the single-valve H.F. amplifier.

Later we can proceed to consider the component layout in detail, considering the positions which the parts should occupy in order to ensure stable operation and the highest degree of efficiency. This is a matter which frequently presents a difficulty, but which should be understood.

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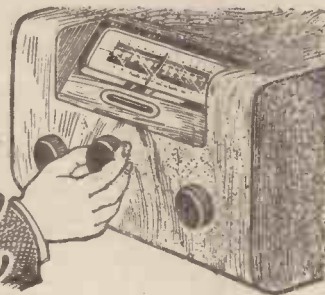
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# On Your Wavelength



By Jhermion

## Ferranti Trade Mark

ALTHOUGH the name Ferranti is known probably throughout the world for its connection with all kinds of radio and electrical equipments, being the name of the founder of the Ferranti Company, it has been found desirable to register it as a trade mark, and the name Ferranti has been registered at the Patent Office as a trade mark, irrespective of the form or type in which Ferranti appears, and applying to all kinds of radio sets and parts, domestic appliances, electrical measuring instruments and meters, and transformers and associated apparatus of many kinds.

## Pick-up Hum

I AM reminded of a peculiar difficulty which was experienced by an acquaintance a short time ago—and one which was very elusive. In this instance a straight three-valve mains receiver had been constructed by following the simple circuit arrangement of S.G., det., pentode, and the set functioned remarkably well on radio. Immediately a pick-up was connected to the grid of the detector valve, however (using the standard connection), gramophone reproduction was almost entirely drowned by a loud hum. The bias resistance was suspected and replaced, the pick-up leads were completely screened and the screen earthed, and two different earth connections were tried; but to no avail. The trouble was, in the end, traced to poor earth-return connections through the "metallised" chassis—again a home-made one which appeared to be satisfactory and which, in fact, showed good continuity when tested between several points with a battery and milliammeter. The moral is obvious: use only metallised chassis which are metallised, and which are made by a reputable firm. These are sprayed by a patented process which ensures that the metal coating is continuous and thus perfectly conductive.

## New Abbreviations

WE have now become accustomed to A.V.C., Q.M.B., Q.A.V.C., Q.P.P., not to mention G.B., L.T., A.C. and S.W., so we are now introduced to A.V.E., this being an important sales point in the literature of at least one valve manufacturer in describing the 1936 models. The abbreviation stands for automatic volume expansion, the object of which is to compensate for the deficiencies in the transmissions as put out by the B.B.C. The engineers purposely give special emphasis to certain types of transmission—speech

in particular—with the object of providing the most suitable "material" for the average listener with the average set. But those who are in search of real quality (or should it be "high fidelity" this year?) want something rather better than this, and we are assured that A.V.E. gives it. I am afraid that I cannot yet speak from experience of the system, but I certainly hope to try it before very long. Incidentally, the new valve for this purpose is similar to the class B valve which we know well, and is officially described by the makers as comprising "two high-magnification triodes having variable- $\mu$  characteristics mounted side by side in one bulb." It is available for either battery or mains operation.

## A "Service" Idea

I SEE that the suggestion has been put forward in some quarters that a meter should be fitted to receivers to indicate the number of hours that it has been in use. The idea is, apparently, that a form of clock should be included in the H.T. circuit, so that it is made to operate when the set is switched on and thus shows at a glance the

total number of hours during which the receiver has been in use. It is suggested that this would be useful from the service point of view, since it would give some indication of the life of the valves, and thus, as to their condition. I cannot see any practical difficulty in the scheme, for, after all, it is only the same as including a synchronous clock in the set as is done in many high-class receivers already, except that the clock would not always be in circuit and could not, therefore, be used for telling the time.

Probably the suggestion could be put to good use by manufacturers of receivers, but in my opinion most sets are already sufficiently complicated. For manufacturers, however, if the device were fixed inside the set it would be of assistance to their service engineers, and would avoid the misunderstanding which often crops up due to the fact that the user explains, after a fault has developed, that the set is virtually new and has not been in use for more than a few hours.

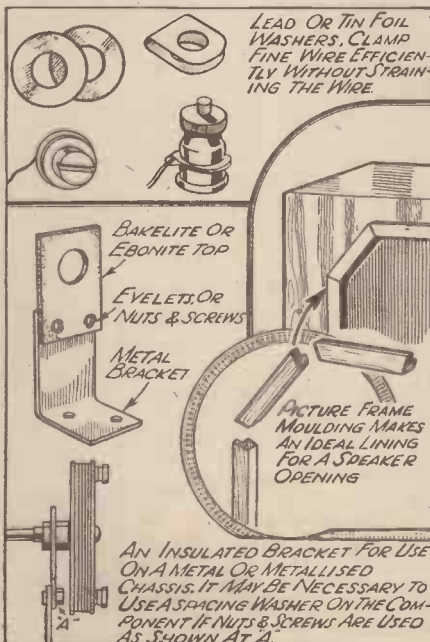
## Cell Indicators

THIS is not a reference to some prison scheme, but is the name which naturally comes to one in reference to the new idea of fitting a "condition indicator" to the L.T. battery. I am glad to see that another manufacturer has adopted this device (you will remember that there has been one on the market for some time), and it shows at a glance whether your L.T. battery needs recharging. There is thus very little chance of being let down due to the battery running out in the middle of a programme, and I am sure all battery users will be very pleased that this idea is gaining ground. No doubt, too, many of them will wish to see the arrangement incorporated in the H.T. and the G.B. battery, but I am afraid that this hope will not be realised. The arrangement works on the condition of the acid, and is really a development of the old idea in which pieces of plastic substance, or small coloured balls, were placed in the accumulator and floated or sank according to the condition. Unfortunately, with the dry battery the only indication will be a meter, and I cannot see the manufacturers selling H.T. batteries with a meter ready attached! How about a small cut-out arrangement, which whilst the current is higher than a certain predetermined value, will remain intact, or in a certain position, and when the current falls to a given value this breaks or changes colour? Now then, manufacturers and experimenters, here is an idea which will give you some sleepless nights.

## Radio from a Kite

SOME interesting experiments in reception can be carried out if you are lucky enough to own a kite. A flexible wire may be used for the tail, with a lead carried down the normal kite string, or the string itself may take the form of wire

(Continued overleaf)



(Continued from previous page)

When attached to a receiver and tuned to a station with the kite only a few feet from the ground, the string should be paid out and the peculiarities of reception noticed. In addition to the gain in height it may also be found that peculiar fading effects are noticed, due to some apparent screening pockets in the air, and provided that the aerial is attached at its end to the receiver, so that no alteration in length takes place which would, of course, affect the tuning point on the receiver, you may spend an interesting hour. Try to log one of those weak foreign stations and listen to the behaviour of his signal as the kite passes from one region to another, or try a short-wave receiver on about 20 metres with a similar scheme. In this case, of course, you must keep the aerial rather on the short side, but if you have access to a large open space you might walk about—say, with headphones on and a small portable receiver, and find that in some spots the station becomes completely inaudible.

### Tuning Coils

IF I were asked to select a component upon which I receive more queries than any other, I should put tuning coils at the top of my list with a long gap between it and the next item. Readers tell me that they suffer from break-through, that they cannot receive stations on the long waves, or *vice versa*, that coils do not cover their respective wave-bands, and so on. The point is that ready-made clothes must necessarily suffer from the defects of a general design intended to cover all physiques. The manufacturers supply you with a coil which is the best possible for general purposes. You must adapt it to fit your set in the same way as ready-made clothes must be let out or taken in to suit the frame which will eventually support them. Coils returned to the makers because of one of these defects are almost invariably returned marked O.K. Yet the trouble persists. The fact is that you cannot make a size 9 foot fit a size 7 shoe without a rub somewhere. Coils which do not suffer from break-through in London may do so in Manchester; no manufacturer can guard against local conditions. Even commercial sets are not immune. That little more, how much it is! Every receiver needs to be adjusted for the position in which it operates.

### The Satyr

I DO not know whether you have ever heard this story, but I will risk repeating it. Once upon a time, a wireless ham, tired of listening in to our excellent programmes, decided to take a walk in the country. Whilst he was ruminating, like the wool-bearing quadrupeds in the fields, he came across a satyr—half-man and half-beast—employed by the local circus hard by. It was a very cold day, and the satyr, who seemed of a matey disposition, said: "How do?" or words to that effect. "How about a cup of tea at yon hostelry?" Our ham-handed friend, feeling the cold wind not half so much as man's ingratitude to the B.B.C. announcers, readily agreed. They perched at a table, and whilst the demoiselle was collecting their cups of tea, he breathed vigorously on his hands, which were blue with the cold. "Why do you do that?" said the satyr, for being half an animal he did not feel the cold. Upon being informed that it was to keep his hands warm, the satyr looked troubled. Within the fifteen minutes or so which the average waitress takes to produce the brew of stale leaves, their orders duly arrived, and our wireless ham blew vigorously



### Pick-up Connection

IT is a generally accepted fact that a better quality of reproduction can be obtained with an electric pick-up than with the acoustic soundbox, and the connection of a pick-up to a radio receiver is a fairly simple matter. If a sensitive component is used, a powerful output valve may be fully loaded from one efficient L.F. stage, but if one of the low-sensitivity types is employed it is necessary to add an extra L.F. stage. The pick-up in each case should be connected between the grid of the first L.F. amplifying valve and the required G.B. voltage socket, if the valves are of the battery-operated type. When mains valves are used, one pick-up lead should be connected to the valve grid and the other to the common negative lead; bias is obtained automatically by means of a resistance in the cathode lead.

### Pick-up Hum

WHEN a mains-operated L.F. amplifier is employed in conjunction with a good pick-up, excellent quality reproduction may be expected, but it is often found that a receiver which has a perfectly silent background on radio hums badly when the pick-up is switched on. This is generally due to the use of long pick-up leads, and, in most cases, may be eliminated by screening these leads and connecting the screen covering to the earth terminal of the set. In order to prevent the lead-to-screen capacity from seriously affecting the ganging of the H.F. tuned stages, when the detector acts as the first amplifying valve of the gramophone amplifier, the lead to the radio-gram switch should be kept as short as possible. If the hum does not decrease in intensity when screening has been effected, it is probable that the gramophone motor casing and frame have not been earthed, and therefore a lead should be connected between these and the receiver earth terminal. It is also important that the speaker leads be kept away from the pick-up.

### Wattage Ratings

MOST readers know that voltage is equal to current multiplied by resistance, and that wattage is equal to current multiplied by voltage. Our correspondence indicates, however, that beginners find it very difficult to apply these simple rules in practice, especially in connection with the calculation of resistance wattage ratings. It is probable that most constructors who read this paragraph have experienced trouble with overheated resistances at some time or other; it is, in fact, a very common trouble. When designing a receiver it is advisable to use resistances having a rating at least 10 per cent. higher than the actual wattage dissipated across them when the receiver is in use. This wattage dissipation is calculated by multiplying the current squared by the resistance in ohms, or by multiplying the voltage dropped across the resistance by the current passing through it, the voltage drop having been found by multiplying the resistance in ohms by the current in amperes.

upon the tea. "Why do you do that?" said the satyr. "To make the tea cooler," said the ham. "Then," said the satyr, "I shall resign my post. I am advertised by the local circus as the world's most curious creature, but I must give place to you. Any person who can blow on his hands to keep them warm, and with the same breath blow on the tea to make it cool, must be an even rarer bird than me." The moral I wish to point in this story is that there are many readers who write to me about their wireless sets who want things all ways. They want the sensitivity of the receiver improved without its selectivity being affected; they want to receive programmes from the remotest parts of the earth, and extreme quality from every transmission received. Such requests alternate with those for a one-valve set or a crystal receiver which will receive American radiations on all wave-lengths, and ending with the proviso that the receiver must be able to work a loud-speaker at comfortable entertainment volume. I am no satyr. If I were, I should be in the same position as the one in the legend I have related, brought up to date, of course, to suit my purpose.

### G.W. Radio 'Phone Number

WILL readers please note that the correct 'phone number of Messrs. G.W. Radio Ltd., of 7, Chapel Street, Lamb's Conduit Street, London, W.C.1, is Holborn 4434, and not 3334, as, due to a printer's error, appeared in their advertisement on page iii of cover of our issue dated July 6th.

### "Childhood Days"

ON August 8th the B.B.C. Midland Orchestra gives a programme entitled "Childhood Days." It is in two half-hour sections, divided by the Air-do-Wells from Regional. Reginald Burston, who conducts, has chosen the programme, which begins with "The Parade of the Tin Soldiers," and closes with Romberg's "Toy Symphony."

### SCREENS: THEIR PURPOSE AND APPLICATION

(Continued from page 539)

cal strength take care also to use to the full its screening properties. In the first place, by a careful disposition of the components on the upper and lower surfaces the wiring may be effected in a more direct manner; the second and most important point is that any chance of interaction between the leads of the grid and anode circuits, which must be avoided at all cost, can be prevented by confining the different circuits to opposite sides of the base.



Fig. 6.—Screened wiring.

Under certain circumstances the use of screened wiring (Fig. 6) becomes necessary, but such screening requires using with discrimination. Another familiar form of screening is that whereby most valves are shielded by the application of a metallic coating to the outside of the bulb, the earthing arrangements for which are already completed by the covering being connected to the negative filament pin as shown in Fig. 7.

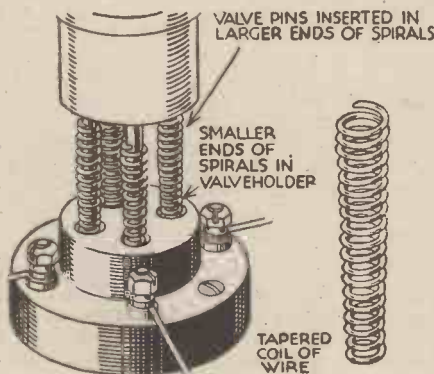
A PAGE OF PRACTICAL HINTS

SUBMIT  
YOUR  
IDEA

READERS  
WRINKLES

THE  
HALF-  
GUINEA  
PAGE

**An Anti-microphonic Valve-holder**  
SOMETIMES the detector valve is suspected of being microphonic, but because of the trouble and slight expense involved nothing is done about it. Here is a very simple anti-microphonic valve-holder which will solve the trouble. Wind round the tapering part of an awl, or steel

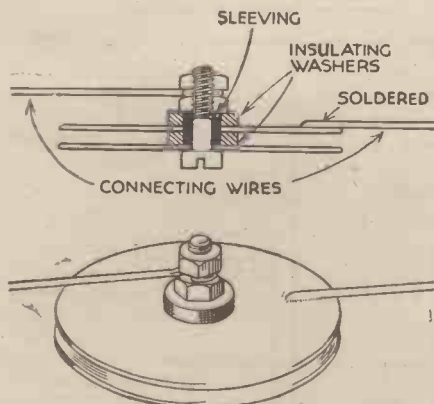


A simple anti-microphonic valve-holder.

knitting needle, some fairly thin springy wire in the form of a spring for about 1 1/2 ins. with about 1/16 in. between each turn. Make four of these, and after removing the valve from the holder, fit the thinnest end of each spring tightly down each valve socket. Plug the valve into the top ends of the springs, as shown in the diagram. —F. E. BLAMEY (Whaley Bridge).

**A Neat Grid Condenser**

A VERY neat grid condenser of small capacity for the detector valve of a short-wave may be made from two circular tin discs such as are sold for mending kettles. A small bolt, No. 6 or No. 8, B.A., is passed through the central hole and is



A method of making a small grid condenser.

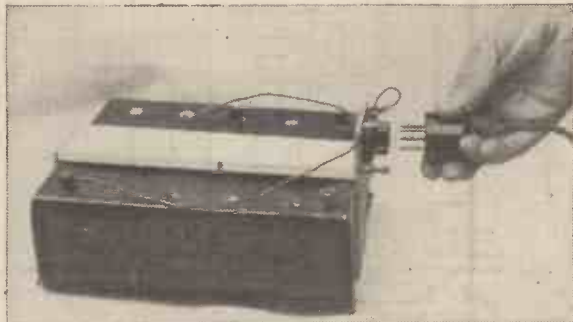
insulated from the upper disc by means of a piece of rubber sleeving, and bakelite or ebonite washers. One wire is soldered to the upper disc, and the other is clamped between the nuts, as shown in the accompanying sketch. —T. A. BRIGGS (Bath).

**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., 8-11, 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 Wrinkle.

**A Plug-in H.T. Connector**

WHEN disconnecting the H.T. battery one is apt to forget the tappings for the different plugs, and in some cases even when the tappings are memorised a good deal of time is wasted in getting the plugs into their respective sockets. By making a frame with strips of wood about 3/4 in. thick and 2 ins. wide, as shown in accompanying illustration, and fixing a valve holder to this frame, the H.T. battery, and also the L.T. and grid-bias battery—if a multi-pin valve-holder is used—can be connected or disconnected with ease, and there is no danger of inserting a plug in a wrong socket. The leads from the set terminate in the end of an old valve, each lead being soldered to the pin of the valve. The valve pins can easily be cleared by heating over a candle and inserting a piece of wire in the hollow of the pin. The negative lead is soldered to the pin which makes contact to the socket in the valve-holder that is connected to negative of battery, and so on.—F. W. RITCHIE (Macduff).



A useful plug-in connector for an H.T. battery. The valve-holder can be mounted on a shorter piece of wood if cabinet space is limited.

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**A Variable Resistance**

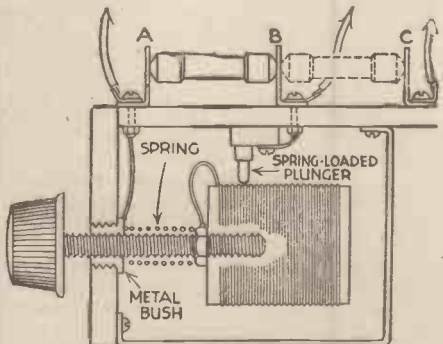
HERE is an idea for a variable resistance which allows a very accurate adjustment to be made. The metal bush is firmly screwed into the wooden block, and passing through it is the screwed rod affixed to the end of which is a round wooden former. A complete spiral is cut round the former, the pitch of which is the same as that of the screwed rod. Into this spiral resistance wire is wound.

The spiral is best cut on a screw-cutting lathe, or the wire may be wound round parallel, and then staggered the required amount afterwards.

Thus when the knob is turned, the wire moves round in exactly the same path as the screw, allowing the wire to come in contact with the plunger a little at a time and not by the length of a complete turn

of wire, as is common in most resistances. Three clips, A, B, and C, are provided so that the loading resistance may be either in series or parallel with the adjustable resistance.

It will be appreciated, of course, that it is essential that the thread of the screw which is used, and the thread or "pitch" of the actual resistance winding must be identical, otherwise the whole advantage of the device will be lost. To obtain the correct pitch, mount a pencil in place of the plunger and rotate the knob, afterwards winding the wire over the pencil mark.



A useful variable resistance with fine adjustment.

# MORE SUPERHET POINTERS

**D**ESPITE the rapid growth in popularity of the superheterodyne circuit, it is by no means well understood by the average constructor, as is evident from many of the queries on the subject which are frequently received by the Free Advice Bureau of this journal. I believe that most regular readers now have a good general knowledge of the principles, and general fundamentals of the system, but many of the practical details have not been completely grasped, chiefly because of the comparative lack of experience with superhet receivers. This is fairly evident from several enquiries which have lately been received from readers who wish to add pick-up connections to sets provided with A.V.C., and having only a single L.F. valve—usually an output pentode.

Methods of Connecting a Pick-up to Receivers Having Diode Second Detectors are Described, and Reference is Made to a Peculiar Form of Instability.

representative component is the Varley, type DP. 16.

When the receiver is being used for radio reception the choke behaves simply as a series resistance and has thus no effect on the normal functioning of the circuit, but when the switch is turned to the "gram" position it makes the I.F. valve suitable for use as an excellent low-frequency amplifier.

### Gram. Volume Control

The method of connecting the pick-up is rather unusual, for it is wired in parallel with a 25,000-ohm potentiometer, which is itself in series between the grid terminal of the preceding I.F. transformer and the grid of the valve. The potentiometer, which should be of the "carbon-track" or other non-inductive type, provides a means of input volume control when the pick-up on radio, when it prevents parasitic oscillation which might otherwise be present.

When using the simple connections shown in Fig. 1 it might sometimes be found that a certain amount of instability occurs when the pick-up is in use, due to the fact that this component is not actually earthed, the earth connection being via the secondary winding of the I.F. transformer, the A.V.C. decoupling resistance and also the load resistance in the "Westector" circuit. Should any trouble be experienced in this respect a simple on-off switch may be connected between the points marked A and B in Fig. 1, and this may be ganged with the radio-gram-change-over switch and so wired that

its contacts are closed when the pick-up is in use. This switch provides the additional function of short-circuiting the I.F. transformer and so "muting" the radio portion of the receiver and preventing breakthrough of radio signals.

### An Alternative Arrangement

A slight objection to this method of pick-up connection is that the pick-up should be disconnected when not in use, for otherwise the capacity of its connecting leads is likely to affect the correct working of the I.F. valve and to detune the secondary of the transformer. An alternative method of pick-up connection which avoids this difficulty is shown in Fig. 2, where the pick-up is shown included on the earth side of the I.F. transformer, virtually in parallel with the decoupling resistance of the A.V.C. system. It should be noted, however, that a .01-mfd. fixed condenser is included between the pick-up and the latter resistance to prevent a short-circuit of the bias supply.

By way of a change, and to include details suitable for an alternative type of circuit, a double-diode second detector is shown in Fig. 2 in place of the "Westector," but otherwise the arrangement is similar, again a high-inductance L.F. choke is again wired in series with the primary winding of the L.F. transformer, and a switch is used to connect the output from the I.F. valve to the grid circuit of the output pentode. In this case, however, an additional .01-mfd. fixed condenser is used in series between the choke and the switch to prevent short-circuit of the H.T. supply through the L.F. volume-control potentiometer.

Despite the inclusion of the latter volume control it might be desirable in certain instances to fit a volume-control potentiometer between the pick-up and the terminals shown, in order to prevent overloading of the I.F. valve when used for low-frequency amplification. Most modern pick-ups, however, have a built-in control, which will correctly serve this purpose.

(Continued on page 555).

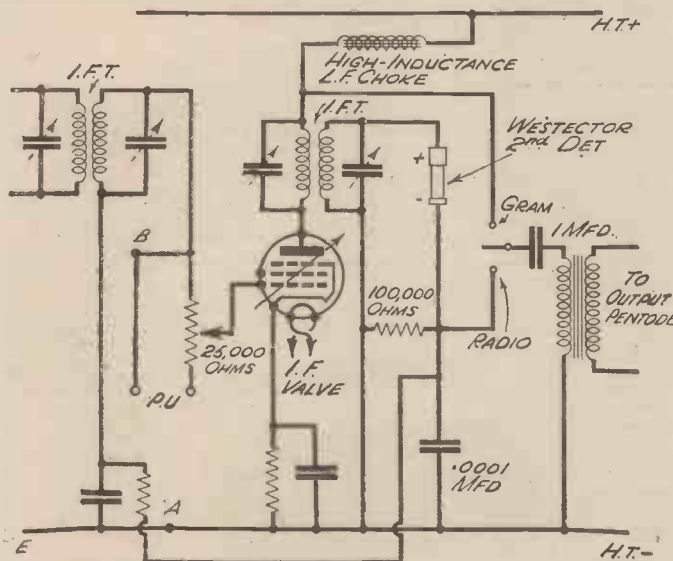


Fig. 1.—Showing the method of using the I.F. valve of a superhet, with "Westector" second detector, as pick-up amplifier. A mains valve is shown, but the connections are similar in the case of a battery set.

### Using the I.F. Valve for L.F.

It is appreciated that this last valve cannot be expected to provide sufficient amplification to signals fed from a pick-up into this grid circuit, but as the valve is not preceded by a three-electrode detector, the usual method of using the latter valve as amplifier cannot be adopted. This being the case, the best idea is to apply the output from the pick-up to the last I.F. valve (or to the I.F. valve when only one is used) and to arrange a system of switching the output from this valve directly into the grid circuit of the output stage, thus eliminating the second detector. One satisfactory way of doing this in a receiver employing a "Westector" for second detection and A.V.C is shown in Fig. 1, where a low-frequency choke is included between the H.T.+ terminal on the intermediate-frequency transformer and the high-tension supply. The "lower" end of this choke is joined to one terminal of the usual change-over radio-gram. switch, so that the choke provides, in conjunction with the coupling condenser normally fitted, a choke-capacity circuit. The L.F. choke should be a good one, with an inductance of not less than 200 henries and a current-carrying capacity of about 10 milliamps; these requirements are fulfilled by the type of choke designed for use with a power-grid detector, and a repre-

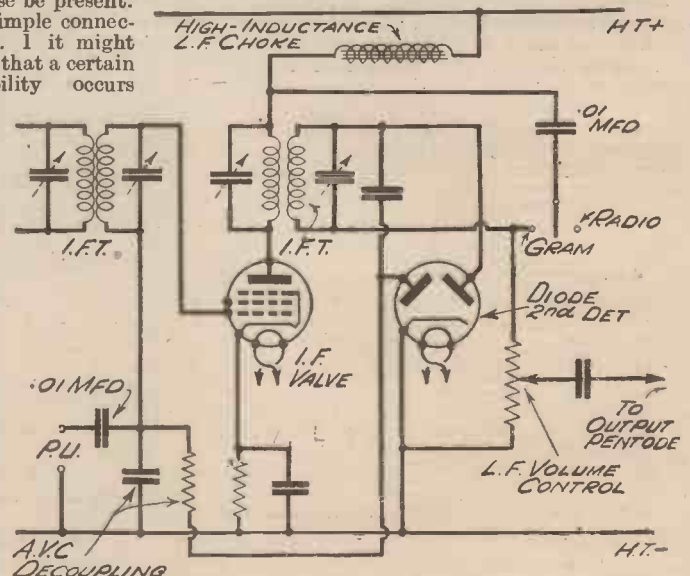


Fig. 2.—Another method of using a pick-up with a modern superhet. In this case a double diode is used as second detector. The circuit is a "skeleton" arrangement only, drawn to show the connections described.



# SHORT WAVE SECTION

## EXPERIMENTAL WORK FOR BEGINNERS

Practical Hints on Making a Start in Short-wave Work, the Procedure to Adopt, and the Pitfalls to Avoid. By A. W. MANN

**T**HE popularity of short-wave reception is due in some measure to the fact that consistent and satisfactory results may be obtained with simple apparatus. In addition to the attractions of world-wide reception, this most interesting branch of radio science offers ample scope to those who are experimentally inclined.

During the early days experimental work was the pastime of a favoured few, as components were difficult to obtain and prices considerably higher than they are to-day. Times, however, have changed. Empire broadcasting and the world-wide interchange of short-wave programmes have created an ever-increasing demand for short-wave receiving apparatus and components.

Under the above circumstance prices are comparatively low, and the potential experimenter who is prepared to progress in easy stages will find that, even though his means are limited, it is possible to acquire quite a lot of useful and well-made apparatus at low cost by carefully studying the advertisements of those firms who specialise in the manufacture and sale of short-wave components.

The purpose of this article is to show those who are experimentally minded how to make a start, the procedure to adopt, and the pitfalls to avoid.

Research and experimental work as carried out in commercial laboratories follows along certain specialised and pre-determined lines, as to permit each research worker to follow his own inclinations would prove to be non-productive. A definite method of procedure so far as the amateur experimenter is concerned is of equal importance, taking into account that the desire of the individual is to increase his knowledge of short-wave circuits, receivers, and associated apparatus.

### Chassis Construction

The foundation of every modern receiver is the chassis. Aluminium sheet construction must be ruled out owing to the fact that chassis and panel combinations of various sizes will be required, and expenditure must be kept down.

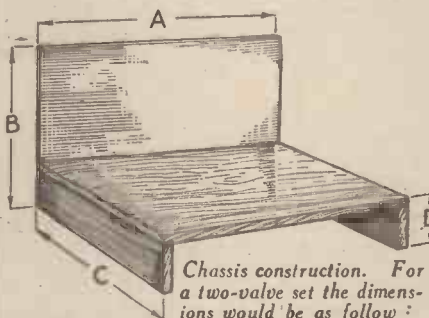
Plywood panels cut to size and backed with copper foil, chassis of the same material mounted on 1½in. runners and copper foil lined on the underside are recommended, as they are cheap to make, and if given two or three coats of clear varnish, are of pleasing appearance. Water and spirit stains, however, should not be used for obvious reasons.

Standard panel sizes are as follows: 9in. x 6in., 12in. x 9in., 12in. x 8in., 12in. x 7in., 12in. x 12in., 14in. x 7in., 16in. x 8in., 18in. x 7in., 20in. x 8in., 21in. x 7in.,

24in. x 7in., 26in. x 8in., and of 3/16in. or ¼in. thickness.

Chassis dimensions will be governed by the length of the panel, and the number and dimensions of the chassis mounted components. Two examples are given which are suitable for a two- and three-valve combination respectively (see Fig.).

If the experimenter wishes to try out a number of four-valve circuits a 20in. x 8in. x ¼in. or 21in. x 7in. x ¼in. panel, and a chassis 10in. wide will allow ample spacing of components. It should be understood that the dimensions given may be varied to suit the panel mounting and baseboard components. If the constructor keeps in mind that wiring must be as short and direct as possible, and that the cramping of components must be avoided, he will not find it difficult to decide as to the exact dimensions of the panel and chassis. Chassis construction offers one great advantage amongst others, which is generally overlooked, i.e., chokes, decoupling, condensers and voltage dropping resistances may be mounted underneath if desired.



Chassis construction. For a two-valve set the dimensions would be as follows: A=12in. or 14in., B=7in., C=7½in. to 8in., D=1½in. For a three-valve set: A=18in., B=7in., C=10in., and D=1½in.

### The Choice of Coils

The question of short-wave coils is a very important one. The once popular two-pin type which were about three inches in diameter has definitely gone out of favour. Whilst this type were efficient they were bulky, and required a more than ample space on the baseboard or chassis. In addition to this the magnetic field created around them was rather a wide spread, and in most instances the chief cause of instability.

The valve-base mounting type at present available commercially have much to recommend them. Alternatively the experimenter may make his own coils, and a study of various articles published in previous issues of PRACTICAL AND AMATEUR WIRELESS will show that there is a wide scope for experiment in this direction.

If it is decided to use a valveholder as a coil base one of the five-socket baseboard type should be used. The extra socket may come in handy at a later date.

### Values of Components

The actual values of various components will depend upon the circuits chosen as the basis of experiments. If tuning coils are purchased select one make and keep to it. If you decide to make your own coil formers or wind your own coils the same rule applies. When commercial coils are used suitable values relative to tuning-condenser capacities are usually given by the manufacturer. The most suitable capacities for all-round use, and ease of tuning, are .0001 mfd. and .00016 mfd. Capacities of .0003 mfd. and .00025 mfd. should not be considered, as their incorporation in a receiver will make tuning difficult.

The beginner may wonder why the writer stresses that he should stick exclusively to one type of coil and, incidentally, its associated tuning condenser. So far as the experimenting beginner is concerned, there is a very good reason. For example, suppose three different circuits—a detector and one low-frequency stage, an S.G.-H.F. detector and pentode, and an S.G. detector (that is, one using an S.G. valve as a detector), followed by a R.C.C. low-frequency stage, are wired up and tried out in turn, each receiver incorporating different coils, what happens?

The experimenter tunes around during the initial tests and finds that he is entirely lost relative to the tuning range covered by individual coils. Stations heard by chance must be identified, dial readings noted, until sufficient data is collected to enable an approximate idea of coverage to be obtained.

Providing that the same coils are used in conjunction with the other receivers, the data previously obtained will be very useful, although dial readings will differ due to circuit differences, as may be expected. If, however, different coils are incorporated, the aforementioned groundwork will have to be undertaken afresh.

Do not imagine that I am condemning coil experiments. The point I wish to make clear is that the coils you are familiar with are better than the ones you are not, relative to coverage. Later, of course, other types, including dual-range tuners may be made and tried out, and by following this procedure you will eventually become familiar with the different types and the tuning capacities used in conjunction with them. Efficiency tests may then be carried out and comparisons made without having to waste time in finding where you are working.

(Continued at foot of page 550)

# Calibrating S.-W. Receivers

Useful Data for Assisting the Amateur to Calibrate a Tuning Dial Direct

**T**HE beginner usually finds no difficulty in identifying European and other overseas short-wave stations, and in due course has at least a rough idea as to the tuning range of various coils, etc. The identification of DX low-powered transmissions is, however, often difficult as microphone announcements are made in an unfamiliar foreign tongue. Especially does this apply to South American and Central American transmissions, due to the fact that new stations come on the air whilst the older ones go off, change their wavelengths, or publish one schedule, announce another; and work to a different one altogether.

The old hand, with his calibrated wave-meter, checks and identifies by wavelength in conjunction with a reliable short-wave station list, but the beginner, however, is not experienced enough to calibrate apparatus, which, unless carried out accurately, is worse than useless. There is no reason why he should not tackle this calibration problem in another way, and thus gain experience in calibration procedure, and the plotting of graphs. The idea is to calibrate the tuning dial or dials directly, and the only qualifications necessary to do so are ability to tune the receiver, the possession of an up-to-date list of short-wave stations, complete with time schedules and wavelengths, and a rough idea of the tuning ranges of your receiver.

Every station heard should be identified definitely, the dial reading and coils used, or tuner-switch positions noted until sufficient data is obtained to enable the calibration curves to be plotted.

The data given in this article concerns stations which are receivable in the British Isles more or less consistently, and where ever possible, the most powerful and reliable transmissions are listed, all of which are telephony stations, the majority being recognised broadcasters.

The average short-wave tuner and coil combinations cover, as a rule, all wavebands between 14 metres and 55 metres. In a previous article some considerable time ago the writer dealt with code stations within these bands, but as there are many who cannot read code, and short-wave broadcasting stations are increasing in numbers, code transmitters for this purpose previously outlined will be ignored.

## A SHORT-WAVE HINT

### The Short-waver's Loud-speaker

In short-wave work to-day the loud-speaker is gradually ousting 'phones, but the speaker used must be a sensitive one. I have been testing several speakers for sensitivity recently, and have found that the smaller moving-coil models are almost useless where short-wave work is concerned.

Those with a very large permanent magnet, or a mains-energised model, are by far the most useful, being responsive to even the weakest signal. For those amateurs who have mains handy I would suggest that a cheap and excellent loud-speaker for short-wave work would be a mains-excited moving-coil one. This could be run direct from D.C. mains or from A.C. with the addition of a Westinghouse H.T.12 rectifier and a 4 mfd. condenser, as shown herewith.

### List of Stations

The lowest wavelength used by a short-wave broadcast station is listed as 13.92 metres, and is used by W-8XK for broadcasting. Between 13.92 metres and 15.5 metres, sixteen transmitters are listed. Unfortunately, with the exception of W-8XK, all are commercial phones. The most easy to identify are PSA (Rio de Janeiro), which calls WKK or WLK during daylight on 14.23 metres.

PMA 15.50 metres (Java) radiates gramophone records around noon daily, later calling Amsterdam then scrambles speech. Below this is DFA (15.58 metres (Germany) heard around 3 p.m. PLE (15.93 metres) working Holland from 11 a.m. daily.

Twenty-one stations are listed using 'phone or broadcast between 16.06 metres OCL (Peru) and 16.92 metres HSP (Bangkok, Siam). GSC (16.86 metres), and W-3XAL (16.87 metres), are most useful calibration points.

In the 17-metres band between 17.10 metres WVY Poona (India) and WOO 17.52 metres (U.S.A.) are five commercial 'phones WOO and WVY, which should be listened for when testing intelligible speech, Position B. The same applies to KWO (California, U.S.A.) on 19.47 metres.

Between 19.52 metres and 19.84 metres are ten broadcasters: HAS (Hungary) (announces Budapest) (19.52 metres), DJQ (19.63 metres), DJB (19.73 metres), HVJ (19.84 metres).

In the 20 metres band, HBJ (20.60 metres), and amateur phones, may be heard carrying out experimental transmissions at intervals, HBJ being located at Geneva.

In the 21.70-23.45 metres band are eighteen listed transmitters, mostly commercial 'phones, CGA-3 (22.58 metres) may be heard working ships during the day—call CGA-3 (Montreal).

On 23.38 metres is Radio Maroc of Morocco heard Sundays between 12.30 p.m. and 2 p.m. 1AC (23.45) Coltarno works ships during the mornings, and often uses English language.

The most reliable points to follow up are CT-1GO (24.20 metres) (Paredo, Portugal), CTICT (Lisbon), 24.53 metres, and FYA (25.23 metres), (Pontoise, France), DJD (25.49 metres) (from noon).

28.14 metres Nazaki (Japan), from 8 a.m.,

28.51 metres VK-2ME-VLK, 6 to 11 a.m. are also worthy of note.

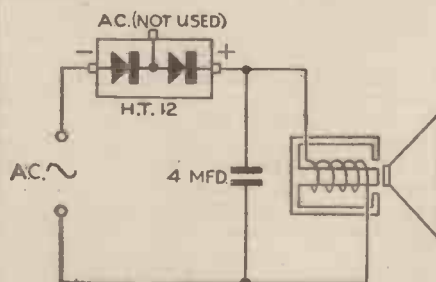
LSX (29.98 metres) is a well-known South American on the air daily for an hour from 11.15 p.m. Wednesdays. EAQ (30.40 metres) daily from 9.15 p.m. provides a useful point. 2RO (30.67 metres), DJA (31.38 metres), GBC (34.56 metres), CNR (37.33 metres) followed by a number of 40 metres band British amateur 'phones will complete matters, and avoid the difficulty of attempting to catch commercials by chance on intelligible speech.

The 40.60 metres-49.02 metres band is shared by over forty stations, including twenty-nine broadcasters. The most suitable for our purpose are HB9B (42.14 metres), 9 p.m.-9.30 p.m. Thursdays. REN (45.38 metres) (Moscow), 6 p.m. to 11 p.m., CT-1GO Paredo (Portugal) (48.40 metres), from 12-20 a.m. Tuesdays to Fridays (see later schedules), W-8XK (48.86 metres) from 9.30 p.m. daily, W-3XAL (49.18 metres) Monday, Wednesday and Friday, from 10 p.m., also on Saturdays from 10 p.m. to 4 a.m. Sunday morning. W-9XF, also use this wavelength CP-5 La Paz (Bolivia), 49.34 metres, from 1 a.m. daily, OER-2 (Vienna) from 2 p.m., GSA (49.59 metres), 3.45 p.m.; RW59 (Moscow) (50 metres) from 8 p.m. daily. HAT (55.56 metres) from 1 a.m. Mondays (Budapest); GBC (60.26 metres) working ships at irregular intervals, also CGA-8 (61.15 metres). RV-15 (70.63 metres) from 6 a.m. daily together with 75.80 metres amateur 'phones will enable the beginner to compile all the data necessary to calibrate his receiver tuning dial directly.

In conclusion, accuracy is most desirable, therefore make quite sure, about the call letters heard, check the schedules where given in this article against one of the many available in *World-Radio*, and *Short-Wave Organisation* journals in order to note possible changes.

It will be noted that gaps between wave bands have been made by the writer intentionally because coils usually overlap in tuning ranges, and stations heard at maximum range on one are often at minimum range on the next highest coil. Search for the stations given, and in addition log the dial readings, etc., of all stations identified but not listed in this article. The more points of calibration obtained the greater the accuracy of your calibration charts.

The speaker should have a field-winding resistance of 2,500 ohms, and if connected as shown, and fitted with a hum-bucking coil (as all modern speakers are) there will be no hum. The sensitivity of such a speaker will probably come as a revelation to many.



Circuit diagram for a mains-energised moving-coil speaker for s.-w. receivers.

## EXPERIMENTAL WORK FOR BEGINNERS (Continued from page 549)

### Checking Tuning Range Coverage

When more experienced, full advantage can be taken of that most useful piece of apparatus, the calibrated oscillator, the construction and calibration of which will prove to be most interesting, and which will enable the tuning ranges covered by different types of coils to be checked accurately. Spare components, such as resistances, grid condensers, and leaks, if sound in every way, may be used for experimental purposes.

Good class L.F. transformers and output chokes will also prove satisfactory. The maker's name is a useful guide in connection with components of this type.

Whatever components are required, avoid the temptation of using what is usually referred to as junk. Junk-box receivers may function, but the fact remains that good components will undoubtedly ensure the most satisfactory results.



# Automatic Relays : How They Work!

In This Article the Author Deals With Various Forms of Relays, and Their Uses

By G. V. COLLE

THE development of the electro-magnetic-mechanical relay has been closely linked with the evolution and perfection of the telephone system. It represents the harnessing of magnetism in perhaps its most useful form, viz., that of a robot. Next to the valve, it is unquestionably one of the wonders of science, in that it can be made to perform endless feats in all branches of radio, electricity, and even more important, in industry. With regard to the telephone, it would be true to state that the modern automatic exchange would not be possible without it. Rather than delve here into the intricacies of the telephone apparatus controlled by relays, the writer would suggest that the

which is normally a flat piece of soft iron mounted on springy metal, or a similar support, and close to the end of the iron core. Instead of the usual make-and-break contacts and hammer, as fitted to a bell, the armature carries a small piece of metal with electrical contact points mounted on it which can contact with corresponding adjacent "blades." Obviously, the armature can be arranged to contact with innumerable electrical blades or, if it is controlled by a sufficiently powerful electro-magnet, it can force a whole bank of contacts together. Indeed, it is easy to see that the system lends itself to hundreds of different arrangements. If these local contacts are joined to various electrical machines, a single press-button, or switch, in series with the current supply to the electro-magnet (constituting the master control) will set into action, by means of the armature, all the apparatus connected *via* the local contact blades.

In consequence of the foregoing facts, it is not surprising that one can find relays actuating circuits passing tiny currents of a few milliamps, up to those giant devices controlling hundreds of amperes. The latter types are usually known as magnetic breakers and automatic cut-outs, but fundamentally they function the same as the extremely sensitive relays used for most radio purposes. It also follows that the construction of a relay must vary according to the apparatus it is to control and, consequently, one can find literally hundreds of types in the catalogues of those firms specialising in them.

When automatic-volume-control first made its appearance in radio sets, a number of the more sensitive telephone relays were adapted, by very slight modifications, to the circuits. Owing to unfavourable effects in the H.F. amplifier, over which the designers had little or no control, such units were not completely successful and were later eliminated in favour of non-mechanical valve relays.

### Varied Uses

Where less sensitive relays can be employed, quite a useful list of possible radio applications can be envisaged, some of the following being quite obvious and practical—(1) Remote control of the on-off switch in all those rooms within earshot of the set, or (2) a loud-speaker jack in each room, so that the insertion or withdrawal of a plug connected to a portable loud-speaker controls the set. A number of loud-speakers can be used simultaneously, the first loudspeaker jack to be inserted switching on the receiver, and the last one to be withdrawn switching off. (3) An automatic telephone type dial, the pulsations of the make-and-break actuating a relay which controls at the set a pawl engaging with a ratchet wheel. The ratchet wheel can either turn a switch controlling a number of pre-tuned circuits (pre-set condensers adjusted to a number of stations of entertainment value) or other-

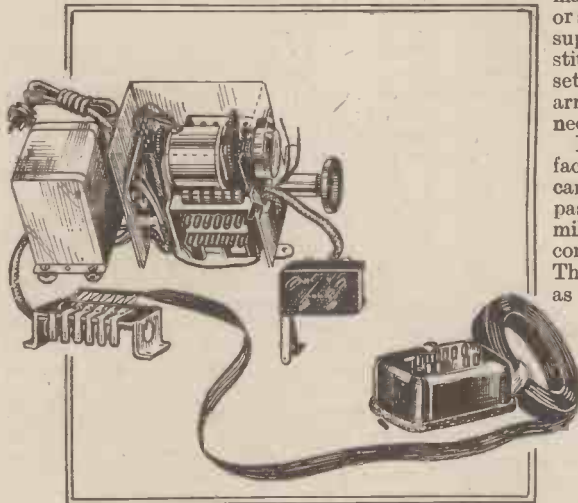
wise an ordinary gang-tuning condenser. (4) Remote adjustment of the volume control can be achieved with a separate relay, working on the same principle as the tuning system, the volume control itself being chosen to operate in steps rather than by gradual movement.

There is no difficulty in connecting the receiver to the remote-control panel, as a multiple flexible cable having as many separate conductors as required can be obtained with a neat overall braided cotton covering to match existing furnishings, or in neutral colours, to be inconspicuous. Furthermore, it is not always essential to have completely rotary (360°) tuning condenser and controls in the set, because two similar relays can be mounted to operate in opposite directions, a "reverse" or "retard" switch being provided on the remote-control panel.

If one wishes to know whether the set is accurately tuned, it is possible to mount a visual tuning indicator at the control end and connect in the usual H.T. lead to the controlled valves, the only precautions necessary being to provide two adequately insulated conductors and decoupling condensers at the receiver end of the leads. A further refinement in the case of pre-set tuning could take the form of remote control of trimmer condensers, but the combinations are endless.

### Photo-electric Cells

Photo-electric or light sensitive cells can be classified as non-mechanical relays in that these units change their internal resistance according to the intensity of the light impinging on them. By directing a beam of light on a cell and connecting it to a valve amplifier, one is provided with a system which has innumerable possibilities. The passage of a solid or light-excluding object between the light beam and cell will cause a strong impulse to be transmitted to the object electrically controlled. Among



An American automatic system for providing full remote control.

reader should visit the G.P.O. Stand at the next Radio Exhibition, where he will probably be afforded an exact idea of the part played by these devices. Alternatively, most chief telephone exchanges are open to inspection.

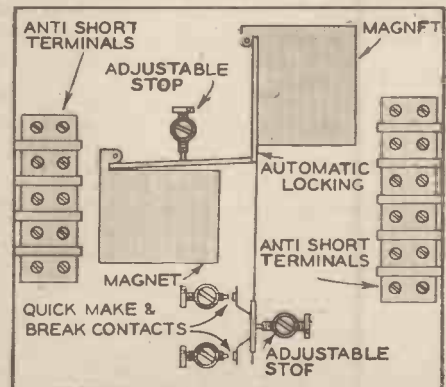
The relays used with radio receivers have chiefly been confined to the remote control of the set and to operate the latter by means of loud-speaker plug points.

To-day only about three English firms make relays for radio purposes, although they are used to an increasing extent on electronic principles for industrial use. Simply explained, this means that machines are controlled by photo-electric cells in conjunction with relays to start or stop the driving sources in the event of something going wrong.

We are concerned for the moment, however, only with the application of relays for radio reception control and, in order to visualise the possible applications, it is necessary to understand their general function.

### Working Principles

The basic arrangement is very much the same as an ordinary electric bell, that is, an electro-magnet and armature or "trembler." When a current is passed through the coil surrounding the iron core, it creates a strong magnetic pull on the armature,



The internal arrangement of the Belgian relay.

the applications of these devices one can name burglar alarms, printing and paper-making machines (the light beam is continually interrupted, except in the case of a break in the paper when the cell stops the driving source), extracting unlabelled tins in a canning plant (B.T.H. make this device), and operating doors to lifts and kitchens of restaurants (G.E.C.).

(Continued overleaf)

## AUTOMATIC RELAYS

(Continued from previous page)

The combination of photo-electric-cell light beam in conjunction with electro-magnetic-mechanical relays, with or without valve amplifiers, opens yet another field of application. It is quite impossible even to begin naming things which can be controlled in this section, because the manufacturing specialists claim they are able to devise robot arrangements for appliances which previously necessitated some form of manual operation. It is interesting to observe that so far such ingenuity has been confined to scientific investigations in laboratories.

Although relays in relation to radio reception cannot solve as many problems of

control as in industry, yet they undoubtedly offer valuable scope for investigation in the case of cripples, hospitals, hotels and



The Bulgin relay for use as a remote control.

for those who are loath to leave their fireside armchairs.

For the benefit of interested readers, we append a list of leading relay makers:—

- Automatic Electric Co., Ltd., Strowger Works, Liverpool, 7.
- The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.
- Siemens Bros. & Co., Ltd., Relay Automatic Telephone Section, 38, Upper Thames St., London, E.C.4.
- Telephone Manufacturing Co., Ltd., Hollingsworth Works, West Dulwich, London, S.E.21.
- Gent & Co., Ltd., Faraday Works, Leicester.
- Standard Telephones & Cables, Ltd., North Woolwich London, E.16.
- A. F. Bulgin & Co., Ltd., Abbey Road, Barking, Essex (radio type).
- Radio Furniture & Fittings, Ltd., 106, Victoria St., London, S.W.1 (radio type).
- W. H. Sternefeld, 178, Gloucester Terrace, London, W.2 (radio type).
- British Thomson Houston Co., Ltd., Rugby, England.

AS many short-wave listeners are interested in picking up

ship-shore transmissions and *vice versa*, a few details regarding the channels used by, say, the new French liner *Normandie* (call-letters: FNSK) may prove useful.

As a rule, when within relatively a short distance from either her home port, Le Havre (France), or the English coast, communication is established on 65.72 metres (4,565 kc/s), the opposite number in Paris (TY12) working on 71.68 metres (4,185 kc/s). If Rugby GBC is required, the *Normandie* calls on 67.72 metres (4,430 kc/s), the English station replying on 60.30 metres (4,975 kc/s). Later, during the early evening hours, the ship uses a lower channel—namely, 33.19 metres. When at a greater distance, say, in mid-Atlantic, the shore transmitter utilises a wavelength of 24.35 metres (12,330 kc/s), and the *Normandie*, 22.70 metres (13,215 kc/s). Possibly other channels may be tested out at various times for radio telephony, but the ones given are those which were adopted on her first trip.

Signals from the CSL 500-watt short-wave transmitter of the Portuguese National Broadcasting Station at Lisbon can be fairly well heard on most nights on 48.78 metres (6,150 kc/s) between B.S.T. 19.00 and 23.00; there is also a broadcast between midday and 13.30, but this does not appear to be a regular feature. As a rule, the medium-wave programme is relayed, and in almost every instance the writer has noticed that announcements are given out by a woman. In connection with the planned development of the Portuguese network, a 20-kilowatt short-wave station is to be installed at Barcarena, at a cost of some twenty thousand pounds, in order that Portugal may establish a link with its colonies overseas as well as with its nationals in Brazil and other districts in the North and South American continents.

VE9HX, Halifax, on 49.1 metres (6,110 kc/s) would seem this year to have taken over the duties formerly carried out by the N.B.C. stations, inasmuch as every Sunday morning, between B.S.T. 04.00-06.00, the studio broadcasts urgent messages and even complete letters to trappers in the North-West Territories of Canada from their relatives in less rigorous climes. VE9HX comes on the air daily at B.S.T. 22.00 with the Canadian National Song (*O Canada*) as an opening signal.

Just above the Canadian station you may find W9XAA, on 49.34 metres (6,080 kc/s), which, owned by the Chicago Federation of Labour, relays programmes from WCFL, Chicago, a medium-waver in the N.B.C. Blue Network. The short-waver

## LEAVES FROM A SHORT-WAVE LOG

has recently installed a new aerial which has been made directional to Europe, and in consequence is anxious to learn how the transmissions are being heard on this side of the Atlantic. Reports may be sent to W9XAA, American Furniture Mart (20th Floor), 666, Lake Shore Drive, Chicago (Ill.). Broadcasts are carried out between B.S.T. 21.00 and 06.00.

I learn that the Westinghouse Electric and Manufacturing Company, in order to test the possibilities of ultra-short waves for television transmission and so on, is now operating three 50-watt stations at, respectively, Philadelphia, Pittsburgh, and Boston. These experimental transmitters relay the programmes of KYW, Philadelphia, KDKA, Pittsburgh, and WBZ, Boston, on 5.4 metres, or 55,500 kilocycles, and reports from listeners are desired.

YV6RV, Valencia (Venezuela), which has been a "three star" South American for some months and is now working on 46.01 metres (6,520 kc/s), possesses a regular daily schedule of two series of broadcasts—namely, from B.S.T. 17.30 to 18.30, and from 23.30 to 03.30. It is the latter which has been picked up so regularly. In the call, reference is made to two channels, 6,520 kilocycles and 1,350 kilocycles, the latter being the frequency used by the broadcasting band station of which the programmes are relayed.

It is reported that experimental short-wave transmissions are being carried out by Captain A. W. Stevens, one of the two adventurers connected with the forthcoming U.S.A. Army National Geographic Stratosphere Ascent. The site of the transmitter is Rapid City, South Dakota, from which the flight is to be made. The wavelength utilised is 23 metres (13,500 kilocycles).

TGX, Guatemala City, which has been reported at times on various wavelengths, has now been found regularly transmitting for some days on 52.45 metres (5,720 kc/s) between B.S.T. 01.30 and 03.00. Unfortunately, in its immediate neighbourhood—only 5 kilocycles away—OXL, Skamlebaek (Denmark), a 20-kilowatt (52.40 metres), works intermittently throughout the night and frequently swamps the South American signals.

Considerable activity prevails in Italian official wireless circles in respect of the development of the short-wave network, and the T2RO transmitters are being brought into line to supply a world service much in the same way as Zeesen and Daventry.

At present for these broadcasts, Italy is using 5-and 20-kilowatt transmitters on the following channels: 25.4 metres (11,811 kc/s); 31.13 metres (9,635 kc/s); 31.25 metres (9,600 kc/s); 42.98 metres (6,980 kc/s), and 49.30 metres (6,085 kc/s). The present schedule of broadcasts, which is still in a skeleton stage, is as follows: for the Far East (including Japan) (25.4 metres), from B.S.T. 14.15-15.15 daily; for South America (31.13 metres), B.S.T. 00.45-02.15, Wednesday, Friday, and Sunday; for Canada and the U.S.A. (31.13 metres or 31.25 metres), B.S.T. 23.00-00.30, Monday, Wednesday, and Friday; for North Africa, daily (31.13 metres), B.S.T. 13.15-14.00; and, irregularly, for North America (49.3 metres) after midnight.

Tests are also being made with Tripoli on 42.98 metres (6,980 kc/s), and this is the channel which, no doubt, will be used for the daily service. ICK, Tripoli, has been using 51.5 metres (5,825 kc/s), 31.71 metres (9,460 kc/s), and 29.30 metres (10,240 kc/s). As regards the Daventry Empire service, the B.B.C. has brought GSL into being, following a series of tests; it is on 49.1 metres (6,110 kc/s), and may be heard between B.S.T. 20.30-22.00 (Transmission 4).

Items of Interest from U.S.A.

In the United States, two items of news are of interest to us. The first concerns W8XK, the short-wave transmitter of KDKA, East Pittsburgh, which now advertises its summer time-table as under: from B.S.T. 13.00-01.15 (19.72 metres, 15,210 kc/s); 01.15-04.00 (25.27 metres, 11,870 kc/s), and 04.00-07.00 (48.86 metres, 6,140 kc/s). The 13.93-metre (21,540 kc/s) channel is now only being used for experimental purposes. W2XHI, the new short-wave transmitter for WOR, the 50-kilowatt Newark (New Jersey) broadcast band transmitter, and which it had been hoped would be launched on the ether during the summer, will not be ready before November. It will be an asset for British listeners, as through this channel we shall be able to hear other programmes than those usually picked up from the N.B.C. or C.B.S. networks.

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CUTTING THE COST

# BEGINNER'S SUPPLEMENT

How the Constructor Can Make Several Economies Without Sacrificing Efficiency.

**R**ADIO as a hobby is, of course, unequalled, and like other hobbies demands a certain amount of monetary expenditure which is very moderate considering the amusement, instruction and entertainment obtained. It may, however, unless wisely planned, overstep reasonable bounds, and a few suggestions and hints whereby expense, particularly of the wasteful character, may be avoided will be welcomed by many readers.

Expenditure on radio may be divided into three sections, first, non-recurring capital expenditure; second, the cost

As for instruments, one good milliammeter reading to 2.0 mA will suffice, the constructor finding much interest and instruction in designing a combination testing instrument with five or six useful ranges in volts and milliamps, by means of line resistances and multiplying shunts, as has been described in previous issues.

### Useful Hints

Aerial and earth might also be considered as a primary capital expenditure and here, too, it pays to erect the most efficient installation at the outset. Tar the bottoms of aerial poles before sinking them in the ground, to avoid rot and the cost of renewal; use wire halliards for similar reasons. It is also a good plan to put in all the extension wiring at one time, providing alternative aerial and earth points wherever they are likely to be useful, and also such speaker extensions as may be considered necessary.

The economy here lies in the fact that unless some such provision is made, it will be necessary to run temporary leads whenever occasion arises for rigging up apparatus in other parts of the house, and it is astonishing what a large quantity of flex can be wasted in this way. Theoretically there should be no waste in using temporary leads, but the general experience is that if twenty yards of flex are paid out for some temporary job, it seldom goes back into stock in really serviceable condition.

Turning now to the materials and components for the real constructional work, the chief expenditure is, of course, on valves, and the principal components such as coils and variable condensers, transformers and speakers.

### Standardising

It is in connection with components and materials that quite useful economies may be made—economies which are small in themselves but which mount up to a surprisingly high figure in the course of a season. Take the matter of terminals and other connectors. Often a set is intended for continuous service, and once connected to its batteries or power supply unit is seldom disconnected. Under these conditions, therefore, it is good economy to fit permanent connecting leads to the set for H.T., L.T., and aerial and earth. They may be soldered to the most

suitable spots, and a turn of wire taken round some fixed portion of the set to avoid mechanical strain on the soldered joint. Spades, or a washer soldered to the end of the lead, will provide good connections to the L.T. battery and, of course, good wander plugs for the H.T. battery. Aerial and earth wires may terminate in plugs to fit aerial and earth sockets on a small ebonite panel mounted on the wall, window frame or elsewhere near the set.

This raises the general question of plugs and sockets, and here it is suggested that one standard size of socket be adopted for use throughout the installation. This means that only two sizes of plugs will be required—the ordinary battery wander plug and the larger plug for use for aerial, earth, speaker and all other

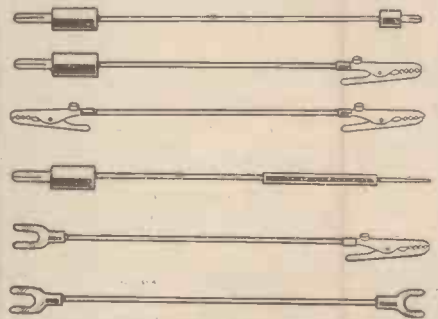


Fig. 2.—Handy test-leads and shorting leads save wasteful use of flex and facilitate the work.

removable connections. One of the chief advantages of this arrangement is the economy in the matter of leads. During the course of experimenting, quite a large number of more or less temporary connections have to be made, and usually odd pieces of flex are used with the result that large lengths of flex are continually being cut, short ends wasted, and most of the stock rapidly becoming unserviceable. By using standard plug connections and either small spade tags or crocodile clips, in conjunction with handy lengths of good quality flex, all this waste can be avoided and the risks of bad connections and mistakes eliminated.

On one constructor's bench which I saw recently was a splendid collection of temporary leads. Three standard lengths were provided—24in., 12in. and 6in., fitted with the following combinations of connector; one pair of each size with crocodile clips soldered at each end; one pair of each length with one crocodile clip and one wander plug; one pair of 24in. and one pair of 12in. leads with wander plugs at one end and large plugs fitting all testing instruments at the other end. Then there were a pair of 2ft.

(Continued overleaf)

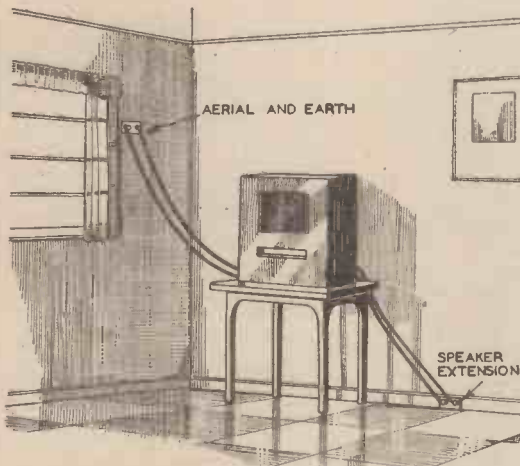


Fig. 1.—All aerial, earth, speaker, and instrument plugs should be of the same size so as to economise in leads.

of constructional material; and third, running expenses, and in each category a saving might be effected without endangering either the efficiency of the apparatus used or constructed, and without sacrificing interest.

### First Considerations

To commence with non-recurring initial expenditure, this comprises the provision of tools and testing instruments. The only point to be made here is that it is much more satisfactory, and cheaper in the long run, to purchase a small selection of good quality equipment than an apparently more comprehensive kit of inexpensive and poor quality tools and instruments. Several articles on tools and instruments have been published recently, so it will suffice to state that good work can be done with a kit comprising three assorted screwdrivers, a couple of pairs of pliers, a soldering outfit with an electrically-heated bit, a few files, a few simple wood-working tools, and a small hand drill.

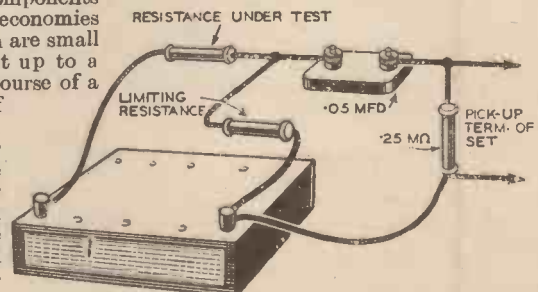


Fig. 3.—Connections for a "noise test" on resistances, volume controls, transformer windings, etc.

(Continued from previous page)

leads with large plugs at one end and test prods at the other, and several "shorting links," 6ins. long, with small spade tags soldered to each end, and others with one spade tag and one crocodile clip. I was informed that two-shillingsworth of thick rubber covered flex, a similar expenditure on crocodile clips, a handful of plugs and tags from stock, and a soldering iron, provided this very neat and useful outfit which has saved many times its cost as well as rendering testing, experimental hook-ups and temporary connections quick, easy and safe.

#### A "Spares" Box

The basis of much economy is a good "spares" box in which all sorts of odds and ends, such as pieces of metal and ebonite, bolts, nuts and screws and small components are stored against possible requirements. It is extraordinary how many useful small parts can be extemporised from this box if one has a little ingenuity and imagination. Old valve bases and valve holders make excellent

multi-connection plugs. Split circuit adaptors can be constructed out of the same material; inexpensive valve-holders of the "chassis mounting" type can be converted into baseboard holders by using 1½ in. wood screws threaded through short lengths of ebonite tube, or even the discarded tops of old wander plugs.

One section of the junk box should be devoted to odd lengths of connecting wire—anything over 6in. is worth saving, and another for insulated sleeving—here anything over 1in. is of value. It is best to have separate tins or boxes for such things as small fixed condensers, resistors and other odd components. Do not, however, make the fatal mistake of putting into your stock anything which is not really serviceable.

#### Running Costs

We now come to the question of running costs, and here no very great economies can be made. High and low tension current is a matter of design, and any attempt at current reduction below normal

values is usually attended by poor performance. But equipment may be preserved against undue maintenance costs, and in this connection regular and proper charging of accumulators, regular renewal of grid bias batteries, cleanliness inside the set and careful handling of all apparatus are of the utmost importance. In the last mentioned connection, "make haste slowly" is an excellent motto. Many good components have been ruined because constructors in a hurry have used undue force on terminals, or attempted crude adjustments with spanner or pliers *in situ* whereas, by removing the component and carrying out the operation patiently and with the correct tools all would be well!

Particular care should be taken when soldering—you may easily loosen an internal connection if the iron stays too long at one spot—and remove all sticky residues of flux which would otherwise set up corrosion. Finally, safeguard your valves with fuses; never probe into the interior of a set when the batteries or mains are connected, and have a final look over before switching on again.

**R**EVERTING to the built-in speaker, it is essential that the sub-baffle, and also the cabinet, be made of good thick timber, wood ½ in. thick being suitable for this purpose, while ¾ in. or even 1 in. is better still. The same remarks apply, of course, to baffles. Improvements can also be made by lining the cabinet with thick felt in order to avoid drummy reverberation. A good solid radio-gram of reasonable size offers no difficulty whatsoever and, if properly treated, is quite as efficient as a large baffle for all normal purposes.

#### Positioning

Coming to the question of locating the speaker for the best acoustic effect, it must be remembered that practically all speakers have directional properties to a certain degree, that is to say, a zone immediately in front of the speaker receives a greater proportion of the sound than the space on either side. A large baffle minimises this effect, but even so, it is usually better to place the speaker diagonally across one corner of a room, or in the middle of one side.

It is well worth experimenting with

## CHOOSING AND USING YOUR LOUD-SPEAKER

(Concluded from page 531, July 27th issue)

alternative positions of the speaker, ultimately deciding upon the location which gives the most satisfactory effect. It is in this connection that the separate speaker scores over the built-in instrument, for it often happens that the ideal spot for the speaker is far from being the best for the receiver itself. By separating the two units, each can be placed to the best advantage. If a separate speaker is not permissible, a compromise must be effected, and a little experiment will enable the most generally satisfactory arrangement to be selected.

If the set is of a very sensitive type, employing a mains aerial or self-contained frame, the problem is greatly simplified, but if an external aerial must be used, it should be remembered that a reasonable extension of the aerial and earth wires may be made as long as they are not too lengthy or tortuous, and that they are kept well away from walls and electric

light wiring. Another alternative is to install a suitable H.F. transformer at the aerial, a twin shielded transmission line from this transformer to the set, and a matching transformer to connect the line to the aerial and earth terminals of the receiver. The set may then

be placed in the position most suitable for the speaker, the length of the transmission line, and its route, being immaterial.

Opinions seem to differ very greatly as to the height at which the speaker should be installed, but generally speaking, knee level or a little higher, as usually found in radio-grams, gives very satisfying results.

One other point remains to be mentioned, and that is the question of using two or more speakers of similar characteristics in different parts of the room, in order to achieve a so-called "stereophonic" effect. Very interesting results can be obtained in this way, and when carefully placed most pleasing and natural effects can be achieved. But it requires a considerable amount of experiment before the best arrangement is hit upon, as mutual interferences, unwanted echoes, and all sorts of queer effects sometimes occur.

#### Interesting Miscellany from Midland Regional

**T**HE week before August Bank Holiday is particularly interesting on the dramatic side of the Midland programme. It includes two feature plays, one with music; a talk on the first-night impressions of the Malvern Festival; and closes with a relay from Malvern on August 3rd of the whole of Reginald Arkell's version of "1066 and All That," produced by Herbert M. Prentice. The second act of "1066 and All That" was broadcast in the Midland programme during the winter.

#### An Ashley Sterne Revue

**E**LSIE and Doris Waters will appear at Broadcasting House on August 12th and 13th in an Ashley Sterne Revue. Charles Brewer is producing these two great comedienne in what is described as a "Zooliday." Gert and Daisy are going to the Zoo, and microphones will eavesdrop

## PROGRAMME NOTES

on some of the comments that these two bright sparks make about the animals. They will meet the elephants and the gorillas and the penguins, and for their own edification a quartet of "keepers" has been arranged and will sing soulful ditties of their work. Charles Brewer feels that listeners will be amused.

#### Midland Bank Holiday Programme

**I**N the Bank Holiday programme the principal Midland items are a relay of a concert by the Band of the 2nd Shropshire Light Infantry, performing at Leamington Spa; and a review of Bank Holiday sport by Henry Grierson of Northampton. The

band of the Shropshire Light Infantry last broadcast with the bugles in a special performance from the Studio in March. The Battalion has this year returned to its home counties—Shropshire and Herefordshire—after an absence of 117 years. The Bandmaster, who will conduct, is Mr. F. W. Dennett, and he composed the "Shrewsbury Troop" which, with the "Raglan Troop," was given in the Studio broadcast.

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# RADIO CLUBS AND SOCIETIES

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

## SHORT-WAVE RADIO AND TELEVISION SOCIETY (THORNTON HEATH)

THE weekly meeting of this society was held at St. Paul's Hall, Norfolk Road, on Tuesday, 16th inst., under the chairmanship of Mr. R. E. Dabbs. Mr. Hubbard, G5OX, gave a talk on five-metre reception and transmission. The most interesting of amateur bands, he stated, had proved to be 56 mc, since even now there was a great deal to be learnt concerning the mode of propagation of these waves. In describing his own 5-metre transmitter, which consisted of a modulated push-pull oscillator, Mr. Hubbard pointed out that the great thing to aim at on these wavelengths was frequency stability. Until a fairly high degree of frequency stability in the transmitter had been attained, a superheterodyne receiver would be of little use for the reception of it. A super-regenerative one-valve receiver constructed by Mr. Hubbard was shown to members, and gave a very good idea of the compactness of receivers for this band. Although it gave good headphone-strength signals, it was little more than two and a half inches high and about six inches long, the tallest part of the set being the valve.

Details of future meetings of the society can be obtained from the Hon. Secretary, Mr. J. T. WEBBER, 368, Brigstock Road, Thornton Heath.

## ANGLO-AMERICAN AND TELEVISION SOCIETY

AL WILLIAMS and his Anglo-American Radio and Television Society Dance Orchestra will be heard from Radio-Normandie (by courtesy of the International Broadcasting Co., Ltd., of London) on September 6th, from midnight to 12.30 a.m. September 7th.

Lady readers will be interested to know that a Ladies Section of the London Branch of the society has been formed. Full particulars may be obtained from Mr. Ernest Norman, 20, Varley Road, West Ham, London, E.16.

The society is organising monthly dances (non-profit) for the benefit of members, and full particulars can be had from Mr. Leslie W. Orton, at "Kings-thorpe," Willowbank, Uxbridge.

## TOTTENHAM SHORT-WAVE CLUB

THE above club recently held a very interesting meeting at which several of the local transmitters were present. Many interesting points were raised, one of them being over the QSL problem, many arguments for and against being put forward by both sides. The transmitters and the receivers gained many new outlooks on the subject. The club holds meetings regularly every week, and further particulars can be obtained by writing to Mr. L. Woodhouse, Hon. Secretary, 57, Pembury Road, Bruce Grove, Tottenham, N.17.

## INTERNATIONAL SHORT-WAVE CLUB (LONDON)

A VERY interesting evening was afforded members of the London Chapter at the meeting held on Friday, July 19th, when Mr. E. G. Nurse gave a talk on Reiss and other Microphones. Mr. Nurse began by describing the types of microphones used in the early days, afterwards describing the different microphones in use at the present day. He also showed how a very efficient microphone could be made up by the experimenter. Mr. Nurse's talk concluded with a demonstration using several different types of microphones. A. E. Bear, Secretary, 10, St. Mary's Place, Rotherhithe, London, S.E.16.

## GRAHAMSTOWN RADIO STATION

THE station is situated near Dassie Krantz on the Mountain Drive, to the south of the City of Grahamstown, at an altitude of 2,400 feet in East Longitude 26 degrees 30.8 minutes and South Latitude 33 degrees 19.8 minutes.

The masts are of the insulated and stay-supported type with a height of 330 feet and the aerial is of the quarter-wave T type. The type of installation is Marconi P.A. 18 B with a frequency of 560 kilocycles or a wave-length of 536 metres. The aerial output is 10 k.w. unmodulated carrier.

The working-hours are the same as those at Johannesburg, and the programme is at present a relay by land-line via Bloemfontein of the Johannesburg programme, but a studio has been completed at the City Hall and an independent local programme is being broadcast occasionally.

Reports of excellent reception have been received from all over the Union, South-West Africa and North and South Rhodesia.

### SPECIAL NOTE

Will querists please comply with our rules when sending their queries? Postal replies are only sent when stamped addressed envelopes are enclosed.

## WHEN TO USE PUSH-PULL

AS the advantages of push-pull amplification appear to be so great and so numerous, the constructor often wonders why it is not used to an even greater extent than it is. There are several reasons, the most important of which concerns the cost of the necessary components. A special push-pull transformer and two output valves certainly cost more than an ordinary L.F. transformer and a single valve, even if the latter has a greater undistorted output than the valves used in the push-pull stage, but there are other points to consider. In the first place it is not necessary to have such complete H.T. smoothing circuits when push-pull is used, due to the fact that the valves are out of phase and ripple (the cause of hum) in the two valves is cancelled out. In addition to this it must be remembered that the H.T. requirements of two valves having an output-wattage rating of, say, 1 watt each may very easily be less than the current consumption of a single valve giving twice the output.

Another point in favour of push-pull is that it can be used successfully when the available H.T. voltage is comparatively low, whereas a large power valve is often comparatively inefficient on voltages below 250 to 300.

In consequence of the above facts it can be concluded that push-pull is (in most cases) to be preferred when an output of more than about 500 milliwatts is required from a battery receiver, when more than 3 watts is required from a D.C. or universal receiver, or, in the case of an A.C. set, when more than 4 watts is required, and the H.T. current is limited—as it might be if an existing set were being modified with a view to increasing the undistorted output.

It is worth bearing in mind that the undistorted output from two valves in push-pull is greater than twice that of one of the valves used in an ordinary single-valve circuit, being equal to approximately  $2\frac{1}{2}$  times the latter figure. It is also well to remember that it is nearly always easier to obtain really good-quality reproduction from a push-pull stage than from a single-valve arrangement giving the same output, whilst the problem of mains hum rarely arises.

## MORE SUPERHET POINTERS

(Continued from page 548)

### Preventing Radio Breakthrough

In the circuit shown in Fig. 2 there is no means of preventing radio breakthrough, but it would be a simple matter to wire an on-off switch between the primary or secondary terminals of the I.F. transformer, and this switch may be ganged with that used for cutting out the second detector. A useful type of switch for this purpose, and one which may also be used in the circuit shown in Fig. 1, is the Bulgin baseboard-mounting Q.M.B. switch; there are various types in this range, and any number can be ganged together by means of a spindle which can be obtained from the makers.

### Tunable Instability

Turning to quite another aspect of the superheterodyne circuit, I would make reference to a form of trouble which is often experienced after building a superhet. This is a peculiar oscillation which occurs at certain parts of the tuning scale, although

the receiver is normally perfectly stable. On rotating the tuning scale, a point is reached at which a persistent and steady whistle or howl is heard; this is louder than that generally associated with second-channel interference, and gives the impression that the second detector is oscillating. In several cases this has been traced to what appears to be leakage of the signal or oscillator frequency into the H.T. circuit, but the exact cause of the trouble appears to be rather obscure. I have, however, been able to overcome it by including an ordinary "reaction" H.F. choke between the primary winding of the first I.F. transformer and H.T.+ . This extra component should certainly be tried if trouble of this nature is experienced.

## 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.

**N. B. (Woolwich).** The circuit could only be improved by using modern efficient components. Such details as decoupling, etc., might improve general working characteristics, but the circuit is quite sound as it stands.

**E. L. W. (Exeter).** There would be no objection to using the plug-in short-wave coils. Simply remove the existing coil and fit a base to accommodate the coils you intend to buy. The circuit itself will not require modification.

**A. S. G. (Perak).** We have no catalogue of the Silver Souvenir. The battery model of this receiver was described in PRACTICAL AND AMATEUR WIRELESS dated April 13th and 20th, 1935, and the A.C. model in May 11th and 18th, 1935. The back issues are obtainable for 4d. each. Details of the valves are obtainable from Messrs. A. C. Cossor, Ltd., Cossor Works, High-bury Grove, N.5. We do not publish lists of second-hand sets. In any case, English receivers would not be suitable for your part of the world.

**G. B. C. (Grantham).** Your troubles are not due to the coil but to the circuit arrangement. The 100,000 ohm resistance in the anode circuit of the detector valve reduces the H.T. considerably, and you should connect this point to H.T. maximum; that is, join H.T. 2 and H.T. 1 together and plug into the highest socket on the battery. We think this will cure the trouble.

**F. N. (Darwen).** We would recommend the Leader Three or the Hall Mark Three, blueprints of both of which may be obtained for 1/-.

**K. H. T. (S.E.2).** The ordinary speakers certainly may be used in addition to your present one, and that is one of the valuable features of the adjustable tapping, as it enables the total load to be matched to the output valve. The Class B mains unit may be used for an ordinary set without alteration.

**F. H. N. (Bedminster).** We regret that we have no blueprints of a receiver using the tuner in question. The makers may be able to supply such a print. They are British General Mfg. Co., Ltd., Brockley Works, Brockley, London, S.E.4.

**H. T. (Richmond).** The panel should be of metal and connected to earth, with all components mounted thereon effectively insulated, if they are not earthed in the circuit. Alternatively, an earthed screen may be fitted behind the reaction condenser, and the spindle of this condenser joined to the earth side of the reaction winding. You do not give a circuit, so that we cannot give more detailed advice.

**W. E. H. (Stockwell).** We cannot recommend a blueprint without knowing just what parts you have got. It is always preferable to build our receivers from the specified parts, especially if you are new to the hobby and cannot efficiently modify a circuit.

**N. R. N. (Cheltenham).** A converter can be obtained, and you should write to the Electro Dynamic Construction Co., Ltd., Devonshire Grove, London, S.E.15, for details of their products.

**N. R. (Blackwater).** The Selectone receiver used the coil in question. A back number giving the constructional details and pictorial plan may be obtained from this office. The blueprint is No. PW10, and it was described in PRACTICAL WIRELESS dated January 14th, 1933.

**S. G. (Gwmfelfach).** We cannot recommend any special make, but would suggest that your local dealer show you various types, and you can then make your selection according to price, etc. The various advertisements in our pages should help you.

**E. B. (Clapton).** The pick-up leads should be passed through metallic braiding and the braiding jointed to earth. Special screening leads of this type should be obtainable from your local radio dealer. The pick-up connections are quite correct. It would appear that the receiver is in need of a thorough overhaul. If you cannot do this you should send it back to the makers for their attention.



# The PRACTICAL AND AMATEUR WIRELESS

# Blueprint Service

These blueprints are full-size. Copies of appropriate issues of "Practical Wireless," "Practical Mechanics," "Amateur Wireless" and of "Wireless Magazine" containing descriptions of these sets can in most cases be obtained at 4d., 7½d. and 1s. 3d. each, respectively, post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets, "A.W." refer to "Amateur Wireless" sets, and "W.M." to "Wireless Magazine" sets. Send, preferably, a postal order (stamps over sixpence unacceptable) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS		No. of B/prints
Blueprints, 1s. each.	Date of Issue.	
Long-Range Express Three	—	PW2
Mains Express Three	8.10.32	PW3
Sonotone Four	15.10.32	PW4
Bijou Three	29.10.32	PW5
Argus Three	12.11.32	PW6
Empire Short-Wave Three	3.12.32	PW7
Solo Knob Three	10.12.32	PW8
Midget Two	17.12.32	PW9
Selectone Battery Three	14.1.33	PW10
Fury Four	—	PW11
Featherweight Portable Four	6.5.33	PW12
Q.P.P. Three-Four	4.3.33	PW13
Alpha Q.P.P. Three	25.3.33	PW14
Ferrocart Q.P.P. Hi-Mag. Three	25.3.33	PW15
Supersonic Six	8.4.33	PW16
Beta Universal Four	15.4.33	PW17
A.C. Twin	22.4.33	PW18
Selectone A.C. Radiogram Two	20.4.33	PW19
A.C. Fury Four	25.2.33	PW20
Radiopax Class B Four	27.5.33	PW21
Three-Valve Push-Pull Detector Set	—	PW22
Double Diode Triode Three	10.6.33	PW23
Three-Star Nicore	24.6.33	PW24
D.C. Ace	15.7.33	PW25
Superset	19.8.33	PW26
Auto-B Three	19.8.33	PW27
All-Wave Two	19.8.33	PW28
A.C. Three	16.9.33	PW29
Premier Super	23.9.33	PW30
Experimenter's Short-Wave Three	23.9.33	PW30A
A.C.-D.C. Two	7.10.33	PW31
All-Wave Unipen	14.10.33	PW31A
F.J.C. 3-valve A.V.C. (Transfer Print)	—	PW32
Luxus A.C. Superhet	14.10.33	PW33
A.C. Quadpak	2.12.33	PW34
Sixty-Shilling Three	2.12.33	PW34A
Nucleon Class B. Four	6.1.34	PW34B
Fury Four Super	27.1.34	PW34C
A.C. Fury Four Super	10.2.34	PW34D
Leader Three	10.3.34	PW35
D.C. Premier	31.3.34	PW35B
A.C. Leader	7.4.34	PW35C
Atom Lightweight Portable Ubique	2.6.34	PW36
Four-Range Super-Mag. Two	28.7.34	PW36A
Summit Three	11.8.34	PW36B
Armadillo Mains Three	18.8.34	PW37
Midget Short-Wave Two	18.8.34	PW38
All-Pentode Three	15.9.34	PW38A
£5 Superhet Three	22.9.34	PW39
A.C. £5 Superhet Three	—	PW40
D.C. £5 Superhet Three	24.11.34	PW43
Hall-Mark Three	1.12.34	PW42
F.J. Camm's Universal £5 Superhet	8.12.34	PW41
A.C. Hall-Mark	15.12.34	PW44
Battery Hall-Mark 4	20.1.35	PW45
Universal Hall-Mark	2.2.35	PW46
Hall-Mark Cadet	9.2.35	PW47
Short-Wave Converter-Adapter	23.3.35	PW48
F. J. Camm's Silver Souvenir (All-Wave Three)	23.2.35	PW48A
F. J. Camm's A.C. All-Wave Silver Souvenir Three	13.4.35	PW49
Genet Midget Three	11.5.35	PW50
Cameo Midget Three	June '35	PM1
F. J. Camm's 2-valve Superhet	8.6.35	PW51
AMATEUR WIRELESS AND WIRELESS MAGAZINE. CRYSTAL SETS.	13.7.35	PW52
Blueprints, 6d. each.	—	AW427
Four-station Crystal Set	—	AW444
1934 Crystal Set	4.8.34	AW444
150-mile Crystal Set	—	AW450
STRAIGHT SETS. Battery Operated.		
One-valvers: Blueprints, 1s. each.	—	AW344
B.B.C. One-valver	—	AW387
B.B.C. Special One-valver	—	AW449
Twenty-station Loud-speaker One-valver (Class B)	—	AW449
Two-valvers: Blueprints, 1s. each.	—	AW388
Melody Ranger Two (D, Trans)	—	AW392
Full-volume Two (SG-Det, Pen)	17.6.33	AW395
Iron-core Two (D, Trans)	—	AW396
Iron-core Two (D, Q.P.P.)	12.8.33	AW396
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)	—	AW338A
Lucerne Minor (D, Pen)	—	AW426
Family Two (D, Trans)	—	WM278
Three-valvers: Blueprints, 1s. each.	—	AW343
8 Radiogram (D, RC, Trans)	—	AW343

P.T.P. Three (Pentode-Triode-Pentode)	June '35	WM389
New Regional Three (D, RC, Trans)	25.6.32	AW349
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-Built Coil Three (SG, D, Trans)	14.10.33	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher, Chassis Model (SG, D, Pen)	3.2.34	AW419
Lucerne Ranger (SG, D, Trans)	—	AW422
Cosor Melody Maker with Lucerne Coils	—	AW423
P.W.H. Mascot with Lucerne Coils (D, RC, Trans)	17.3.34	AW337A
Mullard Master Three with Lucerne Coils	—	AW424
Pentaquester (HF Pen, D, Pen)	14.4.34	AW431
£5 5s. Three: De-luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
All Britain Three (HF Pen, D, Pen) "Wireless League" Three (HF Pen, D, Pen)	3.1.34	AW451
Transportable Three (SG, D, Pen) Multi-Mag Three (D, 2 Trans)	—	WM271
Fury Harris Radiogram (HF, D, Trans)	Aug. '32	WM294
£6 6s. Radiogram (D, RC, Trans)	Apr. '33	WM318
Simple-Tune Three (SG, D, Pen)	June '33	WM327
Tyers Iron-core Three (SG, D, Pen)	July '33	WM330
C-B Three (D, LF, Class B)	—	WM333
Economy-pentode Three (SG, D, Pen)	Oct. '33	WM337
All-wave Three (D, 2LF)	Jan. '34	WM348
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans)	Mar. '34	WM354
Iron-core Band-pass Three (SG, D, QP21)	June '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	Oct. '34	WM371
Graduating to a Low-frequency Stage (D, 2LF)	Jan. '35	WM378
Four-valvers: Blueprints, 1s. 6d. each.		
65/4 Four (SG, D, RC, Trans)	—	AW370
"A.W." Ideal Four (2SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2SG, D, Pen)	—	AW421
Crusaders' A.V.C. 4 (2 HF, D, QP21) and Class-B Outputs for above: blueprints 6d. each	18.8.34	AW446
Quadradyne (2SG, D, Pen)	25.3.34	AW445A
Calibrator (SG, D, RC, Trans)	Oct. '32	WM273
Table Quad (SG, D, RC, Trans)	—	WM300
Calibrator de Luxe (SG, D, RC, Trans)	Apr. '33	WM316
Self-contained Four (SG, D, LF, Class-B)	Aug. '33	WM331
Lucerne-Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2LF)	Feb. '35	WM381
The H.K. Four	Mar. '35	WM384
Five-valvers: Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans)	May '33	WM320
New Class-B Five (2SG, D, LF, Class-B)	Nov. '33	WM340
Class-B Quadradyne (2SG, D, LF, Class-B)	Dec. '33	WM344
1935 Super Five (Battery Superhet)	Jan. '35	WM379
Mains Operated.		
Two-valvers: Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM280
Three-valvers: Blueprints, 1s. each.		
Home-lover's New All-electric Three (SG, D, Trans) A.C.	25.3.33	AW383

S.G. Three (SG, D, Pen) A.C.	3.6.33	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW390
A.C. Pentaquester (HF, Pen, D, Pen) A.C.	23.6.34	AW439
D.C. Calibrator (SG, D, Push-pull Pen) D.C.	July '33	WM328
Simplicity A.C. Radiogram (SG, D, Pen) A.C.	Oct. '33	WM333
Six-guinea A.C./D.C. Three (HF Pen, D, Trans) A.C./D.C.	July '34	WM364
Mantovani A.C. Three (HF Pen, D, Pen) A.C.	Nov. '34	WM374
Four-valvers: Blueprints, 1s. 6d. each.		
A.C. Melody Ranger (SG, DC, RC, Trans) A.C.	—	AW380
A.C./D.C. Straight A.V.C.4 (2 HF, D, Pen) A.C./D.C.	8.9.34	AW446
A.C. Quadradyne (2SG, D, Trans) A.C.	—	WM379
All Metal Four (2SG, D, Pen)	July '33	WM329
"W.M." A.C./D.C. Super Four	Feb. '35	WM382
Harris Jubilee Radiogram	May '35	WM386
SUPERHETS.		
Battery Sets: Blueprints, 1s. 6d. each.		
1934 Century Super	9.12.33	AW413
Super Senior	—	WM256
1932 Super 60	—	WM269
Q.P.P. Super 60	Apr. '33	WM319
"W.M." Stenode	Oct. '34	WM373
Modern Super Senior	Nov. '34	WM375
Mains Sets: Blueprints, 1s. 6d. each.		
1934 A.C. Century Super, A.C.	10.3.34	AW425
1932 A.C. Super 60, A.C.	—	WM272
Seventy-seven Super, A.C.	—	WM305
"W.M." D.C. Super, D.C.	May '33	WM821
Merrymaker Super, A.C.	Dec. '33	WM345
Heptode Super Three, A.C.	May '34	WM359
"W.M." Radiogram Super, A.C.	July '34	WM366
"W.M." Stenode, A.C.	Sep. '34	WM370
1935 A.C. Stenode	Apr. '35	WM385
PORTABLES.		
Four-valvers: Blueprints, 1s. 6d. each.		
General-purpose Portable (SG, D, RC, Trans)	—	AW351
Midget Class-B Portable (SG, D, LF, Class B)	20.5.33	AW380
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Town and Country Four (SG, D, RC, Trans)	—	WM232
Two H.F. Portable (2 SG, D, QP21)	June '34	WM363
Tyers Portable (SG, D, 2 Trans)	Aug. '34	WM367
SHORT-WAVERS. Battery Operated.		
One-valvers: Blueprints, 1s. each.		
S.W. One-valve	—	AW320
S.W. One-valve for America	—	AW423
Roma Short-waver	10.11.34	AW452
Two-valvers: Blueprints, 1s. each.		
Home-made Coil Two (D, Pen)	14.7.34	AW440
Three-valvers: Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver	Jan. 19 '35	AW463
Short-wave Adapter	Dec. 1, '34	AW456
Superhet, Converter	Dec. 1, '34	AW467
The Carrier Short-waver	July '35	WM390
Four-valvers: Blueprints, 1s. 6d. each.		
"A.W." Short-wave World Beater (HF Pen, D, RC, Trans)	2.6.34	AW436
Empire Short-waver (SG, D, RC, Trans)	Mar. '33	WM318
Standard Four-valve Short-waver	Mar. '35	WM333
Mains Operated.		
Two-valvers: Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C.	10.11.34	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	Aug. '34	WM368
"W.M." Long-wave Converter	Jan. '35	WM380
Three-valvers: Blueprints, 1s. each.		
Emigrator (SG, D, Pen), A.C.	—	WM352
Four-valvers: Blueprints, 1s. 6d. each.		
Gold Coaster (SG, D, RC, Trans) A.C.	—	WM292
Gold Coaster (SG, D, RC, Trans) A.C.	Jan. '35	AW402
MISCELLANEOUS.		
Enthusiasts Power Amplifier (1/6 June '35)	—	WM387
Newstyle Short-wave Adapter (1/- June '35)	—	WM388

# Facts & Figures

## COMPONENTS TESTED IN OUR LABORATORY

### Modern Radio Showrooms

THE "His Master's Voice" retail showrooms in Oxford Street (London) are at present being completely reconstructed, and will be rebuilt to the design of Joseph Emberton, A.R.I.B.A., the well-known architect.

When completed in September next, it is believed that these showrooms will be the most modern of their kind in the world. In the architect's plans special arrangements have been made for built-in aerials and for the various rooms to be sound-proof. It will be possible to hear a large range of radio receivers, radio gramophones, and gramophones under ideal conditions. Arrangements are being made to provide at the main entrance a special quick service for record customers.

When finished, the outside of the premises will be one of the most modern, striking, yet dignified frontages in Oxford Street. Non-reflecting windows will make the inspection of instruments easy, whilst an elaborate scheme of Neon lighting will illuminate the facia of the building.

### Wearite Short-wave Coils

A NEW set of three special short-wave coils has been produced by Messrs. Wright and Weaire, and these are of the valve-base type designed to be readily interchangeable in an ordinary valve-holder, thus simplifying wiring and replacement. The coils are built on real low-loss principles, a moulded bakelite base carrying four pins arranged in the well-known valve-base pattern, and six round rods pass from the base to a similar shaped upper portion. The wire is wound over these spacing rods, thus producing what was at one time referred to as a "squirrel-cage coil." As the spacing supports are round in section, only a very small part is in actual contact with the wire and thus the coil is, to all intents and purposes, air-spaced, and losses are thereby reduced to a minimum. The windings consist of primary, secondary, and reaction, one end of the primary being taken to a terminal mounted on the top of the coil, and which facilitates a rapid change of aerial or anode connection to meet certain circumstances. The price of the coil is 3s. 6d., and it is available for three separate wave-bands: Type A for 13-28 metres; Type B for 25-50 metres, and Type C for 48-100 metres.

### New Oldham Accumulators

NO more excuses should exist for the deterioration of the L.T. battery now that actual indicators are being fitted to the cell. In the new Oldham cells, which will be seen for the first time at Olympia, a pivoted arm is being fitted inside the cell in a small section carrying three discs bearing the words "Full," "Low," and "Empty." When fully charged the arm will be level with the first-mentioned word, and as the cell becomes discharged the arm

turns and gradually passes down to the word "Empty," thus affording a ready indication of its condition. If taken to be charged as soon as the arm reaches a certain point, the life of the cell will be prolonged and much better service will be obtained from it. Obviously, as the device operates by virtue of the change in S.G. of the acid, it is not possible to fit it to those cells in which the electrolyte is of the jelly type.

### Bulgin London Showrooms

THE showrooms in London of the Bulgin Company have now been transferred to larger premises and will in future be found at 64, Holborn Viaduct, E.C.1. The old showrooms at Cursitor Street are being closed, and a complete range of all Bulgin products may be seen in the new premises. The new telephone number is CENTRAL 2751.

### B.T.S. Short-wave H.F. Choke

OF special interest is the S.W. choke developed by British Television Supplies. This is wound on a small steatite former less than half an inch in diameter and about 1½ in. long. The choke winding is divided into three sections, the centre portion taking the form of a solenoid winding in the centre of the former, and the remaining portion of the winding being divided into two equal parts wound at each end of the former and taking the form of wave-wound coils. Strong metal clamps at each end of the former are used to terminate the winding and these may be used for direct connection in the circuit or for soldering purposes. The overall dimensions are so small that it may be fitted into a receiver with little fear of interaction, and the choke is effective over a waveband from 10 to 200 metres. The price is 2s. 9d. For those who prefer the all-wave choke a special screened model is available, and is designed for use over a band from 10 to 2,000 metres. A multi-layer winding is employed in this model and is carried on a slotted former with a metal cover over all. Terminals are fitted to the top for connection, and the price is 4s. 6d.

### Baker's Selhurst Speakers

SOME interesting developments of these popular speakers have been announced. One of these developments takes the form of a bakelite diaphragm in place of the more usual paper or buckram material, and it is claimed that by the particular design a much better response is obtainable on speech, thus rendering the speaker especially applicable for "schools" use. A special high-note speaker, claimed to have a range from 3,000 to 18,000 cycles, is also to be introduced during the coming season, and this, together with a triple speaker, incorporating three separate units covering a response curve from 30 to 18,000 cycles, will do much to popularise "quality" reproduction.

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# LETTERS FROM READERS

The Editor does not necessarily agree with opinions expressed by his correspondents.



All letters must be accompanied by the name and address of the sender (not necessarily for publication).

## A "Local" Portable Wanted

SIR,—May I suggest a circuit for that excellent series of articles, "Circuits Readers Ask For"? The suggestion is for a "local" portable that will fetch in the local station at a reasonable volume and with good tone. The type of set I have in mind is a three-valver, with H.F. pentode det., L.F., and pentode output, or a four-valver H.F. pentode, det., L.F., and pentode, using a tuned H.F. stage and untuned detector. In other words, something that has only one tuning dial, is easy to construct, and which will give a reasonable performance. It must have a frame aerial, but need only cover one band (medium), as all the locals are on that waveband. This sort of set would be really useful as a week-end set or bedside portable.—D. G. R. (Streatham).

## Another Good S.W. Log

SIR,—I read with interest the excellent amateur logs included in your issue dated July 6th, and my log on 20 metres over the past few weeks may be of interest to other readers. All stations are on 'phones. In U.S.A.—W9CV Topeka, Kans., W9JHY Indianapolis, Ind., W9MGL St. Louis, Mo., W9BHT Canton, Ill., W9BPK Minneapolis, Minn., W8GLY Pittsburgh, Pa., W8AKU Pittsburgh, Pa., W8CYU Oban, N.Y., W5FJ Enid, Okla., W4AH Charlotte, N.C., W4CRE Franklin, Tenn., W4AGR Palm Beach, Fla., and many other W stations.

In Canada—VE1VC, VE2DX, VE2EE, VE1VR, and also VP6YB Barbadoes, VO1I, VO1G, Newfoundland, HI7G, Santa Domingo, and CO2WW, Havana, Cuba.

My receiver is an o-v-2, with an aerial 20ft. high and 60ft. long, and I find reception on 20 m. best after dark (at present from about 9.30 p.m. B.S.T.), in contrast to winter reception, when most distant amateurs were heard best from 12 noon to 6 p.m. G.M.T.—F. W. HENNIG (Broadwater, Worthing).

## Transmitting Data

SIR,—With regard to the letter by J. C. Johnson in the July 20th issue of PRACTICAL AND AMATEUR WIRELESS, I also would like to see transmitting data published; but why confine it to transmitting circuits only? Why not let us have plenty of articles on the theory of the circuits, operation, construction, and maintenance of a station. This would help many of us who want to obtain a transmitting licence.—J. T. PARKER (Broad way).

## No Acknowledgment from VUB

SIR,—With regard to the reception reports wanted by the Broadcasting Station VUB, I have sent them two reception reports, and they are the only station which did not answer my reports, so perhaps they are not receiving them. As I have sent reception reports to the following and received verification cards and acknowledgments, it seems rather doubtful to me if VUB is receiving them.

VK2ME Sydney, Australia, VK3ME Melbourne, Australia, W2XAF Schenectady, America, W1XAZ Springfield (Mass.), W3XAL Bound Brook (N.J.), W1XAL

Boston (Mass.), W8XK Pittsburgh, W3XAU Philadelphia (Pa.), W8XAL Cincinnati, RW59 Moscow, HVJ Vatican City, Italy, 2RO Rome, Italy, LKJ1 Jeloy, Norway, EAQ Madrid, Spain, HBL Radio-Nations, HBP Radio-Nations, Switzerland, CT1AA Lisbon, Portugal, and FVA Radio-Colonial, Paris. These were all received, with a few more stations nearer home, on my home-made 3-valve short-wave set, from February, 1934, to December, 1934.—GEORGE GREAVES (Rhydney).

## A Switching Peculiarity

SIR,—In reference to your explanation of J. H. B. (Nr. Chorley) regarding switching peculiarity in his Wireless League Three, I had the same experience with this set myself, but effected a temporary remedy by inserting a switch in one of the H.T. leads, and by switching the H.T. off first, the remaining switch can be used silently.

If the circuit of this set is studied it will be seen that there is a variable resistance controlling the volts to the auxiliary grid of the H.F.P. valve, this resistance being connected across the H.T. supply, one side going *via* the switch to negative. The object of the switch is to break the L.T. supply, and also disconnect the negative side of the resistance from the main negative lead.

It must be noted that this does not affect the H.T. supply to the valves, and when switching off, the disconnection of the negative side of the resistance causes a surge of current to the grid of the H.F.P. valve, this lasting for a second until the filaments cool off, which accounts for the rise in volume. If this explanation is not clear to readers possessing this set, they might like to try an experiment.

Disconnect the wire leading from the resistance to the switch while the set is working, when it will be found that there is a sudden burst of volume, though distorted owing to overloading, which is identical to that heard when switching off.—W. G. GOOCH (Lowestoft).

## S.W. Verifications

SIR,—As a reader of your excellent paper since the first issue, I have watched with keen interest the strides you have made towards the encouragement of short waves. In a recent issue there appears a letter from K. Dowker, regarding the closing of the Bombay stations if more reports are not forthcoming. This prompted me to write this letter, as I have been a short-wave enthusiast since 1926, but up to June, 1934, I had two verifications only. I was advised to join the International Short-wave Club; incidentally this advice came over the ether from EAQ Madrid. Within twelve months I have received nearly one hundred verifications from twenty-five countries, and have altogether logged over three hundred stations. Only through the help and valuable information contained in this club's magazine have I been able to compile such a log in so short a time. Most stations require reports, but their addresses are sometimes not easily understood, owing to language difficulties. The magazine mentioned contains station addresses, calls, interval signals, wavelengths, times of

transmissions and other information which aids the novice in identifying stations.—ERNEST J. LOGAN (Hertford).

## Television at Olympia?

SIR,—With reference to Mr. J. C. Johnson's article on "Transmitting Data," I am fully in support of this idea, as it would be extremely useful to all readers who propose taking up amateur transmitting seriously, after passing the P.M.G. test.

Also, would you mind informing me whether there will be any television apparatus on show at Olympia this year, as it will be a waste of time and money to go up to see it, as I have done in past years, unless there is something of television interest on view?—M. BURGESS (Brighton).

[We are unable to make any definite statement with regard to the television situation.—ED.]

## Transmitting Data

SIR,—Having been a reader of your paper for a number of years, I take this opportunity of informing you that I am of the same opinion as your correspondent, J. C. Johnson, of Rubery. Your paper has enabled me to qualify for a G.P.O. licence (2BHT), but that is as far as I have got, and this is my second year with a licence. I would very much like to see more of the crystal-controlled and master-oscillator type of transmitters.—V. WALKER (2BHT) (Heckmondwike).

SIR,—I heartily agree with Mr. J. C. Johnson's statement in his letter in the issue dated July 20th. I, myself, hope to be able to pass the P.M.G.'s test one day, and information and technical data on amateur transmitting would be invaluable. I have taken your excellent paper from No. 30 onwards, and I am very pleased to note how the S.W. section has grown. I feel quite sure that in publishing details of transmitting, etc., you would be pleasing a large number of readers. Wishing your paper every success.—RONALD CHADBONE (Hugghenden).

CUT THIS OUT EACH WEEK

## Do you know

—THAT the surface of all conductors for use on very high frequencies must be perfectly smooth and highly polished to reduce the resistance.

—THAT the reason for the above is to be found in the fact that high frequencies travel on the surface and not through a conductor.

—THAT the metal from which a conductor is made will govern its H.F. resistance.

—THAT the capacity of an air-spaced condenser will vary with the humidity of the atmosphere, and this is especially noticeable in the case of very small capacities.

—THAT resonance in a cabinet may be cured by packing the corners with kapok or similar material, or by fitting thick cardboard over the sides of the cabinet.

—THAT the back of a speaker cabinet should never be closed in unless material which permits the passage of sound waves is used.

—THAT for a similar reason the speaker cabinet should not be placed close to a wall.

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, Geo. Newnes, Ltd., 8-11, 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.



LET OUR TECHNICAL STAFF SOLVE YOUR PROBLEMS

Queries and Enquiries

If a postal reply is desired, a stamped addressed envelope must be enclosed. Every query and drawing which is sent must bear the name and address of the sender. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

SPECIAL NOTE

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. Please note also, that queries must be limited to two per reader, and all sketches and drawings which are sent to us should bear the name and address of the sender.

Parallel-fed Transformer

"Would you be kind enough to show me how I may be able to change an ordinary L.F. transformer to a parallel-fed transformer coupling unit, and let me know what resistances I must use for same?"— J. P. M. (Easington Colliery).

THE parallel-fed arrangement is simply the addition of a resistance and condenser, and the three components may be mounted on a small ebonite panel or the resistance and condenser may be mounted direct on the condenser. The connections are as follows: Anode of the valve to one side of resistance and one terminal on the fixed condenser. Other terminal of resistance to H.T. positive (or decoupling components), and other terminal on condenser to terminal P on transformer. Terminal H.T. on transformer is joined to earth, whilst terminal G is joined to the grid of the next valve, and the G.B. terminal is, as usual, joined to the grid-bias battery. It is, however, possible to modify the ratio of the transformer by various combinations of the four connections, and this has been explained on several occasions in our pages.

2-Valve Superhet

"I notice certain differences in the list of parts and the diagrams of the 2-valve superhet, particularly with reference to the pre-set condensers, the valveholders, and the valves. Secondly, I am not clear to which terminals the wire attached to terminal 3 on the aerial coil is joined. It would appear that it should not be connected to terminal 1, but if it is connected to terminal 2, what is the object of connecting it to the screw fixing the coil to the chassis?"—A. F. M. (Chilswick).

THE list of components in our issue dated July 13th is correct, as certain slight changes were found to be necessary

on further experiment with the receiver. With regard to your second query, the lead from terminal 3 to the screw on the screening can is an insulated lead and is only connected to terminal 4 in addition to 3. There is no connection to terminal 2, and the object of the wire in question being joined to the screening can screw is to earth it, as you will see from the diagram that after being joined to terminal 4 it is connected to the metal baseboard and the wave-change switch. We trust the matter is now quite clear.

Piezo Electricity

"Can you tell me if there is any difference between the Rochelle salt and the piezo electric crystal? I believe this material is now being used in wireless parts, but at present—being new to the hobby—I cannot see how it can have any application to wireless."—G. T. U. (Oakengates, Salop).

THE Rochelle salt crystal has a piezo electric effect or constant, but it is not alone in possessing this. Other materials possess the property, including quartz. The Rochelle salt crystal used for wireless purposes is artificially grown and is used in the production of loud-speakers, microphones, and gramophone pick-ups. At the present time the number of components made in this way is rather limited, but owing to the efficient manner of working which is obtained by the use of this principle, there is no doubt that it will become very popular in time.

Pick-up Volume Control

"Can you give me the best way to control the volume from my pick-up? I cannot find a potentiometer which gives good quality, and therefore would like your opinion on the matter."—D. R. A. (Cheltenham).

OBVIOUSLY, from your remarks you are not using the correct value of control, and this must be chosen according to the particular pick-up which you are using. There are several points to bear in mind. Firstly, the resistance is in parallel with the pick-up, and therefore must be of such value that there is no serious modification of the pick-up characteristics. Secondly, part of the potentiometer will be in series with the grid, and thus will cause loss of high notes, unless properly chosen. The makers of the pick-up generally give the correct value of the volume control, but if this information is not forthcoming, and you have tried several values without success, we would suggest that you use the instrument without an associated volume control,

and for the purpose of controlling the loudness of the signal use a control in the next L.F. stage. This scheme would have the advantage that the control would also be operative on radio signals.

Two Sets on One Aerial

"I should be glad if you could answer this point. I have a standard set joined to my aerial and earth socket, and to hear the television signals I wish to connect another set to the same aerial. I have tried out the arrangement but find that when the two sets are joined to the aerial I only get very weak signals from both sets. Is this correct, or does it indicate a bad aerial system?"—T. A. (Cardiff).

THE results are quite in order and simply indicate that the aerial circuits of the two receivers are different, and thus the tuned circuit of one acted as a wave-trap, or, alternatively, there was mutual inductive coupling between the two aerial coils and thus a fresh tuning-point should have been sought. We presume you simply tuned each set to its correct wavelength setting and then found signals were weak. Had you re-tuned, no doubt you would have found a point where the interaction was more or less negated. On the other hand, it is preferable, when endeavouring to use two sets in this manner, to use a very small coupling coil for each set and connect these in series between aerial and earth. Alternatively, a small fixed condenser may be used as the feeding component from the single aerial lead.

Improving Short-wave Conductors

"In view of the fact that short waves travel on the surface, would it not be an improvement to plate short-wave coils, etc., so as to get a really low-resistance surface? If so, why has this not been done by the manufacturers, who still seem to use ordinary copper?"—R. P. O. (Oxford).

YOU are probably thinking of the fact that silver has a lower comparative resistance than copper, but we would point out in the first place that the difference is only .06, taking as a standard copper with a factor of 1. Thus the difference is very slight and the additional expense would not be justified in a commercial article. A very smooth surface is desirable, but until you get down to the really ultra-shorts the improvement which would be obtained by silver plating would not be worth while.

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

Miscellaneous Advertisements

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. Unless otherwise stated, all items are clearance, second-hand, or surplus lines, and radio components advertised at below list price do not carry manufacturers' guarantee. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," 8, Southampton Street, Strand, London.

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THE following American Types, 4/6; 250, 210, 245, 47, 46, 24, 35, 51, 57, 58, 55, 37, 80, 6A7, 2A7, 27, 77, 78, 2A5, 281. All other types, 6/6. B.T.H. Moving Coil Speakers, matched pairs, Sin. 1, 500 ohms, 7,500 ohms. (1,500 speaker as choke 7,500 speaker in parallel with H.T. supply), with output transformer for pentode, 15/6 per pair; A.C. kit for pair, 12/6.

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PREMIER I.T. Charger kits. Westinghouse rectifier, input 200-250v. A.C., output 8v. 1/2 amp., 14/6; 8v. 1 amp., 17/6; 6v. 2 amp., 27/6; 30v. 1 amp., 37/6; 2v. 1/2 amp., 11/-.

B.T.H. Truspeed Induction Type A.C. only, Gramophone Motors, 100-250v. 30/- complete; ditto, D.C., 42/6.

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WIRK Wound Resistances, 4 watts, any value up to 50,000 ohms, 1/-; 8 watts, any value up to 100,000 ohms, 1/6; 15 watts, any value up to 50,000 ohms, 2/-; 25 watts, any value up to 50,000 ohms, 2/6.

MAGNAVOX D.C. 152, 2,500 ohms, 17/6; D.C. 154, 2,500 ohms, 12/6; D.C. 152 Magna, 2,500 ohms, 37/6; all complete with humbucking coils; state whether power or pentode; A.C. conversion kit for above, 10/-; P.M.-7in. cone, 16/6; 9 in. cone, 22/6.

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1,000 OHM 150 milliamper, Semi-variable resistance, 2/-; 1,000 ohm 250 milliamper, tapped, for any number, .18 volts, 3/6; 800 ohms, 350 m.a., tapped, 2/-.

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(Continued at top of column three)

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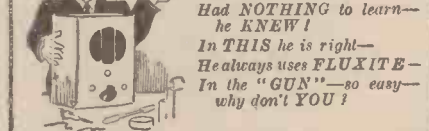
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See that FLUXITE is always by you—in the house—garage—workshop—wherever speedy soldering is needed. Used for 30 years in government works and by leading engineers and manufacturers. Of Ironmongers—in tins, 4d., 8d., 1/4 and 2/8. Ask to see the FLUXITE SMALL-SPACE SOLDERING SET—compact but substantial—complete with full instructions, 7/6. Write for Free Book on the art of "soft" soldering and ask for Leaflet on CASE-HARDENING, STEEL and TEMPERING TOOLS with FLUXITE.

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(Continued from foot of column one)

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LISSEN 3-gang, superhet coils, 6/-; Lotus 3-gang band-pass coils, 12/6; Iron core coils with circuit, 2/11 each; Varley band-pass aerial coils, B.P.5 type, 2/9; ditto band-pass transformer, B.P.8, 2/6.

H.F. Chokes Premier screened, 1/6; Premier short-wave, 9d.; pre-sets, any value, 6d.

PREMIER smoothing chokes, 25ma. 20 henries, 2/9; 40 ma. 30 henries, 4/-; 60 ma. 40 henries, 5/6; 150 ma. 40 henries, 10/6; 60 ma. 80 henries, 2.500 speaker replacement, 5/6.

PREMIER auto transformer 100/200-250 and vice versa, 100 watt, 10/-.

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**1935 Northumbria AC Sets.** Few to clear. 4-valve, 82/6, 5-valve, 97/6.—Novo Radio (2), Union Works, St. John Street, Newcastle-on-Tyne, 1.

**PEARL & PEARL** Summer Bargain List: free. 190, Bishopsgate, London, E.C.2.

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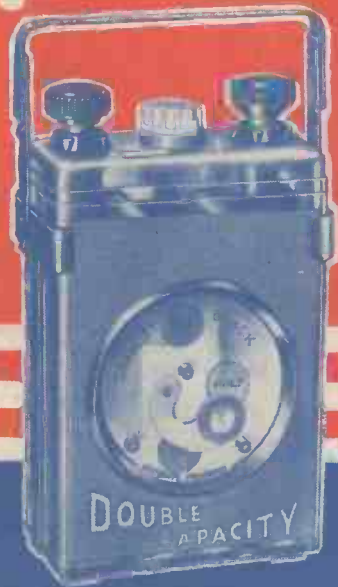
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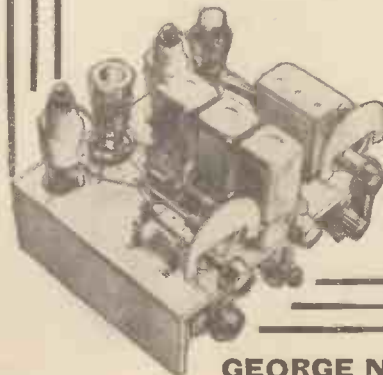
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# Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:  
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VOL. VI. No. 151. August 10th, 1935.

## ROUND *the* WORLD of WIRELESS

### Radio Lille PTT Testing

THE new transmitter at Lille-Camphin, is now completed and may be heard testing on 247.3 metres (1,213 kc/s) every morning and evening before and after the day's advertised programme. In the south-eastern districts of England its signals in power equal those of the Poste Parisien and of Radio-Paris.

### Holland versus Romania

AS was to be expected there is trouble on the 1,875-metre channel, which is shared by Kootwijk and the new Brasov station. So far as can be seen neither country is willing to abandon this wavelength and it will be left to the authorities to revise the Lucerne Plan and solve the problem.

### New Czech Station

THE transmitter which the Czech authorities intend to build for the broadcast of special programmes to the German-speaking population of pre-war Bohemia, is to be erected on the summit of Mount Jeschken, overlooking the town of Liberec (pre-war: Reichenberg). The mountain is over 3,000 feet high and, in consequence, offers a very favourable site for a broadcasting station.

### Bulgaria's New 100-Kilowatt

THE new station which is to replace the small Radio Rodno plant now working on 352.9 metres (850 kc/s) is being erected at Vakarel in the immediate neighbourhood of Sofia. It was necessary to build a high-power transmitter as suitable telephone cables are almost non-existent in Bulgaria, and consequently prevent an extension of the network by "relays." For some time Sofia will be compelled to broadcast its own programmes, as connection with Belgrade, to tap the European telephone network, is unsuitable for the transmission of orchestral or vocal entertainments.

### New Interval Signal

LISTENERS to the broadcasts of Nice-Juan-les-Pins (France) on 240.2 metres may have noticed during the past few days that the station has adopted a musical interval signal. To perpetuate the memory of the Provençal poet, Mistral, the studio now uses a few bars from his famous hymn

*Corpo Santo*. This is also played at the end of the day's broadcast, and precedes the French National Anthem, *La Marseillaise*.

### Radio Lisboa

THE Portuguese National transmitter at Barcarena, working on 476.9 metres, was officially opened on August 1st. So far the broadcasts have been of an experimental nature, but in future the programmes will be extended to a regular and more satisfying daily schedule.

**Next week's issue will  
contain a Special  
Radiolympia Supplement and Complete  
Guide to the Show.  
Many other Extra  
and Special Features  
will also be included.**

### Radio for Papua

AT Port Moresby, on the island of Papua, in the Pacific, Amalgamated Wireless (Australasia), Limited, has erected a 100-watt transmitter. It will be used for the relay of wireless programmes from Sydney and Melbourne.

### Protecting the Neighbours!

IN Germany the authorities have decreed that from 11 p.m. owners of wireless apparatus must reduce the volume of sound from loud-speakers in order that neighbours who may be early risers should not find their rest disturbed. This decree in particular applies to flats and apartment houses.

### Not So Good!

ON July 1st last the number of radio listening licences registered in Germany was 6,589,454, or a drop of 82,937 on the previous month. The only explanation

given is that the licences are paid monthly and that during the holiday season Germans suspend their subscription.

### An Expert Commentator

LISTENERS to the medium and short-wave American stations will be interested to learn that the NBC has engaged Miss Amelia Earhart, the famous aviator, to supply running commentaries on all occasions when any one of the studios relays a broadcast of a flying event.

### Choral Concert from Porth

A CONCERT by the Porth and District Choral Society, conducted by Stanley Williams, will be relayed from the Central Cinema, Porth, on August 11th, for Western listeners. Margaret Tann Williams (contralto) will sing some items from "The Messiah."

### Orchestral Programme

ON August 14th listeners to the Scottish National will hear a concert by the Princess Theatre Orchestra, conducted by Robert W. McLeod, with Mae Johnston, soprano. The orchestra will play "The Princess's March," a selection, "Princess's Songs," both arranged by McLeod, "The Cingalee," by Lionel Monckton, a selection, "Just in Time," by McLeod, and a one-step, "Jewish Song," by McLeod; while Miss Johnston, with orchestra, will sing "Only a Rose," from "The Vagabond King," by Friml, "She had a letter from her love," from "Merrie England," by German, "A Geisha's Life," from "The Geisha," by Sidney Jones, and "I love you so," from "The Merry Widow," by Lehar.

### Good Fare from the Regional

ON August 15th Reginald Foresythe will give a pianoforte recital of some of his own numbers. Two of his works—"Lament for Congo" and "Melancholy Clown"—have been very popular recently and were included by Ambrose in the programme of his concert at Covent Garden in June. On August 21st Anona Winn and her Four Winners will be heard again by listeners in the Regional programme. Her own cleverness as a singer and mimic coupled with the unobtrusive excellence of her pocket orchestra have made this act one of the most popular of recent variety turns.

# ROUND the WORLD of WIRELESS (Continued)

## "Radiolympia"

JOHN SHARMAN will this year again be in charge of the arrangements and production of "Radiolympia." The exhibition authorities are erecting a theatre in Olympia which will have an enormous stage and the biggest proscenium arch in London, and John Sharman's shows will be correspondingly ambitious. There will be three performances daily throughout the period of the exhibition.

A glittering galaxy of radio stars has been collected for the various performances. Among their favourites whom listeners will be able to see and hear are: The B.B.C. Dance Orchestra directed by Henry Hall, Elsie and Doris Waters, Lily Morris, Leonard Henry, Elsie Carlyle, Leslie Sarony and Leslie Holmes ("The Two Leslies"), Scott and Whaley, Stainless Stephen, Norman Long, Billie Merson and Babs Valerie, Harry Hemsley, and the Radio Three. A special feature of this year's "Radiolympia" will be the presentation at each performance of that immensely popular surprise item "In Town To-night." In addition to Henry Hall and the famous B.B.C. Dance Orchestra, listeners will hear Geraldo and his Gaucho Tango Orchestra and the Casani Club Orchestra, directed by Charlie Kunz. Sydney Baynes and his light orchestra will provide orchestral accompaniment to the various acts throughout the whole show.

## "The Mollusc"

THIS play by Hubert Henry Davies has been adapted for radio by Cyril Wood and will be produced by him on August 16th for Western listeners. One scene from the play was included in the series of dramatic features entitled "Facet" some time ago.

## "Songs Out of the West"

THIS is the title of a programme constructed from the works of Robert Herrick and F. W. Moorman's "Robert Herrick: A Biographical and Critical Study." It has been arranged and will be produced for Western listeners by Cedric Cliffe on August 14th.

## The Scottish Military Band

THIS well-known band, conducted by John A. McIvor, with Florence MacBride, violin, will broadcast on August 15th. The Band will play the march "Liberty Bell" by Sousa, the overture, "The Bohemian Girl" by Balfe, "Salut d'Amour" by Elgar, "Bells of St. Malo" by Rimmer, and excerpts from "Iolanthe" by Sullivan; while Miss MacBride will play "Menuett" by Beethoven, "Canzonetta, Op. 6" by d'Ambrosio, "Tambourin" by Gossec, "Rondino" by Beethoven, "Paradise" by Krahauser, and "Czardas" by Hubay.

## "The Silver Spoon"

A LIGHT comedy called "The Silver Spoon," specially written for broadcasting by Henrik Ege, and with music by Eric Ansell, will be heard by National

## INTERESTING and TOPICAL PARAGRAPHS

listeners on August 23rd and repeated in the Regional programme the following evening. The plot is riotously complicated, and has to do with the adventures of a wealthy stockbroker, whose hobby is the purchase and management of derelict night clubs. He keeps his hobby hidden from his wife, whose time is apparently devoted to

good works and who is an ardent member of many clubs of a very different nature.

## "Happy Days"

AN excerpt from the Aberdeen Tivoli's Resident Summer Show entitled "Happy Days" will be relayed from the Tivoli Theatre on August 9th. The cast includes George West, Herbert Cave and Lilian Denton, Peter McSweeney, Maia Barrie, John F. Traynor, Clayton and Bates, and Mr. Collins' Dancing Ladies.

## AN UP-TO-DATE RADIOGRAM



Preparing for an enjoyable half hour of recorded music with their "His Master's Voice" 33-guinea auto-radiogram.

## The "Society Entertainers"

THIS popular concert party, which is well-known to Northern Ireland listeners for their broadcasts from Portrush Orange Hall, will give a special midnight matinee on August 9th, for Empire listeners.

## Sonata Recital from Newcastle

BROADCASTING from the Newcastle studios, Marie Hall (violin) and Mary Ramsay (pianoforte) will contribute a sonata recital to the Northern programme on August 12th. Their programme will include Beethoven's "Sonata in C minor, No. 2" and Haydn's "Sonata in G major."

## Hawaiian Quartet

THE Hawaiian Islanders claim to be the only novelty combination of their kind (steel guitar, Spanish guitar, string bass and ukelele) outside the United States. They consist of four brothers, Peter, Michael, Jim and Joe Hodgkinson, with Peter as their director; and they will be heard on August 13th.

## Old Time Dance Music

JACK McCORMICK and his Ambassadors give a programme of Old Time Dance Music on August 15th. Jack McCormick formerly played at the L.M.S. Hotels when Henry Hall was Music Director there. He has been ten years in the dance band business and brought his Ambassadors to the West End Ballroom, Birmingham, at Easter, after a three years' run at the Rialto, Liverpool.

## Dvorak's "New World" Symphony

FOR the Friday afternoon Symphony Concert by the B.B.C. Midland Orchestra on August 16th, the principal work will be Dvorak's "New World" symphony. H. Foster Clark will conduct the Orchestra. The Orchestra will also be heard on the following day when they illustrate one of Leslie Heward's talks on favourite composers. His subject is the music of Elgar. Emme Northall, the Wolverhampton contralto, will be the vocalist.

## Broadcast from a Swimming Pool

THE first broadcast from an open-air swimming pool will be given from Prestwick Bathing Lake on August 10th. Listeners will hear diving, swimming, shooting the chute, interviews by Jack House and some of the swimmers, the oldest and youngest bathers, a life-guard, a champion swimmer and with Jack Thomson, the superintendent of the Lake.

## SOLVE THIS!

### PROBLEM No. 151

Jordan's three-valve A.C. mains receiver had given good service for some months, but suddenly developed a very loud hum. An inspection of the receiver showed that no connections had broken loose, but upon testing with a meter he found that the total current consumption was much higher than when the receiver was first put into use. What had happened? Three books will be awarded for the first three correct solutions opened.

Envelopes must be marked Problem No. 151 in the bottom left-hand corner and must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Entries must be received not later than the first post Monday, August 12th, 1935.

### Solution to Problem No. 150

When Wilkin fitted the fixed condenser he was overlooking the fact that it is necessary to have the H.T. applied to the anode of the valve, and the broken primary would prevent this. Thus, although he completed the circuit with a fixed condenser there was still no H.T. on the valve.

The following three readers successfully solved Problem No. 149 and books are accordingly being forwarded to them: J. Widdan, 4 Spring Gardens, Dorking, Surrey; T. E. Griffith, 26 Marlborough Road, Newport, Mon; R. S. A. Larmuth, The Grange, Handforth, Cheshire.



# Wireless Sets for the Blind

There are Many Interesting Points to be Considered When Building Wireless Receivers for Blind Listeners, and These are Discussed in This Article

by W. J. DELANEY

**T**HERE are, unfortunately, thousands of people in this country who have either lost their eyesight entirely or whose vision is sufficiently defective to render the operation of an ordinary wireless receiver beyond their ability. To this type of person wireless offers a wonderful field of entertainment, but it is essential that the receiver shall be under their control so that they may make the necessary adjustment of volume and station-selection. The ordinary broadcast receiver is not of much use, firstly because the controls are more or less indistinguishable, and secondly, because of the difficulty of tuning. The

.0003 mfd. pre-set could be employed, and for those at the upper end of the medium wave-band a .0005 mfd. condenser will give better tuning.

## Ganged Switching

No difficulty should be experienced in the control of a number of switches such as would be required in an H.F.-detector circuit, which would, of course, necessitate four separate condensers. In Fig. 1 is shown the method of changing from one station to another, the earthed end of the tuning coil being taken to the arm of a single-pole change-over switch and joining to each pole one side of a pre-set condenser. The other side of each pre-set is joined to the grid end of the coil. Each condenser is individually adjusted to a station, and then the switch will enable the receiver to be used on either station at will. To avoid difficulties due to instability arising from the wiring of ganged switches the small toggle-type of switch illustrated in Fig. 3 should be employed. This is mounted on the baseboard (either on top of a chassis or below it) and a rod is passed through the dolly, and thereby any number of such switches may be linked together and operated at once by a single knob on the

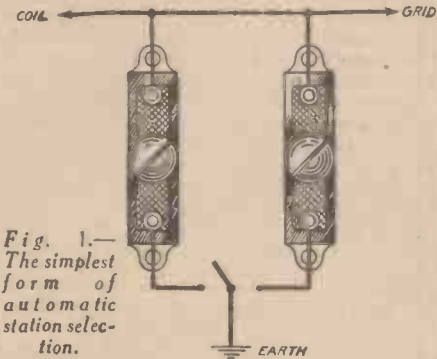


Fig. 1.—The simplest form of automatic station selection.

following notes will give some idea of the lines which it is preferable to follow when building a receiver for a blind person, and no doubt there are many readers who will be desirous of making such a set for a friend who has lost the use of his eyes, or to be given as a present to a local institution where it may be suitably used.

## Automatic Station Selection

It is obvious that the ordinary method of tuning is not all that can be desired, and a circuit which has been pre-tuned to the two B.B.C. programmes (National and Regional) will meet all normal requirements. In most parts of the country these two programmes may be obtained on the medium-wave band, and thus a home-made coil could be used, or a commercial coil with the switch permanently set to the medium-wave band. If the coil is of the type requiring an external switch, the contacts which are normally shorted by the switch may be permanently connected with a piece of wire. If a home-made coil is to be adopted, it will be found that in most cases a hank of fifty turns of 22 gauge D.C.C. wire (wound round a glass or similar object about 2½ in. to 3 in. in diameter and then slipped off) will cover the wave-band with a .0005 mfd. condenser connected in parallel. If an H.F. stage is to be used, then a metal screen will have to be mounted between the H.F. and detector stages to maintain stability. In place of the customary variable or ganged condenser, an ordinary pre-set condenser should be used, and it will be found easiest to use a separate condenser for each station. For the lower wave stations

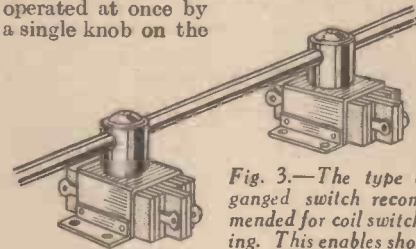


Fig. 3.—The type of ganged switch recommended for coil switching. This enables short leads to be used.

panel. These switches are manufactured by Messrs. A. F. Bulgin, and it will be seen that the separate switches may be mounted quite close to each coil and wiring thereby kept short. There are only two positions to these switches, and thus there will be no difficulty in operation, as the control

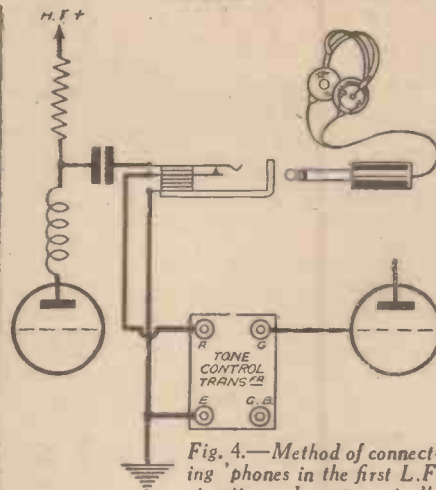


Fig. 4.—Method of connecting 'phones in the first L.F. circuit, and automatically cutting out the loud-speaker.

knob will only turn to the right or left and the contacts fly into position with a definite click, thus giving the user a clear indication that the operation has been correctly carried out.

## Using Headphones

There are many families in which only one member is afflicted with loss of sight, and this probably means that the receiver will sometimes be required by that member of the family when others do not wish to listen. For such a circumstance it is advisable that ordinary headphone reception may be adopted, but if the receiver develops any really high-powered output, it would be unwise to include the headphones in the output stage in view of the fact that the average blind person has very keen hearing and thus can be satisfied with a quite moderate signal on the 'phones. Arrangements should therefore be made to include the 'phones in the first L.F. stage,

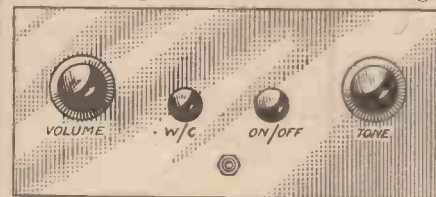


Fig. 5.—Suggested panel lay-out.

immediately following the detector valve, and in Fig. 4 a simple scheme is outlined which has also the advantage that the speaker is automatically silenced owing to the fact that the last valve is isolated.

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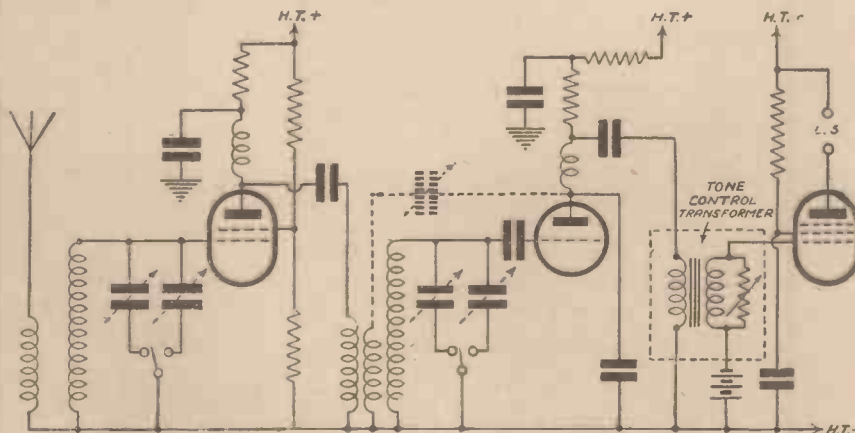


Fig. 2.—Principal features of a set suitable for a blind listener. The first valve should be of the variable-mu type to offer smooth volume control.

**WIRELESS SETS FOR THE BLIND**

*(Continued from previous page)*

A "change-over" jack is employed, and the 'phones are connected to an ordinary plug. Insertion of the plug automatically includes the 'phones in the detector anode circuit, but they are isolated from the H.T. circuit, and, therefore, even if a mains receiver is being used, there is no risk of shock.

**Tone Control**

In view of the keenness of hearing of a blind person it is advisable also to include some method of modifying the tone of reproduction; generally a "deep" or "mellow" tone is preferred. Therefore, one of the specially-designed tone-control transformers is used in the L.F. stage and the necessary control may be mounted on the panel in addition to the volume-control switch. Thus, a panel for a receiver based on the above lines would be arranged somewhat as shown in Fig. 5, the two outside controls being for volume and tone, and the two central ones for station selection and for switching the receiver on and off. In

the centre is the jack for 'phone connection, and each control has a definite position, thus causing no doubt as to its setting and use.

**An Alternative**

In the unfortunate event of the

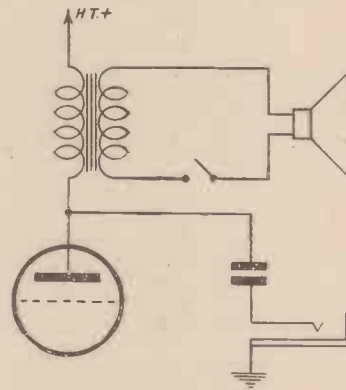


Fig. 6.—A scheme for including 'phones in the output stage and silencing the loud-speaker.

listener being hard of hearing, it may be desirable to include the 'phones in the last anode circuit, and the arrangement shown in Fig. 6 should then be adopted. To silence the loud-speaker in this case a switch must be joined in the secondary side of the speaker unit—leaving the primary in circuit permanently to act as a choke. Although the switching of the speaker could be carried out automatically with a jack having a greater number of contacts, this has not been shown in view of the fact that it may be found desirable to use the speaker for other listeners at the same time.

The arrangement shown in Fig. 2 is only an outline of the essential parts covered in this article, and a receiver utilising these features could be built to operate either from batteries or mains. In the event of the nearest station being situated some distance away reaction may be found desirable, and this could be adjusted by a pre-set condenser fitted inside the receiver and adjusted by the builder before the set is installed. It should be unnecessary to adjust this for two-station reception.

# Switch or Tune?

The Possibilities of Building Receivers Incorporating Tuned Pre-Set Condensers are Discussed in this Article

**E**VEN in this mechanical age the operation of tuning a wireless receiver becomes to many people a task requiring considerable patience, and even after they have finished tuning-in, an experienced person can often coax the set to produce far superior results—both in clarity and volume—from the same station. In the event of the tuning condenser being a two-gang component with external trimmer, the final trimming operation proves to be beyond their capabilities.

For these people, and others, who, in the main, use only two or three "local" stations, the substitution of switches bring-

ing tuned pre-sets into circuit seems to be the simplest and most inexpensive method, although the latter only holds good if it does not mean building a new receiver for their especial benefit.

From the point of view of the normal listener, the idea of a switch for each station seems rather an extravagant method, particularly so if every worth-while station is to be included, and the accepted method of tuning-in the stations with a variable condenser

**Switching Local Stations**

Concentrating on the former, little explanation is necessary, as full details are given in Fig. 1: it will be seen that double-pole change-over switches are used, one for each station. Each switch is used in conjunction with two pre-sets, one tuning the aerial circuit, the other being responsible for the tuned grid (or tuned anode) stage. If the circuit is followed in detail it will be seen that, with both switches in the up position, the normal tuning is in circuit; if one of the switches is down, the appropriate pre-set condensers are substituted for the normal air-spaced tuning condensers.

If, through some error, both switches are down together, the only result is to

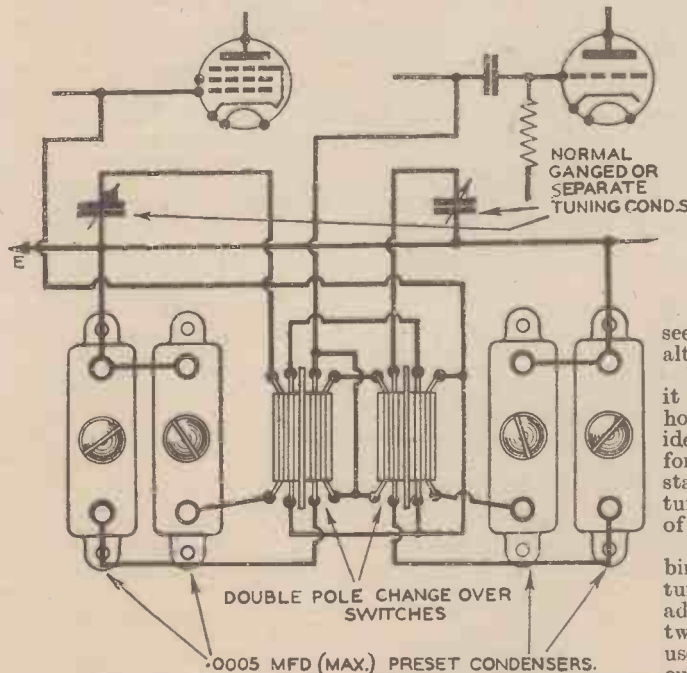


Fig. 1.—Wiring details of a receiver designed for two "switch" stations in addition to the normal tuning arrangements.

NORMAL TUNING  
KNOBS

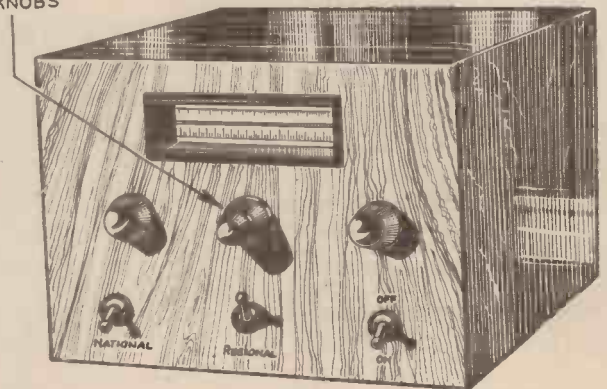


Fig. 2.—A receiver designed on the lines suggested.

seems to have no other alternative.

From these remarks it would seem that the household set would be ideal if it had a switch for each of the local stations, and also normal tuning for the benefit of the DX fan.

Actually, this combined method of tuning a set can be adopted fairly easily if two tuned circuits are used; three tuned circuits present more of a problem, but the adoption is not impossible.

tune the set to a wavelength higher than either of the two normally used wavelengths.

The position of the tuning condenser makes no difference to either of the "switch" stations; for example, if the set is tuned in the normal way to, say, Budapest, the "switch" stations are immediately substituted on the operation of their appropriate switches, although it might be necessary to readjust the reaction control slightly.

As these switches are in the grid circuit it would be advisable to keep the leads as short as possible, and it would probably be as well to shield the leads to the "grid" side of the switches with screened systoflex. Ganged switches could be used with advantage to prevent instability.

# Circuits Readers Ask For

The Circuit Described This Week is for Battery Operation and Intended for an Output of Well Over One Watt. It Employs Permeability Tuning. By FRANK PRESTON

THE circuit to be described combines a number of features which have been suggested by various readers, and is for a high-class battery receiver with permeability tuning, and class B output. It will be gathered from this that the circuit is intended for use when both high selectivity and comparatively large output are required. In addition, of course, the arrangement is designed to give good-quality reproduction for a minimum H.T.-current consumption.

## Easy Construction

Notwithstanding these desirable features, the receiver can be built very easily, for the connections are few in number and the layout particularly straightforward. These advantages result chiefly from the use of a complete Varley permeability-tuning unit, of which details have previously been given in these pages. The complete three-gang unit measures only 6 1/2 in. by 5 1/2 in. by 4 1/2 in. high, and can thus be accommodated on a reasonably small chassis without there being any crowding of the other components. As we have explained in previous articles in this journal, the principal advantage of permeability tuning is that it gives sensibly uniform selectivity and sensitivity over the whole of both (medium and long) wavebands covered; because of this the band width accepted by the band-pass circuit remains constant, the result being that there is no sideband cutting on any transmission, which ensures uniformly good quality over the wavelength scale. A form of inductive band-pass coupling is used in the circuit shown, and this gives a band-width separation of about 6 kilocycles, which is adequate for good reproduction.

## The Tuning Circuits

To simplify the circuit diagram the three tuning units comprising the assembly are shown as rectangles, but those who wish to trace out the complete tuning circuit can easily do so by making reference to the diagram shown inset, which applies to each of the three units. From this it is seen that there are three windings in all, one of these being for use as an aerial coupler (in the first coil), as band-pass coupler (in the second coil), or as reaction winding (in the third coil). The two other windings are for long and medium waves, respectively, one of them being used alone for medium-wave reception, and the two together in series for long waves. There are also two pre-set condensers on each coil unit, and these are marked L and M in the diagram. They are for trimming the circuit, and the references indicate long and medium waves, respectively. It might be mentioned in passing that this method of

ganging is ideal, since it ensures perfectly accurate matching over both wavebands, and is better than the system which has to be adopted when using ordinary coils in conjunction with a gang condenser, in which case a single trimmer setting must be used for both wavebands.

Apart from the tuning arrangements, the circuit is not unusual and represents a well-tried system of leaky-grid detector, followed by a small-power driver valve and class B output. The first valve is a variable-mu H.F. pentode, which provides sufficient pre-detector amplification for most purposes and ensures that the range of reception shall be sufficient to make it possible to bring in upwards of twelve transmissions

H.T.+ lead for the screening grid of this valve, a fixed potentiometer is used and this, in conjunction with the variable-mu volume-control potentiometer makes it necessary to employ a four-point on-off switch. This point may not be quite clear until it is explained that the switch, in addition to breaking the H.T. and L.T. circuits, has also to break the circuits of the two potentiometers; if this were not done, there would be a leakage of H.T. or G.B. current through one of the potentiometers.

## Components Arrangement

A list of suitable components is given below, and the method of arranging these on the chassis is governed, principally, by the tuning unit, the terminals of which are disposed together on a plate attached to the right-hand side of the unit. Because of this, it is best to have the input circuit (aerial) on the right of the chassis, and the output circuit (speaker terminals) on the left. By following this arrangement it is possible to keep all H.F. leads reasonably short and direct, and to place the valves according to the sequence of the stages. A general idea of a suitable layout can be gathered by making reference to Fig. 2, but those constructors who still prefer the

baseboard form of construction can slightly modify the arrangement without introducing any serious losses. Fig. 2 does not show all the components, but those omitted should be placed on the underside of the chassis as near as possible to the valve-holders to which they are to be connected.

## The Power Supply

It may be desirable to add a note concerning the H.T. and L.T. supplies, because it is frequently thought that, because the average H.T. current consumption of a class B valve is comparatively small, a standard-capacity high-tension battery may be employed. The point to remember, however, is that the "peak" or maximum current passed by the valve is approximately 30 milliamps, and it is obvious that a battery rated to give 7 milliamps cannot adequately cope with this condition. It is by far the best—and most economical—method to employ either a super-capacity battery or an eliminator so that a maximum current of, say, 40 milliamps (which is occasionally taken by the four valves together) can be obtained without the H.T. voltage falling. It is not only in the interest of economy that the large-capacity battery is better, but also in connection with the quality of reproduction. Class B amplification has often been wrongly accused of giving unsatisfactory quality purely and simply because the user did not "feed" the valve correctly. It is obvious that if the anode voltage fluctuates as the

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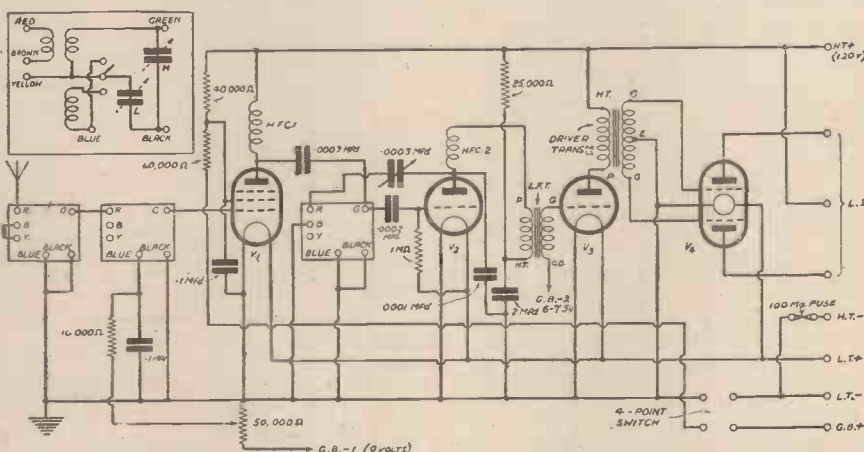


Fig. 1.—The circuit diagram of the 4-valve permeability-tuned receiver described. For simplicity the three sections of the permeability tuner are shown as rectangles, but the circuit of each of these is as shown inset.

at good speaker strength. At the same time the volume control has a sufficiently wide range of variation to reduce the input from the local station to such an extent that the output is no more than a whisper.

## The On-off Switch

To save the necessity for a separate

### PRINCIPAL COMPONENTS REQUIRED

- One Peto-Scott metallised chassis, 14in. by 8in. with 3in. runners.
- One Varley permeability tuner, type BP.100.
- Three Clix 4-pin valve-holders.
- One Clix 7-pin valve-holder (for class B valve).
- One Wearite screened H.F. choke, with pigtail, type HFPA (H.F.C.1.).
- One Bulgin "Standard Screened" H.F. choke (H.F.C.2.).
- Five Eric 1-watt resistors: 10,000 ohms, 25,000 ohms, 40,000 ohms, 60,000 ohms, and 1 megohm.
- Three Dubilier fixed condensers, type 670: .0001 mfd., .0002 mfd. and .0003 mfd.
- Three Dubilier fixed condensers, type BB: two .1 mfd. and one 2 mfd.
- One J.B. .0003-mfd. "Dilecon" reaction condenser.
- One Ferranti 50,000-ohm potentiometer, type P.
- One Graham Farish 1:3 L.F. transformer (L.F.T.).
- One Bulgin 1:1 driver transformer (D.T.).
- One Microfuse 100 m.a. fuse and holder.
- One Bulgin four-point switch, type S.87.
- Four Cossor valves: 220 V.P., 4-pin (V.1), 210 H.F. (V.2), 215 P (V.3), and 240B (V.4).
- One W.B. "Stentorian" Standard moving-coil speaker.

(Continued from previous page)

current varies the working efficiency of the valve must also fluctuate; and when this occurs distortion is the inevitable result. This applies not only to H.T. batteries, but also to eliminators. The ordinary type of eliminator gives a certain voltage at a particular current load, but if the load is altered the voltage becomes considerably changed. An eliminator for class B must, therefore, be of the special "stabilised-output" type or, in other words, it must be one which has been specially designed for class B or Q.P.P. use. In choosing the accumulator it must be remembered that the total L.T. current required is .85 amp., and that a 40 a.h. accumulator is required to give about forty-five hours' service per charge.

With regard to the loud-speaker, it must be emphasised that this, also, must be of the class B type, which means that it must be fitted with a transformer with low-resistance centre-tapped primary winding. If the constructor already has a permanent-magnet moving-coil speaker on hand which is not of this type, it can be used by fitting a class B output choke between the three terminals on the set and the two terminals on the speaker, but in ordering the choke it will be advisable to give details of the speaker.

**Trimming and Operating**

The operation of the receiver is just as simple as that of any other set, and the tuning knob is operated exactly as if it were attached to a gang condenser; the wave-change switch is also operated in the usual manner. Before finally putting the set into use, however, a little time should be spent in adjusting the trimmers to their optimum positions. To do this first of all set the wave-change to the medium-wave position, turn the tuning pointer until a

station is received on about 300 metres—the scale is wavelength calibrated—and then try the effect of slightly altering the setting of the rearmost trimmer, afterwards repeating this on the others, until

signal strength attains a maximum; during the trimmer adjustment it is best to alter the setting of the pointer very slightly after each trimmer alteration. For those who are not familiar with the Varley permeability tuner, it should be explained that the trimmers are mounted on top of the various sections of the assembly, and that the long-wave pre-set is controlled by means of a hexagon nut, and the medium-wave one by a concentric screw with screw-driver cut.

After the medium-wave trimmers have been set, turn the wave-change switch to the long-wave position, tune in a station received near the centre of the scale and set the long-wave trimmers by using the spanner supplied with the tuner. Care should be taken in carrying out the ganging because the head of the screw will be damaged if undue force is applied and if the screw-driver used is not provided with a very narrow, well-ground blade. Actually, a good bradawl is better than most types of screwdriver. It should also be noted that the capacity of the medium-wave trimmers is increased by turning the screw anti-clockwise, and of the long-wave trimmers by turning the brass nut clockwise.

As screening is complete, any instability will be due to the wiring, and this may easily be corrected.

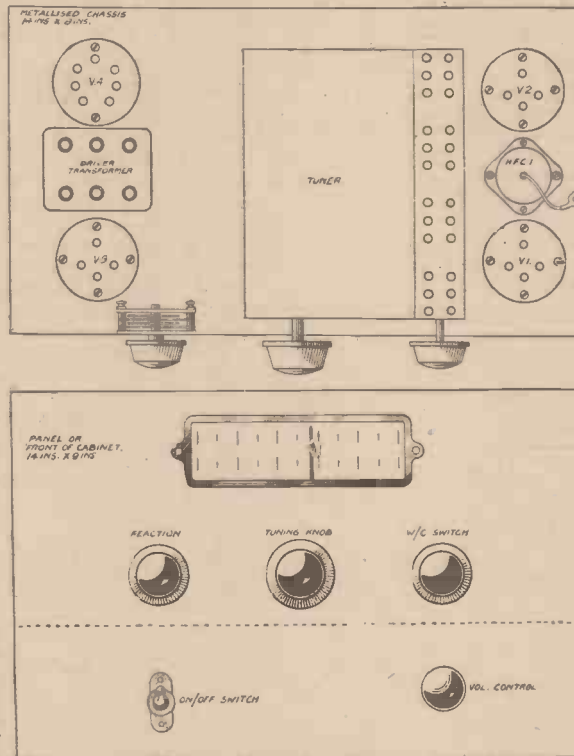


Fig. 2.—Showing a suitable arrangement of the principal components.

# A Novel Loud-speaker Installation

**G**REYHOUNDS on their way back to the kennels after racing bark in their padded cars, and keep up a merry chorus when stowed away safely in their kennels.

To stop this night clamour was a problem that confronted the Greyhound Racing Association at Northaw, Potters Bar, where are the well-known Hook Kennels, housing some 900 dogs. With a sporting respect for the comfort of their country neighbours the G.R.A. consulted Mr. R. H. Dent, the specialist in acoustic equipment and himself a prominent dog owner, and Mr. Dent promptly sought the advice of the Ardente research laboratory. To-day, as a result, Northaw is a zone of silence, and the Hook Kennels the most efficiently equipped in the world.

**Kennels with Loud-speakers**

There are sixteen luxurious kennels at Northaw, and when one doggy tenant started to bark most of the 900 barked in sympathy and rivalry. Now they don't. It has taken only a fortnight to train them not to. From the roof of each kennel there has been suspended a special type of loud-speaker. Each speaker is connected to a central watchman's hut.

The watchman might be dubbed Master of the Greyhounds, as he controls them all. His hut is no place of the familiar coke fire, but a small and ingenious control room. It contains a panel on which are a number of signal lights, one for each kennel, a series of switches, meters, and a speech amplifier.

If a dog barks, or there is any other disturbance in the kennel by day or night, the kennel loud-speaker acts as a microphone which switches on a warning light in the hut, showing the kennel affected.

On switching off the alarm light the watchman is able to speak directly into any kennel or kennels and quieten the restless animal, using the hut loud-speaker as a microphone.

The friendly, soothing word is usually enough to stop any concerted broadcast. Indeed, not the least interesting lesson of this unique installation is the rapid way in which the greyhounds have come to recognise, and obey implicitly, the unseen voice of the watchman.

**Twenty-four Valves**

The installation, which is now in full operation, was devised for its special purpose by the Ardente research laboratory. It took six months to design and bring to perfection, and is normally in use for twelve hours continuously. More than 3,000yds. of lead-covered cable, 24 valves and 18 loud-speakers are employed in the circuit.

In the daytime, when not required for alarm purposes, the equipment can be used as a general calling system for keeping in touch with trainers and kennel boys, and for the broadcast announcement of instructions to the staff.

**KZRM, Manila**

The short-wave outlet of KZRM, Manila (P.I.), which was working on 48.86 metres (6,140 kc/s) and 31.35 metres (9,570 kc/s), has not been heard for some time, and possibly it may have been suspended, leaving the medium-wave station to broadcast the programmes. The KZRM radio entertainments, however, have been picked up as tests made by KAY, the 40-kilowatt R.C.A. station at Manila, on 20.03 metres (14,980 kc/s), but so far there is no regular schedule.



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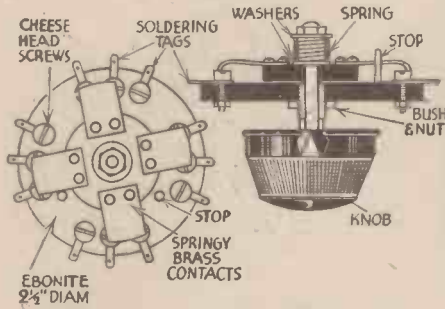
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READERS WRINKLES

THE HALF-GUINEA PAGE

A Four-pole Change-over Switch

THIS simple change-over switch has self-cleaning contacts and one-hole fixing. Two discs of ebonite, 1 in. by 2 1/4 in. in diameter, were first made. A 4 B.A. hole was then drilled through the centre of both discs, and holes were also made near

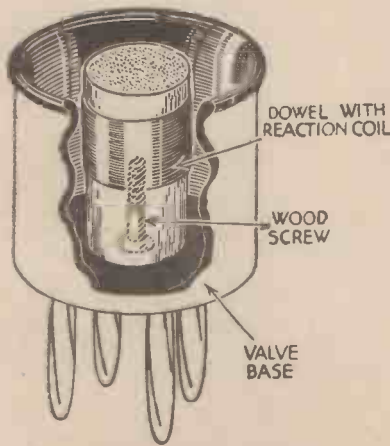


An efficient four-pole change-over switch.

the edge of the larger disc, and the cheese-headed screws fixed. The springy brass strips were bent and riveted to the smaller disc. The two discs were then fitted together as shown in sketch. When mounting the switch on a metal panel see that the ends of the cheese-head screws are not short-circuited by the panel.—E. G. LANE (Graaff Reinet, S. Africa).

Space-saving Reaction Coil

WHEN winding short-wave coils on valve bases, it is often found that the reaction coil takes up more space than is conveniently available. To overcome this difficulty the device shown in the accompanying sketch was devised. The



A useful space-saving idea.

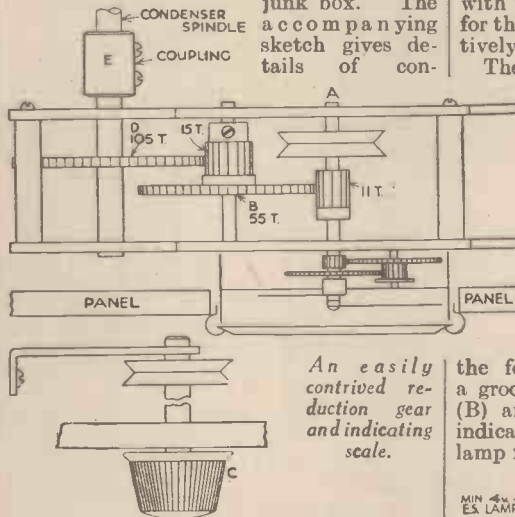
reaction coil is wound on a small piece of wooden rod which is held in position inside the valve base by a screw passing through a hole drilled for the purpose. By using this method more space is left on the valve base for the grid coil.—H. BEADLE (Keighley).

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., 8-11, 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 Wrinkle.

Combined Reduction Gear and Indicating Scale

WHEN stations crowd on the dial, one sometimes wishes for a wider spacing, and with this object in view I made a dial and reduction gear with a ratio of 24 to 1, using the works of an old clock of Swiss make, which was requisitioned from the junk box. The accompanying sketch gives details of con-



An easily contrived reduction gear and indicating scale.

struction. A 2-in. diameter clock is most suitable from the point of view of space economy, but if space is no object, any old clock—within limits—may be adapted.

Remove the outer case, take away the escapement wheel and spring, remove main spring from pinion B and in its place fix a gear wheel with approximately fifteen teeth; a pulley wheel should be soldered to spindle A, and another pulley of similar size at a suitable point for a rubber band drive. This latter pulley is directly attached to control knob C, a brass collar (E) with two set screws connecting pinion D to the spindle of the variable condenser.

This arrangement gives a 24 to 1 reduction, and readings on the clock face, instead of being in degrees, will be from twelve o'clock to twelve o'clock. For instance, with condenser at half position the reading will be six o'clock.

If care is taken there will be no backlash to speak of and very accurate readings

can be taken. With a 2-in. dial the scale is equal to a 72-in. scale. Instead of 180 degrees there are 720 to 10 to the inch.

The number of teeth may be varied, and the degree of reduction altered, but if this is done the reading, of course, will be changed. The reduction should not, however, be more than 24 to 1 for obvious reasons; if a greater reduction be required a smaller driving pulley is recommended.—A. COULDWELL (Wimbledon).

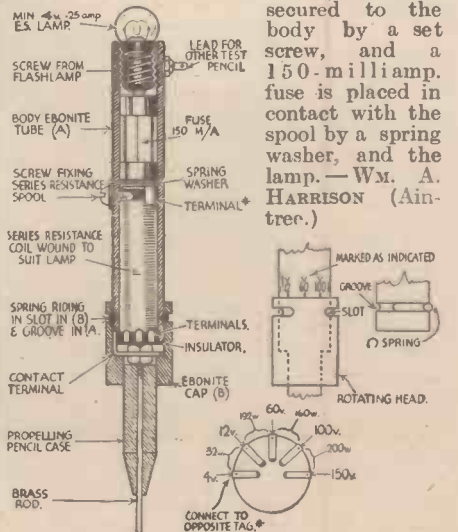
A Variable Testing Lamp

FINDING it was possible to construct a lamp tester also to give some idea of the operating particulars of components such as transformers, batteries, and rectifiers, etc., I decided to construct a variable tester for 4, 12, 60, 100, and 150-volt circuits. The lamp used was 4 volts .25 amp. (i.e., 16-ohm filament resistance), and the required series resistances estimated upon this value, that is to say, for the 12-volt circuit, adding a further 32-ohms in series with the lamp, is 111, 160, and 200 ohms for the 60, 100, and 150-volt circuits respectively.

The lower end of the spool carries five terminals which pass through the spool lead to the internal connections, the first of which is joined direct to the large flat terminal upon the upper spool head. This is essential to cut out the resistance for the 4-volt circuit.

These five terminals are arranged radially, so as to make contact with the rotating head (B) carrying the test pointer. It will be seen that the rotating head (B) is slotted and fixed by a spring in the form of an arc, which rides inside a groove upon the body (A). The head (B) and body (A) are both marked to indicate the full circuit voltage at the lamp filament current value.

The spool is secured to the body by a set screw, and a 150-milliamp. fuse is placed in contact with the spool by a spring washer, and the lamp.—Wm. A. HARRISON (Aintree.)



Details of a novel variable testing lamp.

# COSSOR 1935-



## A.C. MAINS MODEL 364

(illustrated above)

With Pentagrid Frequency Changer, H.F. Pentode I.F. Amplifier, Double Diode Detector, High Slope Pentode Output, Full Wave Rect., Thermometer Twin illuminated and detachable Scales. Combined On/Off, Wavechange and Pick-up Switch, Volume Control. 8" Mains Energised M.C. Speaker. Complete with plug and sockets for extension Speaker and for pick-up. A.C. Mains only 200/250 volts (adjust.) 40/100 cycles.

Hire Purchase Terms: 20/- deposit and 12 monthly payments of 20/-.

### 11 GNS.

## BATTERY MODEL 366A

A Battery operated Superhet with Pentagrid Frequency Changer, H.F. Screened Pentode I.F. Amplifier, Double Diode Detector and Economy Pentode Output. 8" Moving Coil Speaker. Cabinet generally similar to above with accommodation for suitable Accumulator and Batteries.

Hire Purchase Terms: 17/6 deposit and 11 monthly payments of 17/6.

### 9 GNS.

(Exclusive of Batteries.)

## DE LUXE A.C. MAINS MODEL 365

(illustrated on right)

With a performance unsurpassed by any receiver regardless of price, this model incorporates every possible refinement that gives greater efficiency, simplicity and dependability. With Pentagrid Frequency Changer, H.F. Pentode I.F. Amplifier, Double Diode Triode Detector/Amplifier, Super Power Triode Output, Full-Wave Rect. Improved Superhet compensated Anti-Fading circuit with NEON Visual Tuning. Twin illuminated and detachable Scales. Combined On/Off Wavechange and Pick-up Switch. Volume Control. 10" Concert Grand Mains energised M.C. Speaker. Variable Tone control. Provision for extension speaker. Connections for pick-up. A.C. Mains only 200/250 volts (adjust.) 40/100 cycles.

Hire Purchase Terms: 25/- deposit and 12 monthly payments of 25/-.

### 14 GNS.

Here are typical examples of Cossor 1935-36 Radio—modern quality receivers for every purpose and pocket. Backed by the country's finest research laboratories—by a big staff of highly qualified engineers, and produced by an organization which is the largest of its kind in the Empire—Cossor Radio is above all reliable. Ask to see (and hear) any one of these Receivers at your usual wireless shop—or send for free literature. Please use coupon.

## COSSOR SUPERHET RADIO



# 1936 Quality Radio



Illustration shows Models 368 & 436B. Models 360 and 363 are generally similar.

## COSSOR 'SUPER-FERRODYNE' RADIO

These receivers incorporate the famous Cossor "Super-Ferrodyne" developments in conjunction with the most modern of Variable-Mu Screened Pentode circuits, valve combinations and Super Selective Iron Cored Coils. The result is a degree of selectivity and range usually associated with Receivers much more costly. With any one you can enjoy the best of Europe's Wireless Fare—free from interference.

### BATTERY MODELS

#### Model 360 (Power Output)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. and Triode Power Output. Sensitive Moving Iron Speaker. Cabinet accommodates Batteries. **£5.15.0**

(Exclusive of Batteries)

Hire Purchase Terms : 12/6 deposit and 12 monthly payments of 10/-.

#### Model 363 (Pentode Output)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. and Economy Pentode Output. Sensitive 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries. **£6.15.0**

(Exclusive of Batteries)

Hire Purchase Terms : 13/- deposit and 11 monthly payments of 13/-.

#### Model 436B (Class B Amplification)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. High Slope Power Driver and Class 'B' Output. Special 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries. **£8.8.0**

(Exclusive of Batteries)

Hire Purchase Terms : 16/- deposit and 11 monthly payments of 16/-.

### ALL-ELECTRIC MODELS

#### Model 368 (A.C. Mains)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Triode Power Output, Heavy Duty Rect. 8" Energised Moving Coil Speaker. For A.C. Mains only 200/250 v. (adjust.) **£8.18.6**

40/100 cycles.  
Hire Purchase Terms : 15/6 deposit and 12 monthly payments of 15/6.

#### Model 369 (D.C./A.C. Mains)

Universal Receiver similar to illustration but without Bakelite Speaker fret. Specification as model 368 but with 8" Permanent Magnet Moving Coil Speaker. For D.C. 200/250 v. (adjust.) and A.C. 200/250 v. (adjust.) **£8.18.6**

50/100 cycles.  
Hire Purchase Terms : 20/- deposit and 11 monthly payments of 16/6.

#### De Luxe Model 367 (A.C. Mains)

(not illustrated)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Directly Heated Power Pentode Output, Heavy Duty Rect. "Thermometer Tuning" with illuminated wavelength scale, 8" Energised Moving Coil Speaker. For A.C. Mains only 200/250v. (adjust.) **£9.19.6**

40/100 cycles.  
Hire Purchase Terms : 17/- deposit and 12 monthly payments of 17/-.

Prices do not apply in I.F.S.

See them all at  
**RADIOLYMPIA  
STAND 70**

or send coupon for free literature giving fullest particulars.

### C O U P O N

To A. C. Cossor Ltd.,  
Highbury Grove, London, N.5.

Please send me free of charge, literature giving full particulars of the \*Model.....

\* Please state Model required.

Name .....

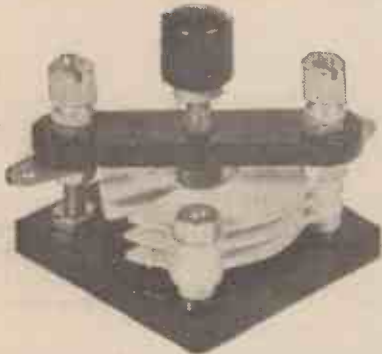
Address.....

.....

P.B.A.C. 10/9/35.

# MORE PRE-SHOW RELEASES

**F**URTHER details are now to hand concerning some of the new devices which will be introduced to the listening public at Olympia, and the indications are that there will be quite a number of features which have been produced not to improve a particular device from the technical point of view, but to offer to the user added protection or safeguard. For instance, the user of a low-tension accumulator fully appreciates now that continued over-running and under-charging soon result in the destruction of the complete battery, with subsequent replacement. A voltmeter and a hydrometer, together, give a perfect indication of the condition of the battery, but many users will not bother to use these devices, or find it tiresome to have to make a combined test. A time-table may be kept, but again there is always the risk that some particular listening period will be omitted and thus the cell will be over-used, or at least kept in circuit until it fails to give



An air-spaced trimming condenser for balancing stray capacities in tuned circuits.

signals. This is bad for the accumulator, and in such a case a slow charge should always be given to avoid disintegration of the plates. In the new Oldham accumulator which is illustrated on our cover this week you will see a very simple and neat device which shows at a glance the exact condition of the battery. No doubt can possibly arise, and the cell may be relied upon to give longer service if the indications on the side are accurately followed.

## Automatic Gramophones

Lovers of opera and other musical items which are recorded on a number of records will be interested in the automatic record-changing apparatus which will enable many records to be played through on both sides without manual operations. Complete operas and musical comedies have been obtainable for some time, but much of the pleasure is lost when the records have to be turned over for each side and the pick-up replaced on the first groove. With the special apparatus shown on the cover, from 1 to 30 records may be stacked on the left, irrespective of their size (10in. or 12in.), and they may be mixed in any desired manner. This latter point is, of course, of more interest to those who are running dances, etc., as the operas above referred to are generally all recorded on the same size of disc. When switched on, this apparatus plays both sides of each record in sequence, or one side only, as desired. As the record is finished it is automatically rejected, the carrier-arm rises and travels to the position required for the commencement of the next record, and this is placed

Further Details of Some Novelties  
Which Will Be Seen at This Year's  
Radio Exhibition at Olympia

on the turntable ready for playing. With a good radiogram it is thus possible to hear a complete opera or piece of music from beginning to end without rising from the chair, and the only word of warning is to use a "permanent" needle!

## Portable Radiograms

Many listeners—especially those living in small flats—would prefer a radiogram, but in general the size of cabinet used for this type of apparatus rather precludes it from inclusion in addition to the remaining furniture. Similarly, those who are fond of the open air and take a portable wireless receiver for use on the river or in the country, often wish to hear music when the programmes are not being radiated, or wish for a different type of music from that being picked up. A portable radiogram, such as that produced by Decca, will then be found of great value, as it is very little larger than the ordinary portable gramophone, but incorporates an electric reproducer and a complete superhet. radio receiver. The cost is only £12 12s., and this particular model is also obtainable



The playing table for converting an ordinary receiver into a radiogram.

for Universal (A.C.-D.C.) operation at £1 1s. more.

## A Convertogram

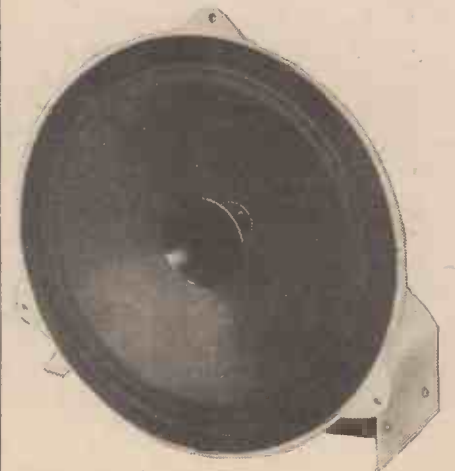
Listeners with the ordinary type of consolette, or table-model, receivers may also be interested in the neat device produced by Cosmograd for converting such a receiver into a radiogram. The apparatus consists of a small drawer-like cabinet containing a complete playing equipment, that is, motor, turntable, speed and volume controls, pick-up, and needle-cups, and designed for A.C. mains operation. When the pick-up leads are connected to the receiver the complete equipment becomes a radiogram and takes up very little more room than the original receiver. If desired, it may be obtained in the form of a pedestal with storage space for records, but then, of course, the space-saving advantage is lost.

## Short-wave Components

In view of the imminence of short-wave television programmes, there will be many new short-wave components, some of which will have very original ideas incorporated. One of the most important features of a short-wave television receiver will be the wide frequency response which will have to be obtained to get good quality pictures. Obviously, therefore, the ordinary 9 or 10 kc/s band-pass components will not be suitable, and in a superhet. the I.F. transformers will have to be of a different type. Several firms will show special I.F. transformers possessing variable selectivity devices so that the band width may be varied according to the needs of the listener, i.e., wide for television pictures and narrow for broadcast programmes. Special tuning coils and condensers will also be on view, but no doubt the special H.F. choke made by the Kingsway Radio Company, and reviewed on our "Facts and Figures" page, will attract considerable attention. The idea of using a liquid inside a tube, with the choke enclosed in it, is certainly a novelty.

## Quality Components

There appears to have been a decided advance in the production of components for better quality reproduction, and speakers in general will be found to have been remodelled. The combination of a special high-note reproducer, with the ordinary moving-coil unit, will enable a much greater frequency band to be covered, and one of the speakers incorporating the two units is shown on this page. It is a W.B. production and is now included in their Stentorian range of speakers. The small horn speaker for the upper frequencies may be seen in the centre of the cone diaphragm, and a splendid overall response is claimed for this particular speaker. Messrs. Bakers, Selhurst are also producing a special combined speaker consisting in this case of three separate speakers claimed



A new W.B. speaker giving a wide range of reproduction.

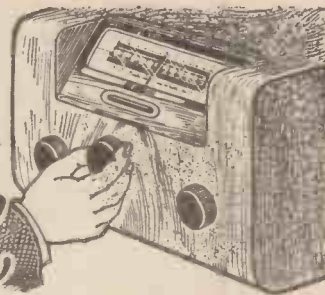
to cover a band from 30 to 18,000 cycles. A further novelty in this particular speaker is a "Variable Frequency Response Unit," which enables the actual response of each speaker to be modified.

**RADIOLYMPIA!**  
Our Stand No. 9 (Ground Floor)





# On Your Wavelength



By Jhermion

## The Six Pips

EVER stopped to picture in your mind the effect of the six pips? We do not now need to check our timepieces by one of a dozen or more local clocks, any one of which may be wrong! We can now check the time several times a day, and I often reflect upon the many thousands who pull out their watches or gaze at the clock on the mantel when the familiar six pips are broadcast.

The ship's chronometer can be kept to exact time, and even railway time nowadays means something more accurate than the position of two hands on the station clock at a particular moment.

Many readers continue to wonder whether the first pip or the second pip indicates exact time. Make a note of the fact that it is the last (or sixth) pip which indicates the time. The other five are merely warning pips signifying "Get Ready." The pips are each of one-second duration.

## Police Transmissions

THUS a letter from C. W. P. (Northants): "Re your remarks on police radio transmissions, you may be interested to hear that on July 15th, 1935, at about 21.20 G.M.T., I received at good R9 strength a series of tests from Station GTM, which I was later able to identify as the call of the Liverpool Police. This station operates on a wavelength of 145 metres (just below the 1.75 metre amateur band). Both C.W. and telephony were used and the speech quality was excellent. The operator was heard giving H.Q. instructions to the mobile units G.T.M. 1, 2 and 4. Judging from the considerable strength of this station, I should imagine that reception in the States would be quite possible under favourable conditions. It would be rather thrilling to hear the U.S. cops giving to our own force the description of a wanted gangster free in England! By the way, the R.X. used here is a 1-v-0 T.R.F., with no other L.F. amplification."

## A Short-wave Fan

THERE are those who consider that listening on the short waves is an over-rated pastime, indulged in by those who like to smother their walls with verification cards—mere pot-hunters! There waited into my office the other day, like a breath of fresh air, a letter from one J. S., of Aberdeen, who indited the following epistolary eulogium:—

"I have built exactly seventeen short-wave sets including two superhets. I also bought a commercial four-valve set, and I sold it a week after at a good loss. I am now absolutely satisfied with the set I have—the set I have dreamed about. It is one

of your sets, namely, the World Ranger three-valve. There is hardly any background noise, which I think is the greatest thing in S.W. reception. In three nights I toured the world. With this fine set in one night I received seventy-five W. stations on 'phone and C.W., and this is a fact. Also about 15VE stations, and many other parts of the world. W1HFC and W8IMF-WIC5 and W3CRG were absolutely R9. I could hear them at the other end of an 18-ft. room using 'phones. The reaction control is 20-1 slow motion, and it is very



COLLAR SOL-  
DERS TO  
POINTER

THE POINTER  
(BRASS) WITH COLLAR  
SOLDERED ON IS  
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CONVERTING AN OLD  
TYPE DIAL (ABOVE)  
TO A MODERN STYLE  
THE POINTER FITS ON  
THE DIAL SPINDLE.  
THE KNOB ON THE SLOW  
MOTION SPINDLE.

A METHOD OF ILLUMI-  
NATING THE M.W. & L.W.  
DIALS ALTERNATIVELY

READING OR  
PASSE-PARTOUT

M.W. BULB. L.W. BULB.

CARDBOARD  
OR IVORINE  
SCALE

TIN OR ALUMINI-  
UM SHIELD

smooth. On the 20-metre band I get W. stations in as early as 8 p.m. B.S.T. The two other best sets of the bunch were the A.W. Melody Ranger and the World-beater 4v. But, alas, the background noise ruined all the weak carriers.

## Send Me Your Logs!

"I OFTEN wonder if anyone else obtains similar logs to those I get. If so, I would like to see them published so that

Make a Note of it.  
Our Stand at Radiolympia  
No. 9, Ground Floor.

I would get an idea what conditions are like elsewhere. I use three antennæ; not all at once, of course. I have them directional for U.S.A., Australia, South America. I am sure S.W. are becoming more popular every year, and may I add that your P. AND A. WIRELESS always has a space left for S.W. notes, but I notice your past "Leaves From A S.W. Log" never mentions anything about 7-metre and 14-metre bands, which is crowded with telephony stations which I am sure would be of great interest, and also mention time which is best to listen. I find myself on the 14-metre band at 05.00 till 07.00. The W. stations come rolling in at R4 to R9 on the 7-metre band. There is not much chance of telephony with W. stations, but there are plenty of Spanish stations at 11 p.m. onwards. With the broadcasters W2XAF is an R9 signal from 11.30 p.m. onwards, with W8XK R6 and PRF5 a steady R7, fading to R6 on the 75-metre band. I think it is very poor unless conditions are very good. I suppose I have written a lot of stuff you hear daily and you never heed it, but still, I had to get it off my chest and I may mention I will not write you again—well, anyway, not until I see a very hot short-waver which takes my fancy. Well, I wish P. AND A. WIRELESS all the best, and again thanks for a really hot short-waver. I get a good laugh when I see people say that they got W2XAF on a superhet short-wave receiver. I can get W2XAF R3 using my finger as an aerial and I never use an earth. So remember and mention this to your short-wave fans. By the way, I was at an auction sale the other week and I bought a huge transmitter valve for 5s. 6d., and I was going to send it to you for a token of good respect for your notes each week, but if I remember the last time you received one you blew all the fuses.

## Schoolboy Howlers

"I SEE that in this week's PRACTICAL AND AMATEUR WIRELESS you comment on schoolboy 'designers.' I would like to say that some schoolboys, not myself, can solder and build sets quite as well, and sometimes better, than their 'betters.'"

Thus E. H. (Freshfield). I am sure all my readers will agree that some schoolboys can make sets. Very few, if any, can design them. Experience only comes with years of practice. Well, Abyssinia, as May West said to Mussolini! Prosperity is round the Crooner!

## Heating by Wireless

WE have heard many stories of "death rays," and of other forms of wireless radiation which can stop aeroplane engines, etc., but now comes news of a really useful method of employing the wireless ray, this time for the transference of heat. You will no doubt remember that some time ago I suggested that we might one day see the radiation of power in such

(Continued overleaf)

(Continued from previous page)

a form that motor cars and other vehicles could travel without any source of power in them—all energy being picked up by an aerial from a central depot and converted into the necessary tractive effort. The new idea concerns heating for the home, and is supposed to be carried out by means of a radiator of energy, charged, say, at 500 volts and transmitting on a wavelength between 2 and 5 metres. The radiation is in beam-form, and a wire about 20 centimetres long is used as a receiver and is placed in the ray from the transmitter, whereupon it glows. The degree of heat is controlled by varying the length of the wire, and it is claimed that with a single transmitter one can provide sufficient energy to heat a whole block of houses, a district, or even a town. The only snag which occurs to me is—what happens if one steps in the path of the ray and is wearing a watch-chain or some other similar piece of metal which might pick up the energy? Perhaps we must wear asbestos suits!

### Another Battery Boon?

IT would appear, from some advice I have just received, that another boon is at hand for the battery user. The present accumulator is a source of worry, as is also the H.T. battery. What with getting the one charged, and throwing the other in the dust-bin when it is exhausted, there is no wonder that the man who is forced to use batteries envies his more fortunate friend with mains facilities. The new invention is a re-chargeable dry battery, and the scope of this invention is widespread. Firstly, a normal dry cell has a voltage of only 1.5, whereas a wet cell has a voltage slightly over 2. If an H.T. battery is constructed from the 2-volt units it will obviously require fewer cells for a given voltage, although it may be heavier. The ordinary H.T. accumulator is valuable, but cannot easily be taken to the charging station. The new dry cell is more robust, absolutely dry, and possesses all the advantages of the ordinary L.T. cell but without the disadvantage of the liquid electrolyte. Tests have shown that there is great promise in the idea, and it now only remains to see how it is produced for use and the cost of the H.T. and L.T. units. It is stated that an H.T. battery will naturally be slightly higher in cost than a dry battery as supplied to-day, but it will be cheaper than a wet H.T. battery. Size for size, the capacity will be higher, as I mentioned above.

### Super Quality

I CALLED on a "quality fan" the other day and received the shock of my life. I had seen many American advertisements for 15 and 20-valve superhets and I really thought that such an arrangement was beyond the scope of ordinary reason. This quality fan, however, had a marvellous set, and there were over 30 valves in it! Fortunately (for his neighbours, that is) they were not all used at once, but the apparatus was divided into three complete units. There was a straight radio portion consisting of H. F. and detector stages with home-made coils and push-pull detector stages. Another part of the equipment was an L.F. amplifier with tone-control valves and goodness knows what, to produce the best from radio signals, whilst the gramophone amplifier was a completely separate unit with its own mains section. Finally, to make matters complete he had three speakers all mounted on the baffle and claimed that



### Indirectly-heated Rectifiers

INDIRECTLY-HEATED mains valves take approximately thirty seconds to heat up, and therefore during the half-minute period after switching the receiver on, the anode current passed by this type of valve is very low. If there is a high valve resistance in the anode circuit of the valve, the voltage actually applied to the anode during the heating up period will be abnormally high if the rectifier is of the directly-heated type. This high voltage is, of course, likely to damage the smoothing condensers. Fortunately, however, there are indirectly-heated rectifiers available, and when one of these is used no voltage is applied to the valve anodes until the valves are fully heated, and therefore a voltage surge is not obtained when switching on. When an indirectly-heated output valve is used, an indirectly-heated rectifier is particularly desirable, otherwise damage to the mains unit smoothing condensers will probably occur, but if this valve is of the directly-heated type a directly-heated rectifier may be used, provided that the preceding valves require approximately the same anode voltage as the last valve. When the anode voltage required by the latter is greatly in excess of that required by the other valves, an indirectly-heated rectifier should be used, even though the output valve is of the directly-heated type.

### Combination Volume Control

WHEN an efficient aerial-earth system is used, it is often found that the normal grid bias volume control on the variable-mu valve does not prove entirely satisfactory. It is possible, however, to connect a potentiometer in such a manner that it controls both the aerial input voltage and the bias voltage of the H.F. valve. This type of control is easily applicable to the mains type of valve and should be connected in the following manner. Using a potentiometer having a value of between 3,000 and 5,000 ohms, one end terminal should be connected to the aerial terminal, the other end terminal to the earth end of the cathode bias resistance of the H.F. valve, and the centre terminal to earth terminal. A study of the theoretical circuit of this control will indicate that the aerial coil is short-circuited when the H.F. valve bias voltage is at maximum.

### Eliminating Hum

HOME constructors find it very difficult to construct mains receivers that are hum-free. If all the components are in good order, the existence of hum indicates that the receiver design is at fault, and it is surprising how apparently unimportant details such as the omission of component or wiring screening can cause excessive hum to occur. It is advisable completely to screen all L.F. and H.F. chokes and L.F. transformers, and in multi-valve receivers screening of the wiring is very desirable. When tuned circuit leads are screened, however, they should be kept as short as possible, otherwise the lead-to-screen capacity will be very high, and accurate ganging of the tuned circuits will be very difficult.

each was provided with a tone filter, so that it handled only a portion of the complete frequency scale. I must admit that it sounded good, but I am not certain whether the results justify the complication.

### Dordrecht (Holland)

HAS any listener picked up a Dordrecht (Holland) station—possibly an amateur, of which the call-sign, not so far published, has been heard as PAI1J or PI1J? The channel used was judged to be about 42.35 or 42.4 metres, and the transmission was logged on two occasions (Saturdays) between B.S.T. 17.10 and 18.30. Announcements in a male voice in Dutch and English intimated that relays were to be effected of the Huizen programme, but on one occasion the London Regional entertainment was tapped. Truly a mystery station!

From the Far East comes the news that ZBW, Hong Kong, on 34.29 metres (8,750 kc/s), is again in operation daily. The programmes, as well as the announcements, are in the English language, and should be sought for between B.S.T. 11.00-14.30; a time signal and weather report is transmitted at midday, B.S.T.

Of the Japanese stations, there are only two now utilised for the broadcast of short-wave programmes—namely, JVN, 28.14 metres (10,660 kc/s) and JVM, 27.93 metres (10,740 kc/s). The former is on the air with a relay of the Tokyo programme, irregularly, between B.S.T. midday-16.30, and the latter daily between B.S.T. 06.50-07.20 and between 09.00-12.30. Every Saturday from B.S.T. 04.30-09.00, and every Sunday from 05.30-09.00, a relay is effected from some sports stadium.

### ZHI, Singapore

DETAILS are also forthcoming of two short-wave broadcasting stations in the Straits Settlements and in the Federated Malay States. ZHI, Singapore, on 49.9 metres (6,012 kc/s), is on the air four times weekly, namely, B.S.T. 10.40-13.10 (Mondays, Wednesdays, and Thursdays), and between 10.10-12.40 (Sundays). Every second and fourth Sunday a service is relayed at 10.40 from the Presbyterian Church, preceded by an organ recital. On Mondays at 11.40 a concert is broadcast from the Tomlinson Hall, Singapore. The station closes down with the call ZHI, Singapore, followed by a cheery "Good-night, listeners, good-night," and the playing of "God Save the King."

ZGE, Kuala Lumpur (F.M.S.), which during the winter was operating on about 75 metres, has now settled down on 48.94 metres (6,130 kc/s). The studio is run by the Malayan Amateur Radio Society, which supplies the entertainments on Sundays, Tuesdays, and Fridays between B.S.T. 11.40-13.40. Although the call is given out frequently, no interval signal seems to be used between items, but the station opens and closes with a signature tune: "Let's Call it a Day."

### A Newcomer

A NEWCOMER who has been logged for the first time in the British Isles is apparently TIRRC, San José (Costa Rica), which was previously advertised on 6,550 kilocycles (45.8 metres), and during the summer months would seem to be working on 13,100 kilocycles (22.9 metres). Broadcasts are made daily between B.S.T. 23.00-02.00, and announcements given out in both Spanish and English. The interval signal consists of three notes repeated *ad. lib.*

# Designing Your Own Wireless Set

IN connection with the high-frequency amplifier, the design of which we were discussing last week, it now remains to deal with the coupling to be used between the H.F. stage and the detector. There are at least three forms of coupling available, and each of these has its own particular merits, and all are suitable for incorporation in a modern receiver. Perhaps the most usual form of coupling is that known as the tuned-grid, and shown in

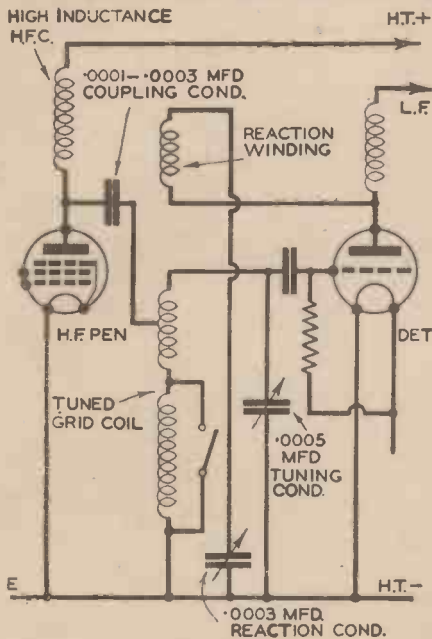


Fig. 1.—A tuned grid intervalve circuit (with reaction). Battery valves are shown, but the connections are similar for mains valves.

diagrammatic form in Fig. 1. In this arrangement an H.F. choke is included in the anode circuit of the H.F. valve and a lead is taken from the lower end of this to one side of a fixed condenser, the other side of which is joined to the tuning coil in the grid circuit of the detector.

This circuit arrangement is very suitable when building an amplifier for adding to a normal detector-L.F. receiver, since the fixed condenser is then merely connected to the aerial terminal of the original receiver. It is evident that the high-frequency amplifier simply takes the place of the aerial, supplying the input to the detector—but after amplification. The tuned-grid coil calls for very little consideration, for it is simply a standard tuner of any type, although if a ganged condenser is to be employed it should have characteristics exactly similar to those of the tuning coil used in the grid circuit of the preceding valve. If the coil is of different type it is probable that it will be impossible properly to trim the sections of the gang condenser, with a result that there must be a tremendous loss in signal strength, especially at certain parts of the tuning scale. To prevent this trouble, the best course is to employ separate condensers for the two circuits or to use a two-gang condenser of the type having an external trimming adjustment capable of producing a fairly wide variation in capacity—0.0001 mfd., for example.

### The S.G. H.F. Choke

The H.F. choke is a very important link in the circuit, and has a considerable

### The Choice of Coupling Between the H.F. and Detector Valves is Dealt With, and Preliminary Notes Regarding Layout are Given

influence upon the efficiency of the finished set. First and foremost the choke should have an inductance of not less than 200,000 microhenries, whilst a value of twice this figure is to be preferred when using a high-frequency pentode, the A.C. resistance of which might easily be as high as 1,000,000 ohms. The choke should also have as low a self-capacity as possible consistent with the appropriate inductance, a value of 3 to 5 m.mfd. being sufficiently good for the purpose. It is also desirable that the choke should be of the screened type, since the screening assists very considerably in obtaining stable operation of the receiver when it is adjusted to give really high amplification. It is sometimes considered that if the coils are screened it is unnecessary to screen the chokes as well, but it must be remembered that the latter can create an extensive magnetic field which might easily "link" with nearby connecting leads and other necessarily un-screened components such as fixed condensers.

The fixed coupling condenser is not generally a critical component, and it is almost invariable to choose a value of .0002 mfd. for it. This is, in fact, a good average, but a certain increase in selectivity can be obtained by reducing this value to .0001 mfd., and a little extra signal strength may be gained by using a capacity of .0003 mfd. This point will best be appreciated when it is remembered that the condenser acts in a very similar manner to that component frequently included between the aerial lead-in and the aerial terminal on the set; this being the case, many constructors may prefer to use a pre-

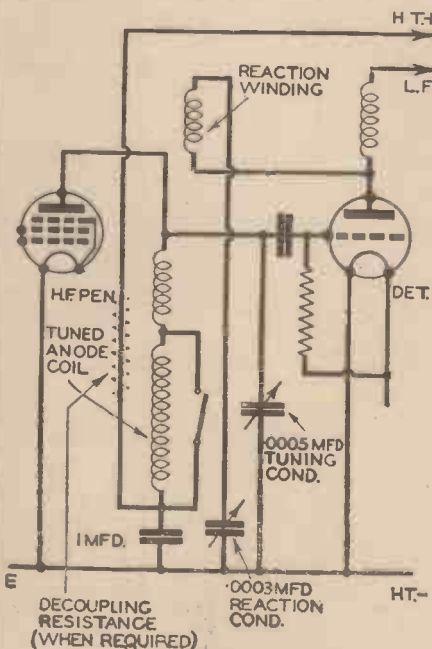


Fig. 3.—An improved tuned-anode arrangement in which an ordinary gang tuning condenser can be employed.

set condenser, which can be modified until the most suitable capacity is found.

### Tuned-anode Connections

A simpler circuit than the tuned-grid is the tuned-anode arrangement shown in Fig. 2. In this case the choke is not required, the tuned winding of the coil being wired directly in the anode circuit of the H.F. valve. Correctly used, this method of connection—in theory, at any rate—

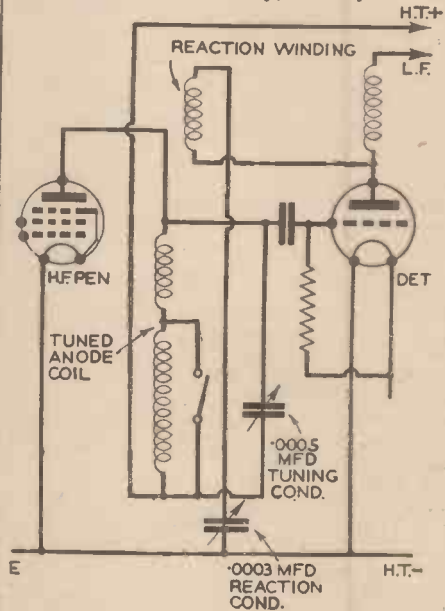


Fig. 2.—The simplest form of tuned-anode circuit in which the tuning condenser is connected in parallel with the anode coil (the same type may be used as in a tuned-grid circuit).

gives rather greater input to the detector than the tuned-grid circuit, although in practice this is not always realised. The reason for the greater efficiency is that the impedance in the anode circuit of the H.F. valve is infinite when the set is tuned to a

(Continued overleaf)

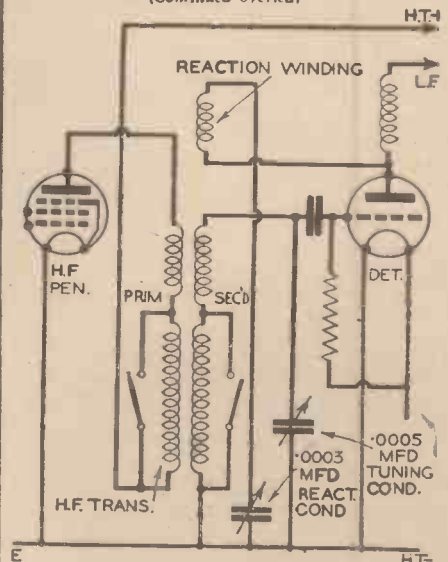


Fig. 4.—An inter-valve coupling circuit which combines the advantage of tuned grid and tuned anode—the tuned H.F. transformer arrangement.

(Continued from previous page)

signal, whereas the impedance of the choke must be appreciably lower. The chief practical advantage of tuned anode however, is that it saves a choke and a fixed condenser. On the other hand the circuit as shown has the definite disadvantage that the moving vanes of the tuning condenser are not connected to earth, but to H.T.+ which means that a gang condenser of normal type could not be used. This little difficulty can easily be overcome by using the connections shown in Fig. 3, where a 1-mfd. fixed condenser is connected between that terminal of the coil which is joined to H.T.+ and earth, the variable tuning condenser being connected between the anode of the H.F. valve and earth. It will be seen that in this case the tuning condenser is in series with the high-capacity condenser across the coil; this, however, produces the same effect as when the tuning condenser alone is in parallel with the windings. When it is necessary to decouple the anode circuit of the H.F. valve, or when the H.T. voltage to it has to be "dropped," the 1-mfd. condenser is required in any case, and so its cost need not be considered. A decoupling resistance is indicated in Fig. 3 by broken lines. There is one other slight disadvantage of the tuned-anode circuit, even when it is arranged as shown in Fig. 3, which is that the full voltage of the H.T. supply is applied between its terminals, so that if the vanes were to touch a short-circuit would result. Provided that a good-class condenser be used, however, this can be ignored.

### H.F.-transformer Coupling

The third form of inter-valve coupling is that shown in Fig. 4, and this is in reality a combination of the other two arrangements. The coupling provided is by means of an H.F. transformer, the secondary winding of which is tuned, the primary being aperiodic, and it is identical in principle with the aerial tuner shown in the circuits dealt with last week. In the present instance it is not possible to use a three-point wave-change switch, and two separate on-off switches, or a four-point switch, must be used instead, unless a by-pass condenser is used in the same manner as in the tuned-anode circuit described above. The tuned-transformer method of coupling combines the advantages of both of the systems previously considered, besides which, theoretically, it provides a certain amount of voltage step-up, due to the secondary winding having a greater number of turns than the primary. This additional amplification is not always realised in practice, but the method of coupling is extremely good when a well-designed coil is employed. But if a poor coil is employed it is usual to

find that the receiver is very inefficient at various wavelength settings, or that reaction control is very "unsteady."

As far as the single-valve high-frequency amplifier which we are considering is concerned, it does not matter very much which of the three types of coupling is used, provided that the disadvantages and special points dealt with are borne in mind. On the other hand, when we come to consider a receiver having two H.F. stages the position is rather different, and it is best for the amateur to avoid using a pair of tuned-anode circuits, because it is then usually rather difficult entirely to avoid

required by the constructor-designer in planning his own particular receiver.

One explanation of the matter of arranging the parts is to the effect that they should be placed as nearly as convenient in the same relative positions as they occupy in a conventional circuit diagram. This is not a bad way of viewing the question, since a circuit is drawn in the most compact form possible, so that the leads between the various components are as short as possible, that the H.F., detector, and L.F. sections of the circuit are spaced out, and that there is a logical sequence of valve stages. This general idea can be followed whether chassis

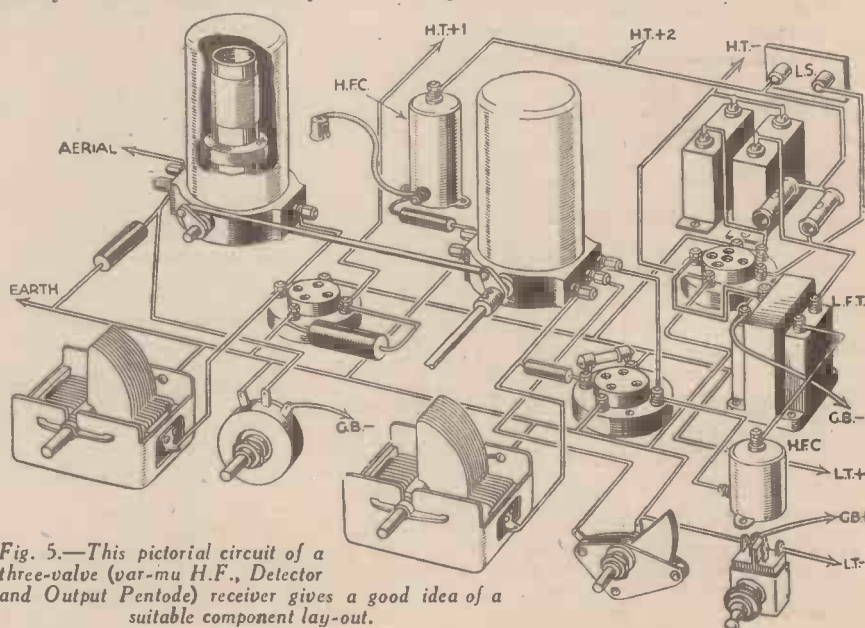


Fig. 5.—This pictorial circuit of a three-valve (var-mu H.F., Detector and Output Pentode) receiver gives a good idea of a suitable component lay-out.

self-oscillation, due to the fact that the circuits are too efficient. This matter, however, we will consider in greater detail when working out the design for a two-stage H.F. amplifier.

### Component Lay-out

It will probably be best now to turn away from the purely circuit design for a time and deal with the question of component lay-out. This is, unfortunately, a matter which is rather difficult of adequate explanation. The principal reason for this is that the actual disposition of the components must depend, essentially, to a very great extent upon the size of chassis or baseboard, and the type of cabinet into which the finished receiver is to be fitted. Because of these difficulties we must first explain the matter in rather general terms in an attempt to supply the information

or baseboard construction is adopted, but in the former case the parts can be rather closer together and may "overlap" to a certain extent, due to the fact that some are mounted on the upper, and some on the lower surface of the chassis. An example of a suitable general arrangement of the components in a three-valve (variable-mu H.F., detector, and pentode) circuit is shown in Fig. 5, and from this it will be seen that particular care has been taken to ensure that the leads in the anode and grid circuits of the first two valves are kept short and direct; this is not nearly so important in connection with the filament leads, and with those wires joining together the low-frequency components. We will go more deeply into the question of layout in the next article of this series, when it will be possible to make particular reference to certain points which should receive special attention.

### "Quayside Nights"

THE third port to feature in the series "Quayside Nights" will be Plymouth, and a relay will be taken from the city on August 10th for Western listeners. The commercial and the fishing side of the port will be included, but as, by history and tradition, Plymouth is prominently a Naval port, it was specially arranged that this broadcast should take place in Navy Week.

### "Sunshine Follies of 1935"

THE microphone goes to the Pavilion Theatre, Perth, on August 12th, to pick up the sparkling entertainment provided by Bert Denver, Harry Niblock, Molly Milne, the Two Rhythm Kings, the Morrell Sisters and the Follies Band, in "Sunshine Follies of 1935."

## PROGRAMME NOTES

### Malvern Festival Concert

FOR the second of the Malvern Festival concerts by the City of Birmingham Orchestra on August 11th, the conductor is Leslie Heward. Mozart's Symphony in C is the principal work to be given. Frank Titterton, tenor, who is a Birmingham man, will sing with orchestra, "Lend Me Your Aid," from Gounod's "The Queen of Sheba." This concert will be relayed from the Winter Gardens.

### Harry Kemp's "Jubilee"

AN excerpt from Harry Kemp's "Jubilee" will be relayed from the Barrfields Pavilion, Largs, on August 15th. The cast includes Bert Bendon, Betty Jumel, Nancy Fraser, Pete Davis, Bond Rowell, Nan Kennedy, Jack Radcliffe, French and Jerome, Harry Carmichael and his Band, and the Gordon Ray Girls.

### "Australia by Windjammer"

ON August 10th Northern Ireland listeners will hear a talk by William L. Stephens, a young Belfast man, who sailed last autumn to Australia in the *Herzogin Cecilie*. One of the most interesting things about this voyage was the degree of luxury, or at any rate of comfort, enjoyed by the passengers.



# SHORT WAVE SECTION

## A Two-Valve A.C. Short-Waver

Details are Given for an Excellent All-wave Receiver which is Simple, Comparatively Inexpensive, and Highly Efficient

It is often thought that mains-operated receivers are not very satisfactory for short-wave reception, but this is far from being true. In fact, a very simple two-valve A.C.-operated set gives results which are far superior to those given by the average three-valve battery set, and the circuit reproduced on this page shows the essentials of a remarkably good short-wave two which is suitable for either the beginner or the experienced experimenter. The arrangement is particularly simple and inexpensive, whilst being easy to operate and capable of extremely good reception on 'phones or speaker.

### Six-pin Plug-in Coils

Perhaps it will be best to describe the circuit throughout, following through it from the aerial to the output system. In the first place, a 6-pin plug-in coil is used in the aerial circuit, the primary of this being untuned and connected between aerial and earth. The secondary is tuned by means of two variable condensers which provide band-spreading, and the reaction winding is series-connected between the anode of the detector valve and the L.F. choke used for inter-valve coupling. Of the two tuning condensers, one has a maximum capacity of .00016 mfd. and the other, of 40 mfd. The former is for normal tuning from one band to another, whilst the latter is for final tuning on any particular band. It should be mentioned, incidentally, that the coil is interchangeable with several others, so that any desired wavelength range can be covered from about 12 metres right up to 2,000 metres. It will thus be seen that, although the receiver is specifically designed for short-wave use, it can also be employed for broadcast reception when the occasion demands.

The detector is of the leaky-grid type, a normal three-electrode valve being used, but it should be particularly noted that the cathode of this valve is joined not only to earth, but also to the junction of two .0003-mfd. fixed condensers wired in series between the heater leads. These condensers should be mounted as close as possible to the terminals on the valve holder, so that the leads to them are no more than an inch or two long. The object of this rather unusual method of connection is to avoid all trace of mains hum, which can be so troublesome in a sensitive short-wave receiver.

### An Unusual Reaction Circuit

Passing to the anode circuit of the detector it is seen that, contrary to the usual practice, the reaction winding is connected directly in the H.T.-feed line

instead of being virtually in parallel with an H.F. choke. This is the circuit generally associated with a movable reaction winding, but in this instance the winding is fixed, and the degree of feed-back is controlled by means of the .0002-mfd. (maximum) pre-set condenser between the reaction

winding and earth, and also by means of the 50,000-ohm variable decoupling resistance in series with the L.F. coupling choke. It is found that, after a preliminary setting of the pre-set condenser, reaction can be controlled completely by altering the setting of the variable resistance; on certain wavebands, however, it might sometimes be found better to modify the capacity of the pre-set. This form of control has the great advantage that its use does not affect the setting of the tuning condenser; it is generally condemned because the variable resistance is found to be "noisy," but this need not be the case if a really reliable component be used. At the same time, those who prefer to employ the more orthodox arrangement can replace the variable resistance by a fixed one of the same value, and use a .0002-mfd. short-wave variable condenser for reaction control.

### L.F. Stability

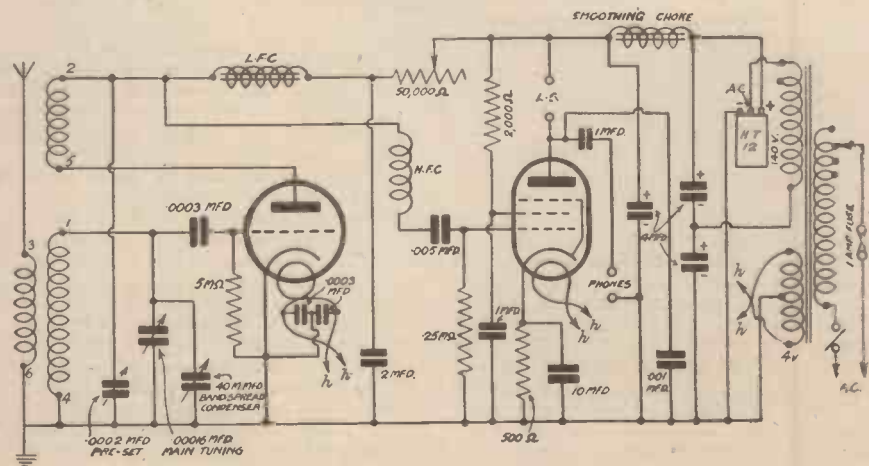
The feed to the second valve—a power pentode—is taken through a short-wave H.F. choke, which prevents H.F. leakage and so ensures stability of the L.F. amplifier. This choke performs the same function as the more usual "stopper" resistance, but somewhat more efficiently. It might be questioned whether choke-capacity L.F. coupling is as satisfactory as transformer feed, and the answer can be given that it is almost invariably better when a pentode is used in the output stage because the amplification provided by this is extremely great, and the use of a transformer increases the liability of instability.

The priming grid of the output pentode is fed through a 2,000-ohm resistance and is by-passed by a 1-mfd. condenser, whilst a .001-mfd. condenser is joined between

(Continued overleaf)

### PRINCIPAL COMPONENTS REQUIRED

- One aluminium or metallised chassis, 12in. by 10in. by 2½in. deep.
- One ebonite panel, 12in. by 8in.
- One Polar .00016-mfd. variable condenser.
- One Ormond 2½-in. plain dial and knob (for above).
- One Eddystone 40-mfd. "Microdenser"
- One Polar "Arcuate" condenser drive (for above).
- One Eddystone 6-pin coil base.
- Eddystone 6-pin S.W. coils according to wave-range required—type 6LB for 12-26 metres, 6Y for 22-47 metres, etc.
- One J.B. "Midget" .0002-mfd. reaction condenser.
- Two Clix 5-pin chassis-mounting valve-holders.
- One Eddystone screened S.W. choke, type 983.
- One Varley L.F. choke, type DP.24.
- One Bulgin 50,000-ohm chemical volume control, type V.C.60.
- One Wearite 30-henry smoothing choke, type H.T.35.
- One Heayberd mains transformer, type W.41.
- One Westinghouse metal rectifier, style H.T.12.
- Four T.C.C. tubular fixed condensers: one .001 mfd. and three .0003 mfd., type 300.
- Three T.C.C. fixed condensers; one 2 mfd., and two 1 mfd., type 80.
- One T.C.C. 10-mfd. electrolytic condenser, type 521.
- Three T.C.C. 4-mfd. electrolytic condensers, type 802.
- Four Dubilier 1-watt metallised resistances: 500 ohms, 2,000 ohms, .25 megohm, and 5 megohm.
- One Microfuse and holder, 1 amp.
- One Bulgin Q.M.B. on-off switch.
- Two Cossor valves, type 41MHL and 41 MP/Pen.



The circuit of the simple and efficient two-valve short-wave receiver described.

(Continued from previous page)

the anode of the valve and earth to by-pass any H.F. which might find its way into the speaker circuit. The speaker transformer is wired directly in the anode circuit of the valve, and serves as an output choke when 'phones are employed. By this arrangement the 'phones are isolated from the H.T. circuit, and complete safety is thus ensured. The only objection to this system is that the speaker remains in circuit when 'phones are connected, but it is not a difficult matter to fit a switch for breaking the circuit between the secondary of the transformer and the speech coil when desired.

### The H.T. and L.T. Supplies

The power-supply unit is of standard type comprising an H.T. 12 metal rectifier connected on the voltage-doubler principle, a mains transformer giving an output of

140 volts at 120 milliamps, and 4 volts at 4 amps., three 4-mfd. electrolytic condensers and a 30-henry smoothing choke. The H.T. output is approximately 200 volts at 35 milliamps, so that, allowing for the voltage drop across the smoothing choke, bias resistance and the primary winding of the speaker transformer, about 180 volts is applied to the anode of the pentode.

The layout of the components is not particularly critical, but it is very desirable that the mains-unit parts should be kept well clear of the coil and first valve, and that the two condensers in series between the heater leads to the detector should be placed directly beside the corresponding valve-holder. It is recommended that a metal chassis be employed, this being about 12in. long by 10in. wide by 2½in. deep. The coil, grid condensers and leaks, as well as the mains transformer, rectifier, and electrolytic condenser can then be mounted

on top of the chassis, along with the .00016 mfd. tuning condenser; the other condensers can be attached to the panel and the bulk of the other parts mounted on the lower side of the chassis. If this approximate layout is followed there should be no difficulty with regard to mains hum or instability.

The actual components listed on page 575 are not very critical, but they have been chosen carefully for use in the circuit in question, and it is therefore recommended that they should be adhered to as nearly as is convenient. Note especially that all three chokes are of the screened type and that the mains transformer is fully shrouded. Also observe the specified working voltages of the condensers, since those types intended for use in battery receivers will not safely withstand the peak voltages obtaining in a mains set using indirectly-heated valves.

## EXPERIMENTAL WORK FOR BEGINNERS

IN a previous article the writer advised prospective short-wave experimenters to start right by following a pre-determined plan in order to achieve success.

To those who must work alone the difficulty is that of knowing where to start and which type of receiver to build. Reading about the modern short-wave super-heterodyne, screen-grid, three- and four-valvers, short-wave adaptors and super-heterodyne converters, various types of simple and complicated aerial systems, each and all of which possess certain advantages, the beginner is naturally bewildered and feels a desire to try them all.

This brings us to a most important point. Whilst it is within the ability of the average radio enthusiast to build a duplicate of a published design, and in addition duplicate the results obtained by the designer, it is quite a different matter to select a theoretical circuit and design a receiver around it in which experimental components are incorporated.

There may be those who see no reason why it should be difficult, and who feel sure that they could do so without difficulty. My advice is, try it. Personally, I have never yet built and tried out an experimental receiver which on test proved that it could not be improved upon in some way or other.

Whilst the one-valve short-wave receiver may appear to an experienced hand as not worth bothering with, the beginner who commences to experiment with such comparatively simple apparatus will find when more ambitious receivers are under way, that the time spent in improving and hotting up various types of one-valve receivers was by no means wasted.

### The Detector Stage

The detector stage is the heart of every receiver. Pre-detector and post-detectors amplification enable us to obtain maximum volume from a given signal, and the number of H.F. and L.F. stages employed depends upon whether headphone or loud-speaker reception is desired.

An efficient detector stage will deliver a comparatively strong signal with a minimum of background noise or mush. To do this it must be stable in operation so that reaction may be increased until the detector valve is oscillating just below the spill-over point, and is thus functioning in the most sensitive condition.

A series of one-valve receiver experiments carried on until it is realised that maximum

In This Article the Author Gives Some Useful Hints on Which Type of Short-wave Receiver to Build.

By A. W. MANN

efficiency and sensitivity have been obtained is thus worthy of consideration.

### The Straight Two-valver

Attention may then be given to the straight two-valver. Here one's scope is widened as various combinations may be tried. First, the detector and transformer-coupled L.F. stage. Much useful DX work, using headphones, may be carried out with a receiver of this type, especially at this time of the year, when in addition to distant S.W. broadcast transmissions, American 20-metres amateur 'phones may be heard which, by the way, offer a useful test of sensitivity and efficiency.

Another step in the right direction is the replacing of the transformer coupling by an R.C.C. unit or the necessary components. Signals will not be so loud, but owing to the reduced background of mush, will be clearer.

### The S.G. Detector

By this time the beginner will have learned quite a lot about stability, and all round efficiency, but there still remains ample scope for further progress. The screen-grid valve when used as a detector has much to recommend it. An S.G. detector followed by an R.C.C. stage of L.F. coupling will provide ample scope for experimenters, and most likely surprising results during the aerial testing period, as this combination, I find, gives clear signals with an exceptionally low background.

Potential experimenters may have a circuit of the S.G. detector type on hand in which a 300-henries L.F. choke, and a .25 meg. resistance are specified as the coupling unit. This type of coupling which, by the way, provides all the advantages of both impedance and choke coupling, is worth trying if suitable components are to hand.

Whilst engaged on experimental work, the beginner should carefully examine all back numbers on hand, note every article or circuit of short-wave interest. TRF threes, fours and variants are worthy of special attention. Various problems associated with their design, lay-out and operation will present themselves.

### The S.W. Superhet

The amateur experimenter whilst favourably impressed with the various types of straight circuits tried out will probably wish to investigate the claims of the S.W. superhet. Before doing so a thorough grounding in fundamentals and troubles common to superhets is advisable, and the simplest types should then be tried out. Always remember that the time to build a comparatively complicated short-wave receiver is when you have sufficient knowledge and experience to tackle and overcome various troubles which may present themselves.

### Portables

The short-wave portable receiver is very popular amongst American experimenters. The writer has read several accounts dealing with world-wide reception carried out whilst crossing the American continent. The receivers used mostly for portable purposes being either a straight two or S.G. detector and R.C.C. L.F.

Thus a very interesting and most promising field of experiment is open to every one. A standard circuit may be used as a basis, and the experimenter may try his hand at designing an all-in headphone short-wave two. Compactness and general efficiency must, however, go hand in hand, one must not be obtained at the expense of the other. It is advisable to consult a list containing H.T. battery voltages and dimensions before making definite plans as to the form of construction to be adapted relative to lay-out, baseboard panel and cabinet dimensions.

The wise experimenter will design and construct his portable S.W. receiver during the winter and thus ensure that so far as the receiver is concerned everything is in order.

In conclusion, just a little advice relative to experimental work generally. Don't lump or combine three or four experiments; for example, if you are trying out a number of different aerial systems do not re-build your experimental receiver at the same time, otherwise it will be difficult to say which alteration improves reception or otherwise, and again, do not rewire for an S.G. detector stage and replace the R.C.C. L.F. stage with choke coupling. This kind of thing leads nowhere.

By the adoption of methodical procedure experience is gained in progressive stages and is true experimental research work. Haphazard dabbling, however, is mis-directed and consequently wasted effort.

**W**E have been reading recently quite a lot about sun spots and their effect upon our weather. These spots, of which some are present at all times, vary in number and activity, and it has been discovered that, working in cycles, they reach a minimum roughly every eleven years. Now 1923 was a minimum peak, with the result that 1928-9 offered excellent conditions for the reception of short waves and, conversely, were unfavourable for transmissions on the medium- and long-wave bands. It should here be explained that the greater the sun-spot activity, the greater influence it has on "wireless" waves; as the cycle swings towards the maximum, the reception of the higher frequencies is improved, and that of the medium- and long-wave channels deteriorates. Now 1935 is not a peak year, but we are slowly nearing 1939, which should show considerable sun-spot activity. This means that from now onwards we may expect to find conditions becoming daily more favourable for logging transmissions on the short waves, at the expense of the longer channels. Then again, although May and June have proved bad months from the excursionists' or holiday-makers' point of view, the owner of a short-wave set has had no cause to grumble. Reception invariably has been well above that experienced over the past two or three years, at this season, and at time of writing is still "well up" in my log for entries of DX broadcasts.

## Leaves from a Short-wave Log

**Panama**  
A friend of mine reports reception of some experimental transmission from the Re-

public of Panama on the 20-metre band—immediately above HBJ, Prangins, on 20.64 metres (14,535 kc/s). These would appear to be tests by HPF, Panama "Ciudad," on 20.71 metres (14,485 kc/s), a 250-watter which is used commercially for a public telephony service with the U.S.A., *via* Florida.

Two broadcasts which are well heard are those carried out respectively by HAS3 and HAT4, Szekesfehervar (Hungary), on 19.52 metres (15,370 kc/s) and 32.88 metres (9,125 kc/s). As they are special programmes for listeners overseas they only take place on Sundays, namely, the first between B.S.T. 15.00-16.00, and the second at midnight. As a rule you will hear a woman announcer, and the interval signal (a short nine-note melody) is that used by Budapest.

### Guayaquil (Ecuador)

A South American station, namely, HC2JSB, Guayaquil (Ecuador), which was recently heard in the early morning hours between B.S.T. 04.00-06.00, appears to have increased its wavelength from 38.17 metres (7,860 kc/s) to 38.96 metres (7,700 kc/s). Announcements are made in both the Spanish and English languages, and the call is given out in connection with its slogan: *La Voz del Andes* (The Voice of the Andes). It is on the air daily (Mondays excepted). The interval signal is believed to be two notes on bells.

Just above—in wavelength—what was first thought to be a French short-waver

frequently mislead when first captured, but if carefully logged act as good landmarks for other searches. In this instance the signal from the French transmitter is a strong one.

JVH, Tokio (Japan) on 20.55 metres (14,600 kc/s), already mentioned in these columns, is a very active broadcaster, and has carried out recently several relays of European programmes. Its duties are not confined to radio entertainments, however, as it is on the air every morning working with Berlin and London. The power is 20 kilowatts, which, on that band, permits excellent reception in Western Europe. Most of the German transmissions with JVH are carried out by DFD, Naenon, on 20.46 metres (14,665 kc/s).

### HJN (Bogotá)

In the very early hours of Sunday morning, between B.S.T. 05.00-06.00, you may have the luck to pick up a talk in English from HJN, Bogotá, on 49.42 metres (6,070 kc/s). The station, so far, has been working irregularly, but has now established a regular schedule. It is a good catch—the distance from London is about 5,290 miles. Although only roughly 50 watts, it styles itself the *Radiodifusora Nacional* (National Broadcasting Station).

VQ7LO, Nairobi, which you may still have registered as being on 49.5 metres, is now operating on 49.02 metres (6,125 kc/s), owing to interference with OXY, Skamlebaek (Denmark). Its present position in the 49-metre band is somewhat more favourable.

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# SHORT WAVES AT OLYMPIA

Radiolympia 1935 Will Give an Impetus to the Rapidly-increasing Interest in the Construction of Short-wave Sets

WHETHER the general public wants short waves or not, this side of radio will be more completely catered for at this year's Show than has been the case previously. Most component manufacturers have gradually been adding short-wave components to their ranges, and there will probably be very few of those firms who specialise in catering for the enthusiastic home constructor who will not have something new and interesting for the short-wave fan. And, what is equally important, the prospective purchaser will find that the prices asked for really high-grade short-wave materials is distinctly moderate, if not extremely low.

This latter fact is clear enough proof that short waves are becoming more popular, for it indicates that the special components which were previously made in comparatively small numbers are now being made in thousands—if this were not true they could not be sold half so cheaply.

## More and Better Components

Another interesting aspect of Radiolympia 1935, from the viewpoint of the short-wave man, will be in the tremendous increase in the numbers of components available for ultra-short-wave use. Several of these cannot be considered as entirely new, for they have been available for the past couple of years or so, but they have never had the wide appeal which they will have this year. This is no doubt largely due to the imminence

of under-10 metres high-definition television, but the excellent results which have been achieved by amateur transmitters working on 5 metres have also given added interest in this direction. A year ago circuits for both transmission and reception on the ultra-short wavelengths were comparatively untried, but to-day there are several satisfactory systems which are both simple and completely effective.

## Wider Frequency Band

With regard to the reception of high-definition television, however, little has yet been done by the amateur because he has not had facilities for experiment. The chief difficulty is going to be, not with the mere reception of 5- or 7-metre transmissions, but with the design of receivers capable of responding to a frequency band of about 1 megacycle—1,000,000 cycles; just think of this compared with the 5 to 10 kilocycles required to cover the present "sound" transmissions. It will at any rate be interesting to see if any manufacturers have already forestalled this problem by providing components suitable for use in the construction of receivers covering such a wide frequency band.

## Higher Efficiency

There can be no doubt that the short-wave components, which will be on view at Radiolympia, will be of far better quality than those seen in recent years, despite the low prices, for a considerable amount of

careful research work has been carried out in the past year in evolving insulating materials with extremely low losses. Various modifications of the original steatite have been produced, and these are as much better than insulating materials previously available as, say, electron and duralumin are better than plain aluminium in the engineering field when lightness and rigidity as well as ease of working are required in combination.

## Short-wave Wavemeters

Previously it has been rather difficult for the short-wave amateur to calibrate his receiver unless he were sufficiently expert to be able to build and calibrate a wavemeter, but there will be at least one inexpensive short-wave wavemeter on show at Olympia, and this alone will give added interest to short-wave work. In addition, however, there will be various new coils and also ready-made parts for building super-regenerative receivers which have again become extremely popular. Altogether the Show will give a new fillip to short-wave work, and will revive the interest of those constructors who have begun to tire of building normal broadcast receivers. In the meantime, PRACTICAL AND AMATEUR WIRELESS is keeping well abreast of all short-wave developments, and the enlarged Short-Wave Section will continue to keep all readers well informed of every new phase and aspect of one of the most fascinating sides of radio.

**CROOK FRIGHTFULNESS.** *By The Victim.* 196 pages demy octavo, 7s. 6d. Published by Moody Bros., Birmingham.

ANYONE reading this book will come to one of two conclusions—either that he is suffering from delusions, or that the author intends it as a record of an attack of hallucination or obsession. It is one of the most curious books ever written. Briefly, the theme is that the entire population of the world is one vast league scheming against the author and planning to take his life. You may think it odd that, after the thousands of opportunities they had of doing this, he is still alive to tell the tale. The peculiar obsession of the author seems to be (so far as anyone can make anything tangible at all from the disconnected paragraphs which comprise the book) that anyone who looks at him is a "molester" who has received secret instructions from other molesters to worry him. In the preface the author, who for some reason or another does not sign his name, "... sincerely hopes that this true narrative will be believed... the harrowing experiences cost me some thousands of pounds... you are getting valuable information at a low price... Should the information be fresh to the police attention to it should be immediate..."

It is suggested that the solution to these "harrowing experiences" is more likely to be found by another branch of science than by the police. Apart from the inane and ludicrous theme of this nonsense the book is ungrammatical, full of misspellings,

## BOOK RECEIVED "CROOK FRIGHTFULNESS"

and makes frequent use of the word "molest" as a noun instead of as a verb. After reading many pages of this typographical concatenation of tergiversatory trash (the words are quite appropriate) one cannot help but agree with the remarks which a Negro passed and which are quoted in the book.

Apparently the author has quite made up his mind that members of the underworld have discovered a particular form of wireless set which enables them to listen in to people's thoughts! As evidence of this he says that he was molested by people snoring in the next room to his at an hotel

to which he had "escaped." The author ingenuously remarks that when he opened his mouth the snoring stopped, but when he breathed through his nose it started all over again—hence, the "molesters" must have been reading his thoughts!

The first part of the book opens on a joyful note—"Was I ever happier than one morning when my employer, a prosperous builder, called me into his office and gave me the glad news that I was promoted to the post of rent collector?" Every wink, and every flicker of an eyelid, every word spoken by anybody and noted by the author is here set on record as evidence that he has been followed round the world. At the risk of being considered in league with the molesters, perhaps it may be tactfully suggested that any ordinary individual would have looked elsewhere for the answer to some of the problems which seem to have troubled the author for so many years.

The reader rapidly begins to wonder why the world should be taking all this interest in a nonentity; he will search in vain in this book to find the answer! The book is contradictory in the extreme and almost demented in the manner in which it endeavours to marshal trivialities and insignificant details in support of the author's obsession that "... I was the victim of a persecution which has driven me around the circuit of the globe in my efforts to escape." It is undesirable to devote further space to this volume except to express the hope that it is intended as a gigantic leg-pull.—F. J. C.

## A FINE BOOK FOR THE BEGINNER!

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## CHOOSING MAINS TRANSFORMERS

# BEGINNER'S SUPPLEMENT



The Various Points About These Important Components, Which Are Discussed in This Article, Should Prove of Special Interest to the Home Constructor.

By G. V. COLLE

**T**HE ultimate aim of the Central Electricity Board is to provide cheap electricity and a standard potential of 230 volts A.C. at a frequency of 50 cycles throughout the British Isles.

Practically everyone using electricity under the new scheme will benefit in several ways. Valve-makers will be enabled to reduce the numbers of types of valves, allowing intensified research in the A.C. types retained, and again, probably lower prices. All-mains operated receivers will be simplified to a slight extent, but the modifications and circumstances may result in less types and in this way very considerable savings in costs.

If A.C. mains of 230 volts, 50 cycles, are to be universal, it follows that mains transformers for home constructors will be an easier choice.

### Technical Data

In order to decide on a suitable A.C. transformer for an all-mains A.C. receiver, assuming the latter is not to a published design, it is essential to collect together certain technical facts. These are enumerated below in their order of importance.

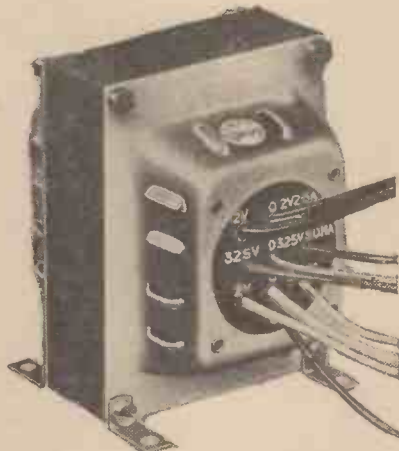
(1) The voltage of the A.C. mains to which the primary will be connected.

(2) The frequency of the mains. A transformer to operate at 25 cycles (assuming one is unfortunate enough still to be on obsolete mains, as in certain parts of Cornwall), will require at least twice as much iron in its magnetic circuit as one operating at 50 cycles. At higher A.C. mains frequencies of 60 to 100 cycles, less iron can be used in the core, but a standard 50-cycle type is quite satisfactory.

(3) H.T. secondary output. One must decide on the type of rectifier to be employed, whether metal-oxide type or valve. In the former case, it is usual to have a plain output with no centre tapping, but it is advisable to look up the rectifier makers' recommendations before making a final choice. If a valve rectifier, it is usual to employ one of the full-wave type, owing to its comparative freedom from residual hum. A half-wave rectifier, such as the mercury-vapour type, can often be used for operating a gramophone amplifier, or two for full-wave rectification for any set requiring a large H.T. current not covered by a normal rectifier valve.

(4) H.T. current consumption. The H.T. secondary current output can be estimated by adding together the total *maximum working* currents of the valves in the complete receiver (which

can be compiled from the valve-makers' data charts). It is highly desirable that, in any event, the H.T. rectified current should be at least 20 per cent. in excess of the estimated requirements of the set, otherwise the life of the rectifier unit or valve may be needlessly limited. Furthermore, the transformer may be overrun and result in a dangerous temperature rise.



A good example of a modern mains transformer.

(5) L.T.-A.C. outputs. When a valve rectifier is used, it is essential that it is operated from an entirely separate L.T.-A.C. winding. A full-wave rectifier valve normally requires a centre tapping (for the H.T.+ lead), although it is by no means vital. However, the inclusion of this tapping and, for that matter, on all similar windings, is a useful refinement.

The voltage and current output of the L.T.-A.C. for the rectifier will depend on the valve-makers' recommendations, and if a delayed-action thermal switch or valve is additionally used, the rectifier A.C. winding must be arranged to deliver the higher current output, as the two are usually connected in parallel.

### A.C.-L.T. Output

A modern mains transformer will incorporate at least two further A.C.-L.T. outputs for the receiving valve heaters. Set designers differ in their ideas on this subject, but it seems clear that on commercial receivers at least, a considerable saving is effected when only one A.C.-L.T. output is provided, as it enables a more compact transformer and easily-wired chassis to be realised.

Such considerations are not of paramount importance to the home constructor, and he would be ill-advised to follow the commercial trend, as the provision of several L.T. outputs, preferably centre-tapped, allow the A.C. transformer to be used in future sets or, even with the same circuit, perhaps be brought up to date.

No current is drawn by those windings not in use, and constructors need only to be careful to insulate the ends of the leads joined to them. One other fact commends itself on L.T.-A.C. outputs, and that is the maximum current which can be drawn from any one winding. Apart from those windings rated at "so many amperes" by the makers, it seems undesirable to exceed 5 amps. for these reasons:

(a) 5 amperes will operate five modern A.C. valves, or 3 one-amp. valves, and 1 two-amp. super-power output valve.

(b) A winding delivering 5 amps. current will not, unless carefully designed, provide, say, the usual 4 volts at a lower current level, but probably 4.4 to 4.5 volts, and will consequently overrun those valves connected thereto.

This last point brings us to the important question of regulation which, apart from mechanical construction, automatically allows one to distinguish between good and poor transformers.

### Regulation Details

Good regulation infers that the voltage output from any or all windings will vary within narrow limits (or not at all!) when the current drawn is varied from zero to the maximum rating. The D.C. resistance of the windings will be low where good regulation is found, and this necessitates substantial wire gauges and, therefore, ample transformer proportions; in turn, this will determine the iron core size. Indeed, on the A.C.-L.T. side it is imperative to wind with enamelled copper strip rather than wire (unless of equal cross-sectional area) to achieve uniform voltage at varying current loads. For the reason that flat copper strip offers a larger heat-dissipating surface combined with compact construction, in turn providing a slightly lower D.C. resistance, it is preferable to the equivalent copper wire.

Of course, the constructor must interpret these details in terms of his own possible applications, because the manufacturer, who knows the exact voltage and current outputs required, finds it unnecessary to mention the word "regulation" except to safeguard himself against a dangerous temperature increase in the event of a set being "on" for an indefinite period.

A conservatively loaded transformer will run cool and, unless badly assembled, will in consequence be free from audible hum due to loose laminations. Heavy end frames to clamp the laminations together are an advantage in this respect, but it should be noted that even such frames are not proof against lamination hum if overloading is allowed to occur.

There is also reason to believe that an electrostatic metal screen (an open-circuited non-magnetic metal foil turn) between the primary and secondary windings and connected to earth, is nearly as effective as an H.F. filter consisting of H.F. mains chokes and by-pass condensers, in excluding mains-conducted radio interferences from the set.

# Facts & Figures

## COMPONENTS TESTED IN OUR LABORATORY

### Aerial Insulators

THE aerial is the most vital part of the complete wireless equipment, although it is possible to make up for its deficiencies by using more valves. Even so, however, the range of a receiver depends upon the energy picked up, and apart from height one of the main considerations of the aerial is its insulation. No matter what type of insulator is fitted, there is often a possibility of losses being introduced due to a dirty surface or to moisture. In our cities most outside articles soon become covered with a coating of soot and this — being carbon—is a good conductor. Even if the surface is such that the rain washes most of the soot away, it is necessary to ensure that the surface will not remain wet, and so provide a leakage path. The group of insulators shown below is of a new range of aerial insulators manufactured by Messrs.



Some of the aerial insulators to be found in the Bulgin range. They include one which incorporates a lightning arrester (top right).

Bulgin, and these embody all the features which are desirable for efficient aerial installation. The material possesses a highly-glazed surface, tending to prevent the formation of a conductive coating, and, what is more important, protection from rain is afforded by the bell-shape of the moulding. Two of the insulators are provided with screw ends so that they may be driven into woodwork or walls to act as a stand-off insulator, and thus keep a leading-in wire, for instance, clear of a wall, drain-pipe, etc. The upper right-hand insulator incorporates in it a lightning-arrester, and thus gives added protection. The lower left-hand component is intended as a link between the aerial proper and the supporting rope or wire. These components will be seen for the first time at Olympia, and details concerning price will be given in a later issue.

### Kingsway U.-S.W. Choke

TO avoid some of the difficulties experienced on the ultra-short waves Kingsway Radio have produced a novel form of H.F. choke, and this is shown at the foot of this page. It consists of a glass tube with the actual choke coil wound *inside* the tube, and to reduce the effect of low impedance at various points and to maintain a constant choking effect over the entire range, the tube is filled with a special high-resistance liquid and then sealed. It is claimed that this results in greatly-improved working characteristics, and the invention has been covered by Letters Patent. The price is 4s. 6d.

### New Dubilier Tubular Condensers

A NEW range of tubular condensers is to be added to the Dubilier products. This is the 4511 series, designed for 400 volts D.C. peak working (1,000 volts D.C. test). The condensers average 2in. long by  $\frac{1}{4}$ in. in diameter and may be obtained in various capacities from .001 mfd. to .5 mfd. The lowest value costs 1s. and the highest 2s. These condensers are provided, of course, with wire ends for connecting purposes.

### Decca Constant-frequency Record

TO test a receiver or amplifier for its range of reproduction a constant-frequency record will be found invaluable. The average broadcast transmission is so variable in volume that it is not possible to judge accurately whether there are any undue resonances in the L.F. equipment, and an ordinary gramophone record suffers from the same defect. The new Decca test record covers a range from 50 to 6,000 cycles in fourteen separate stages. These are all contained on the two sides of a standard 12in. disc, which should, for correct frequency-range be turned at a speed of 77.9 revolutions per minute. To assist in obtaining this speed with an ordinary gramophone motor a stroboscope is printed on the label, and this should be illuminated or examined under the light from a 50-cycle source. Although the ordinary lighting in the home may be used, more accurate results will be obtained if a neon is used. At the correct speed, of course, the disc appears to remain stationary. The level is claimed to be constant from 250 to 6,000 cycles, and is stated to be within .25 decibels plus or minus. The



An ultra short-wave choke of novel design. Mounted inside a glass tube containing a special liquid it is claimed to have a good performance.

harmonic content of the wave-form is stated to vary not more than 5 per cent. of the total output, but is somewhat greater at the lower end of the frequency scale. In view of the delicacy of the record, accuracy can only be guaranteed up to forty playings (twenty per side), although, of course, it may be used until thoroughly worn. The price of the record is 2s. 6d., and the number is EXP55.

## 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. H. B. (Stafford). We regret that we have not described a mains version of the receiver in question, and therefore have no blue print available.

J. W. (Moston). It is not possible to give you the constructional information in a letter. We would refer you to the back numbers of the particular journal in which such information was given.

A. J. R. (South Brent). It would appear that a resistance or condenser has become faulty, and we would suggest that you get the makers to test the set or have it inspected by a Service Agent of the particular company which made the set.

D. E. (Glasgow). If H.T., L.T.— and G.B.+ are all joined to earth, then each of those leads may be taken from the metallised baseboard, either from one single point or from various places. It is essential, however, that the metallised surface is intact and not "scrapy," and to avoid difficulties they should all be taken from one point.

J. G. (Newtown). The trouble is due to H.F. instability, but it is not possible to state what is causing this. Test the H.T. voltages and current, and examine the wiring in case there is some interaction there.

G. M. (Stonyhurst College). If the pentode has five pins, the centre one corresponds to the side terminal referred to in our original letter. The remaining four pins are connected as for the power valve. The reference to pentode working related to the output transformer, which must be modified to suit the difference in load required for the pentode valve.

E. L. B. (Knotty Ash). The method of battery-biasing is quite in order. The voltage of the L.T. winding is rather high, but should not cause an undue rise. It may be prevented by connecting a resistance across the winding to absorb the extra 1.5 volts. The value of the resistance should be 2.5 ohms approximately.

W. B. (Halifax). As you do not know the resistance of the meter it will be necessary to calibrate it from an actual test. To read 250 volts the total resistance to pass 30 mA (which is the full scale deflection) would be 8,333 ohms and, therefore, the external resistance which is required would be that value less the resistance of the meter.

R. F. L. (Henley-on-Thames). As the fuse depends upon the actual load of the receiver there will be no necessity to change the value from that which was specified.

F. C. B. (Haberley). The original receiver was certainly entirely free from the troubles you mention. Undoubtedly, your present difficulties are due to the lay-out, and although screening may cure some of the instability it will probably be found necessary to adopt a larger chassis and make the lay-out more in keeping with original design.

F. J. R. (Margate). Although you could re-wind the pot and energise it from a low-tension source you would probably find it impossible to obtain sufficient lines of force to warrant the use of the speaker, and it would be very insensitive. The important point is the number of ampere turns, and thick wire will prevent you from getting a sufficient number in the space available.

F. N. B. (Harpenden). The set of parts for the Genet Midget Portable costs (Kit A) £1 10s., or (Kit C) £3 19s., from Messrs. Peto-Scott, Limited. You did not enclose a query coupon or a stamped addressed envelope.

P. C. J. (Highgate). Messrs. Leslie Dixon, of Upper Thames Street, may be able to supply you, but we are afraid the valves are not now obtainable.

W. C. M. (Birmingham). Probably the screening of the leads from the coils is causing trouble, as you are thereby increasing the capacity to earth. This is not desirable at this part of the set, and could account for the lack of signal strength and the difficulties you mention.

T. A. M. (Long Melford). It is quite possible that the resistance in question is faulty, or of low value, but this could be proved by modifying the actual H.T. applied to the detector. An increase in value to 50,000 might prove beneficial in your particular case.

Subscriber (No address). Sorry, must ignore your letter. All letters intended for publication must bear name and address of the sender. Let us have this information and we shall be glad to publish your letter.

R. T. A. (Malvern Wells). The remote control selector switch is obtainable from Modern Radio, York Terrace, Clapham High Street, S.W.4. You omitted to enclose coupon and stamped addressed envelope.

# LETTERS FROM READERS

The Editor does not necessarily agree with opinions expressed by his correspondents.



All letters must be accompanied by the name and address of the sender (not necessarily for publication).

## A Super S.W. Receiver!

**S**IR,—I have been a reader of PRACTICAL WIRELESS since number one, and take this opportunity of congratulating you upon the publication of PRACTICAL AND AMATEUR WIRELESS.

In common with many other readers, I would be pleased to see a design for a short-wave superonic heterodyne receiver of six or more valves of the ordinary screen-grid and three electrode types, excluding the power amplifier, which could be built by the user to suit his own requirements. I see in the July 20th issue a request by a Mr. Johnson for a page of transmitting circuits and data, a suggestion which I heartily support. Also, may I suggest a series of articles upon transmitting and receiving antennæ design on the short waves, and more practical articles on the ultra-short waves? I shall be much obliged if you could put me into touch with other short-wave amateurs in my district. Wishing PRACTICAL AND AMATEUR WIRELESS every success in the future.—W. CROSSLAND (Whitstable).

[Will interested short-wave enthusiasts in the Whitstable district please note?—Ed.]

## Adding A.V.C. to £5 A.C. Superhet

**S**IR,—Being an old reader of your enjoyable and instructive wireless journal, may I suggest that you publish a version of your £5 A.C. Superhet incorporating a Cossor D.D.4? This would give A.V.C. without greatly increasing the cost.—H. NEEDHAM (Alford).

## Transmitting Topics

**S**IR,—I should like to support J. C. Johnson's suggestion on the question of transmitting notes. At the moment, those experimenters who, like myself, have a fairly good theoretical and an extensive practical knowledge of receiving technique, and who would like in the future to go in for transmitting, have little or no chance of acquiring the necessary qualifications without spending a relatively large sum of money on, say, a correspondence course.

If you could devote a page, not only to transmitting circuits (as suggested by J. C. J.)—some of us are already familiar with the simpler transmitting circuits on paper—but also to general transmitting technical topics, and keeping always in mind the needs of the would-be transmitting "ham," I am sure many of your readers would welcome this new departure.

What a lot of us want to know is exactly what are the grounds on which one can apply for a transmitting licence, with reasonable chances of getting one? (Apart, of course, from the technical qualifications.) If you could publish some suggested lines of research for the would-be "ham," it would be helpful, as apparently the mere desire to get in contact with other stations is not sufficient to obtain a licence.

As, perhaps, one of your oldest readers, (I am the proud possessor of *Amateur Wireless* No. 1, and many subsequent volumes, also PRACTICAL WIRELESS No. 1 and subsequently), I hope you will go ahead with this new departure in British radio jour-

nalism; for, as far as I know, no other British journal has devoted itself to amateur transmission in the way I have suggested.—F. W. T. ATKIN (Sheffield).

## A Transmitting Enthusiast

**S**IR,—With reference to Mr. J. C. Johnson's letter in the July 20th issue, I am in full agreement with his remarks. I have been a very keen radio fan since the time when we used coils wound on long formers, with tappings sticking out on them and connected with crocodile clips! I also have a shelf that still boasts a valve which lights up like a modern dial illuminator. I have experimented with many types of circuit, both on ordinary and on the short-wave bands. At present I have no short-wave set, but I am watching PRACTICAL AND AMATEUR WIRELESS for the latest S.W. circuits. During last winter, in my quest for knowledge of anything regarding radio, I commenced a course of "Radio Service Engineering" from one of the leading colleges and I am entirely satisfied with the result.

But I am wandering from the point. In my interest in radio reception there has always been an underlying interest in amateur transmission, especially on the short waves. I have never come across any books which dealt with this subject fully, so that I feel that it would be an excellent idea to proceed as Mr. Johnson suggests and to devote a page or two weekly to the technical side of transmitting, somewhat on the same lines as the present series of articles on "Designing Your Own Wireless Set." This procedure would, I feel sure, be exceedingly welcome to many other readers besides myself. Thanking you for the knowledge I have gained in the past from both PRACTICAL AND AMATEUR WIRELESS and the old *Amateur Wireless*, and wishing you every success in the future.—R. I. JENKINS (Crundale).

## Our £5 Superhet Three

**S**IR,—I am much obliged for your letter, dated 16th inst., regarding my difficulties with the ganging of my £5 Superhet Three. By following the instructions I have brought the set to a much more satisfactory state; volume is consistent throughout, whistles have disappeared, and there is no bursting into oscillation at top of the long-wave band. You may be interested to know that to get these results the screw trimmers of the I.F. transformer had to be screwed up as tight as possible, bringing the hexagonal nuts nearer maximum and No. 3 Trimmer three-quarters turn from full in. Considering this is possible by simply following the instructions, without use of an oscillator or A.C. voltmeter, it speaks well of your design and the accuracy of the components specified.—G. H. EWEN (Thetford).

## Remote-control Relay

**S**IR,—With reference to a letter of mine on the subject of remote control, which was published in PRACTICAL AND AMATEUR WIRELESS dated July 20th, some enquiries have been made as to where the automatic selector switches can be obtained. I got mine from "Modern Radio," York Terrace, Clapham High Street, S.W.4. But that was over a couple of months ago, and I am very much

afraid that they no longer have any left. Components of that description unfortunately cannot be repeated. An enquiry might be worth while, however, as I believe they have other shops elsewhere in London.—W. T. PALMER, JNR. (Clapham).

## Our S.W. Section: The Fury Four

**S**IR,—I have read the article on "Reporting Amateur Transmission," by G6FO and found it most interesting and useful. I have been keen on short-wave radio for two years, and during that time I have not seen another S.W. set in this district besides my own. If you mention short waves to anyone here in the North, they retort, "Piffle, no grey hairs for me," yet I have a log of eighty-seven stations heard during the last two weeks, all on the speaker. We have no radio club in this town, so that I have to gather all the S.W. news from PRACTICAL WIRELESS, which I have taken since the first copy. My set is the Fury Four (Battery Model) which I still think is the best four-valve yet, together with a one-valve short-wave converter which I built from particulars published in your S.W. Section.—W. KERSHAW (Burnley).

## Another Short-wave Log

**S**IR,—I have been a short-wave receiving fan for the past seven years, and my log of a few stations recently received on the 40-metre band may prove interesting. My present receiver is a screen-grid detector, with L.F. and power output, using Eddy-stone six-pin coils.

The following are a few American and Canadian stations received one evening from 11.30 to about midnight: W1AJZ (R9), W2HFS, W2FLL, W3BFH, W1BEF (R5 to 7), VE2BGO, VE3HE (R5).

Here are a few English amateurs I received on various Sundays with 'phones: G2VB, 2UT, 2SA, 2NQ, 2WD, G200, 5TZ, 5GL, 5VB, 5TA, G5JL, 5SZ, 5NW, 5ML, 5RL, G5RV, 5VB, 5JQ, 6XR, 6SR, G6XX, 6AU, 6XQ, 6RM, and 6MN.—HORACE A. LOND (Diss, Norfolk).

CUT THIS OUT EACH WEEK.

## Do you know

—THAT where direct pick-up effects are noticed it is generally preferable to screen the entire receiver rather than individual wiring.

—THAT after soldering connections to bakelite or similar components the terminal or other part to which the joint has been made should be closely examined.

—THAT the reason for the above precaution is that the heat of the soldering iron, if applied for too long a period, may loosen the locking device inside.

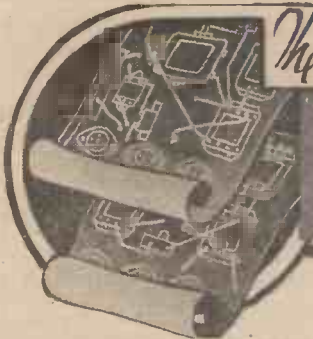
—THAT the current and voltage outputs from a metal or valve rectifier vary inversely.

—THAT for the above reason care should be taken to operate a rectifier at its correct values in order to prevent damage to components or valves in a receiver.

—THAT it is sometimes advisable to fit the mains smoothing choke in the negative H.T. lead of a receiver instead of in the more usual positive position.

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, Geo. Neuenes, Ltd., 8-11, 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.



# The PRACTICAL AND AMATEUR WIRELESS

## Blueprint Service

These blueprints are full-size. Copies of appropriate issues containing descriptions of these sets can in most cases be obtained as follows:—"Practical Wireless" at 4d., "Amateur Wireless" at 4d., "Practical Mechanics" at 7d., and "Wireless Magazine" at 1/3d. post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets, "A.W." refer to "Amateur Wireless" sets, and "W.M." to "Wireless Magazine" sets. Send, preferably, a postal order (stamps over sixpence unacceptable) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

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"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	Aug. '34	WM368
"W.M." Long-wave Converter	Jan. '35	WM380

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LET OUR TECHNICAL STAFF SOLVE YOUR PROBLEMS



If a postal reply is desired, a stamped addressed envelope must be enclosed. Every query and drawing which is sent must bear the name and address of the sender. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

SPECIAL NOTE

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. Please note also, that queries must be limited to two per reader, and all sketches and drawings which are sent to us should bear the name and address of the sender.

Valve Characteristics

"I have discovered a forgotten valve in my junk box and so far as I can make out from the scratches I put on the base in the past this is a P.650. I am not certain, but I think it is a Mazda. I wonder if you have the characteristics of this valve, as I should like to try it again."—T. G. (Highbury).

THE valve is probably the Mazda P.650 with a 6-volt .5 amp. filament. The maximum anode volts are given as 200 and the amplification factor is 3.5. The impedance is 1,300. The maximum anode dissipation is 6 watts.

H.T. Voltages for Leader 3

"Would you please tell me the correct H.T. voltage tappings for the battery Leader 3?"—R. A. J. (Fulham, S.W.).

THERE are only two tappings on this receiver and the lead marked H.T.2 is plugged into the maximum voltage tapping. This should be either 120 or 150 volts—the higher value giving clearer and better signals, although 120 volts will generally be found quite satisfactory. H.T.1 should be plugged into the 60-volt socket for preliminary tests, and when the receiver is correctly working this voltage should be varied, and different values tried between 50 and 80 volts. It will probably be found that with your particular valve there will be a voltage which will give loudest signals combined with complete stability, and this value should therefore be employed.

Sovereign Permeability Tuner

"Will you let me know the connections 1 to 8 of the Sovereign Permeability Coil advertised in 'Practical Wireless' as suitable for Christmas presents, some time ago? I have lost the pamphlet on this coil."—F. C. T. (Greenford).

A THREE-POLE change-over switch is required for use with this tuner, and the connections are as follow: Terminal 1 to aerial; 2 to L.W. aerial switch contact; 3 to earth; 4 to reaction condenser; 5 is an alternative aerial connection; 6 to the grid; 7 to the L.W. grid switch contact, and 8 is joined to the switch so that it is earthed on the medium-wave side of the switch. A receiver employing this tuner was described in Practical Mechanics, dated December, 1933, and a back number may be obtained from this office for 7½d., by post.

An Electric Gas-lighter

"I would be very much obliged if you would let me know what kind of wire is used in a battery gas lighter, or could you tell me of a wire being short-circuited across the negative and positive of a 2- or 3-volt battery which will glow red, as I would like some for experimenting purposes?"—R. P. (Dundee).

ALTHOUGH hardly a wireless query, we give herewith the details you require. The wire used is platinum, and for a 1.5-volt cell you would need approximately ½in. of No. 40 gauge wire. This would pass a current of approximately 2.5 amps, so it should only be kept glowing for the shortest possible time—just sufficient to enable a gas jet to be lit. A 1.5-volt battery of the large torch type will give about 10,000 lights with the above piece of wire. For a larger battery, the gauge of wire should be two or three times as large. ½in. of No. 40 platinum wire will cost about 4d.

Accumulator Charging

"I have just obtained my first wireless set, or rather, built it from the information given in your valuable pages. I am completely new to the hobby, and I wish to

safeguard my accumulator. How is it possible to tell when it wants charging without waiting for it to run right out?"—T. H. (Birmingham).

IN the ordinary type of accumulator it is possible to ascertain the condition by examining the plates. When freshly-charged the positive plates should be a rich chocolate colour and the negative plates a clear grey. In use, the positive plates will become much lighter in colour. A more exact method would be to work out the length of time the battery should last, according to its capacity and the current which is taken from it. Then keep a record of the hours of use, and no difficulty should arise. To ascertain the length of time the battery should last, add up the filament current of the individual valves, and divide this into the capacity rating of the accumulator.

Reaction Problems

"In examining various commercial coils I notice various methods of winding the reaction coil. Is there any rule which should be followed? Furthermore the condenser used to control reaction seems to vary from .0001 to .0005, and may be differential or ordinary. As a beginner I am somewhat confused and should like to know the ins and outs of this business."—J. G. (Hove).

ALL that is required in a reaction circuit is that a coil shall be inductively coupled to the grid coil and the degree of H.F. feed-back controlled by a condenser. Obviously, therefore, the size of the coil, its position in relation to the grid winding, and the capacity of the condenser will all be inter-related and must generally be found by trial and error. The differential condenser is simply a scheme to obtain smooth control by incorporating a separate condenser across the anode-earth circuit in order to provide a constant by-pass capacity. The whole subject is too involved to deal with more completely in this part of the book.

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

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**PREMIER SUPPLY STORES**

ANNOUNCE a City Branch at 165 and 165a, Fleet Street, E.C.4 (next door to Anderson's Hotel), for the convenience of callers; post orders and callers to High Street, Clapham.

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SPECIAL Bargains for callers at our Clapham Branch where Summer Sale is now taking place.

WORLD Famous Continental Valve Manufacturer; mains types, 4/6 each, H.L., L. power; high and low magnification, screen grid; variable Mu screen grid; 1, 3, and 4 watt A.C. output, directly heated pentodes; V.H.P., D.D.T. Diode Tetrodes, 250 volt 60 m.a. full wave rectifiers; A.C. D.C. types, 20 volts, 0.18 amp. filaments; screen grid; variable Mu screen grid; H., H.L., power and pentodes.

THE following Types, 5/6 each; 350v. 120 m.a. full wave rectifiers, 500v. 120 m.a. full wave rectifiers, 2 1/2 watt indirectly heated pentodes.

2-VOLT H.F., L.F., 2/3; power, low consumption 2 power, super power, 2/9; screened grid, variable mu screened grid, 5- or 4-pin pentodes. Variable-mu H.F. Pentodes.

THE following American Types, 4/6; 250, 210, 245, 47, 46, 24, 35, 51, 57, 58, 55, 37, 80, 6AT, 2A7, 27, 77, 78, 2A5, 281. All other types, 6/6.

AMERICAN type 250 Valves 4.5 watts undistorted, 450 volts plate 4/6. Matched pairs 9/-.

B.T.H. Moving Coil Speakers, matched pairs, 8in. 1,500 ohms, 7,500 ohms. (1,500 speaker as choke 7,500 speaker in parallel with H.T. supply), with output transformer for pentode, 15/6 per pair; A.C. kit for pair, 12/6.

M.C. Multi-ratio, output transformers, 2/6; 2-1 or 1-1 output transformers, 2/6; microphone transformers, 50 and 100-1, 2/6; 3 henry chokes, 2/6; 100 henry chokes, 2/6.

A LARGE Selection of Pedestal, table and radiogram cabinets at a fraction of original cost.

BLUE-SPOT 29P.M. P.M. Moving Coil multi-ratio transformers, 15/-; handles 4 watts. Sono-chorde ditto. Ideal for Battery Sets.

ELIMINATOR kits, condensers, resistances and diagrams, 120v. 20 m.a., 20/-; Trickle charger, 8/- extra, 150v. 30 m.a. with 4v. 2-4 amp. C.T., L.T., 25/-; trickle charger, 6/6 extra; 250v. 60 milliamps, with 4v. 3-5 amps., C.T., L.T., 30/-; 300v. 60 m.a. with 4 volts 3-5 amps., 37/6; 200v. 50 m.a., with 4v. 3-5 amps., L.T., 27/6.

PREMIER L.T. Charger kits, Westinghouse rectifier, input 200-250v. A.C., output 8v. 1/2 amp., 14/6; 8v. 1 amp., 17/6; 6v. 2 amp., 27/6; 30v. 1 amp., 37/6; 2v. 1/2 amp., 11/-.

B.T.H. Trusped Induction Type A.C. only, Gramophone Motors, 100-250v. 30/- complete; ditto, D.C., 42/6.

COLLARO Gramophone Unit, consisting of A.C. motor 200-250v. high quality pick-up and volume control, 45/-; Motor only, 35/-.

EDISON BELL Double Spring Gramophone Motors, complete with turntable and all fittings, 15/-.

WIRE Wound Resistances, 4 watts, any value up to 50,000 ohms, 1/-; 8 watts, any value up to 100,000 ohms, 1/6; 15 watts, any value up to 50,000 ohms, 2/-; 25 watts, any value up to 50,000 ohms, 2/6.

MAGNAVOX 144, 15/-, 144 Magna, 25/-, 152, 17/6, 152 Magna, 37/6, 154, 12/6, Dual-Matched Pairs D.C. 144/152, 32/6. Ditto Magna 62/6. A.C. Energising Kit to suit any of above 10/-, all 2,500 ohms. P.M. 7 inch, 16/6, P.M. 9 inch, 22/6. State transformer required.

12 TO 2,000 Metres without Coll Changing; huge purchase of all-band 2-gang screened coils, suitable for screen grid, H.F. stage (tuned) screen grid detector type receiver, complete circuit supplied, 12/6.

BRITISH made Meters, moving iron flush mounting, 0-10, 0-15, 0-50 m.a., 0-100, 0-250 m.a., 0-1, 0-5 amps., all at 6/-; read A.C. and D.C.

POTENTIOMETERS by Best Manufacturers, 200, 350, 500, 1,000, 2,500, 5,000, 8,000, 10,000, 15,000, 25,000, 50,000, 100,000, 250,000, 500,000, 1 meg., 2/-; 5,000, 10,000, 15,000, with mains switch, 2/-.

1,000 OHM 150 milliamper, Semi-variable resistance, 2/-; 1,000 ohm 250 milliamper, tapped, for any number, .18 valves 3/6; 800 ohms, 350 m.a., tapped, 2/-.

COSMOCORD pick-ups with Arm and Volume Control, wonderful value, 10/6.

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(Continued at top of column three)

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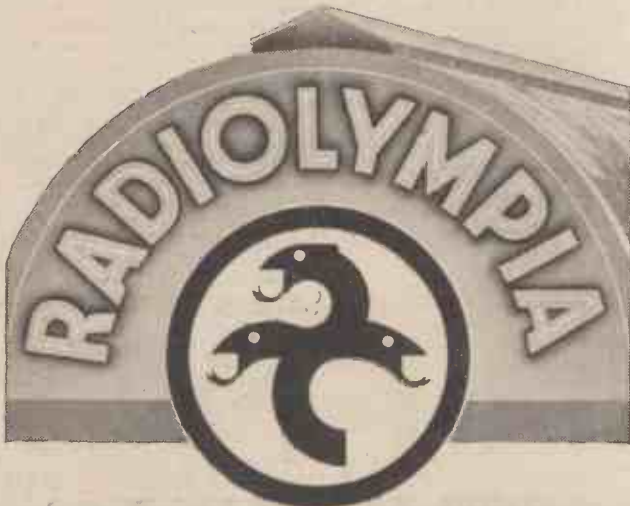
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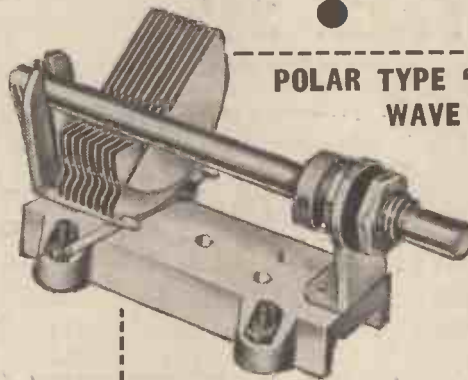
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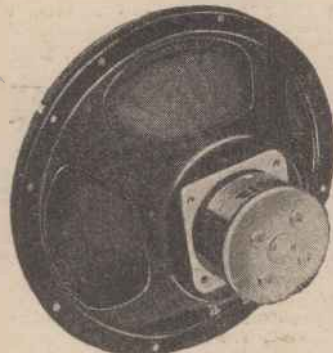
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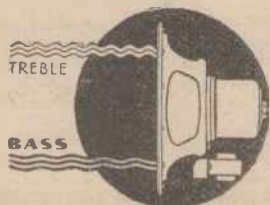


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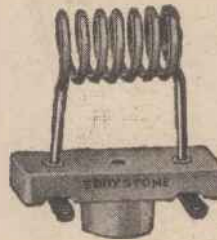


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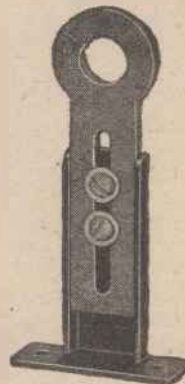
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Cat. No. 1016. 5-pin Price 1/5  
Cat. No. 1017. 7-pin Price 1/3

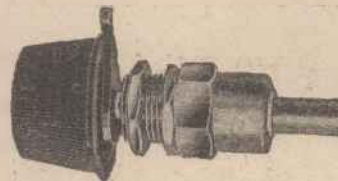
## INSULATED ADJUSTABLE BRACKET AND EXTENSION OUTFIT



Cat. No. 1007. A strong bracket with DL-9 insulating slide adjustable from 2 1/2in. to 3 9/16in. centres. Price 1/6.

Cat. No. 1008. Extension outfit comprising 4in. paxolin tube with 3in. brass spindle and panel bush and nut. Price 1/3.

## SLOW MOTION HEAD FLEXIBLE COUPLER



For slow motion control of components mounted with an extension spindle. Ratio 9:1 with pointer moving through 180°.

Cat. No. 1012, complete with 1 1/2in. dial. Price 3/-.

OLYMPIA STAND No. 30.

Completely flexible but free from back-lash. DL-9 insulation.

Cat. No. 1000, Price 1/6.

# EDDYSTONE

## SHORT WAVE COMPONENTS

STRATTON & CO., LTD., Bromsgrove St., BIRMINGHAM. London Service Depot—WEBB'S RADIO STORES, 14, Soho St., Oxford St., W.1.

# THIS COMFORT IS A HOLIDAY IN ITSELF



Fully Patented No. 414404

SO wonderful is the comfort of the Berkeley Superlax, and so complete the relaxation it gives to both mind and body, that the regular evening rest in its deep cosiness is almost a holiday in itself. For this is the most restful chair for people of all ages. It is designed to suit everyone—tall or short. With its patented automatic action you can have any position—upright, reclining or lounging—without adjustment, without getting out of the chair. The Back and Seat of the Berkeley Superlax are EASILY REMOVABLE FOR CLEANING. HAIR STUFFING. LUXURIOUS SPRINGS in SEAT AND BACK. CONCEALED CASTORS. COVERINGS REPPS, TAPESTRIES, TWEEDS, MOQUETTES, etc.

IN B QUALITY COVERING

CASH PRICE

**62/6**

or 65/-:—10/- with order and balance 10/- monthly. Settee to match £5.2.6

THE *Berkeley* **SUPERLAX**  
THE EASY CHAIR THAT ADJUSTS ITSELF

**H. J. SEARLE & SON, LTD. (Dept. P.R.)**  
70-78, Old Kent Road, London, S.E.1

West-End Showrooms: 133, Victoria Street, S.W.1.

Branches: 83-87, London Road, CROYDON; The Parade, High Street, WATFORD; 149, Becontree Avenue, DAGENHAM; 85, New Street, BIRMINGHAM; 71, Deansgate, MANCHESTER; 12, Poole Hill, BOURNEMOUTH.

Sold under our usual guarantee of money-back, if not satisfied within seven days.

DELIVERED FREE in England, Wales and Scotland.

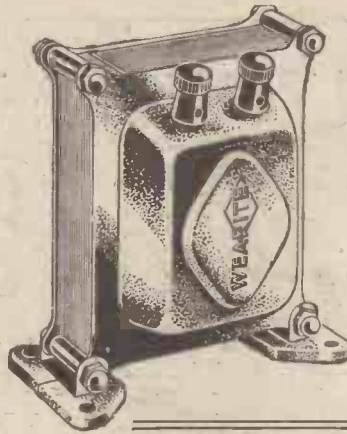
Genuine Berkeleys are only made in our own Factories and are not obtainable through any other furnishing house.

**COUPON** Please send Catalogue of all Models of Berkeley Upholstery, together with complete range of Coverings.

Name .....

Address .....

Practical Wireless .....



### THE H.T. 13 SMOOTHING CHOKE

As illustrated, this choke—one of a full range—has constant inductance. The characteristics are as follows: 40 Henry, 50 m.a., 875 ohms resistance.

Price..... **10/6**

## THE ALL-WAVE MAINS 3 USES

these **WEARITE CHOKES**

The H.F.O. An all-wave choke—one of the first to incorporate a laminated iron core. Impedance 10/2,000 metres. Self cap. 3.5 mmfds. Induct. 250,000 m.h. D.C. Resist. 190 ohms

**4/6**



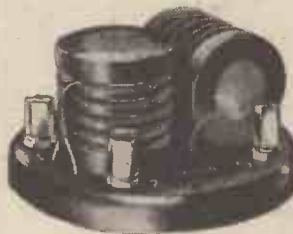
MODERNIZE YOUR SET WITH THESE WEARITE COMPONENTS



### THE UNIVERSAL COIL TYPE "A."

These Universal Coils will bring your set up-to-date, whatever the present circuits. Equally suitable for H.F., Aerial or Band Pass Tuning. Range 180-650 and 750-1,000 metres.

**5/-**



### THE IRON-CORED WAVE-TRAP COIL UNIT.

A wave-trap coil that really does its job. With .0005 Variable Condenser and a Switch, you have a Unit that cuts out that interfering station with ease—and no loss of volume. For any Set—"Super"—"Straight," or Short Waver.

**7/6**

Send for NEW and Revised Wearite Book or see the complete range on

Please send me your NEW and Revised Book containing full technical data on Coils, Chokes, Transformers, etc., and also Blue Prints of new series of circuits, etc.

To MESSRS. WRIGHT & WEAIRE, LTD.,  
740, High Road, Tottenham, N.17.

**STAND 217 RADIOLYMPIA**

Name .....

Address .....

PRAC. 17/8/35.

# Your Guide to the Best.. 1936 Pedigree Radio



Keep this page. It shows you "His Master's Voice" 1936 Pedigree Radio instruments. Fuller information about them can be obtained from Stand No. 77 at Radiolympia.



**MODEL 148 BATTERY RECEIVER**  
Three-valve battery-operated receiver with moving coil speaker, pentode output. Complete with batteries **£7.19.6**



**MODEL 146 BATTERY RECEIVER**  
Four-valve battery-operated superhet receiver with moving coil speaker. Push-12 GNS pull pentode output



**MODEL 340 DC/AC RECEIVER**  
Four-valve (inc. rect.) universal electric DC/AC superhet with AVC **11½ GNS**



**MODEL 441 RECEIVER**  
Five-valve (inc. rect.) AC superhet receiver with adjustable QAVC. Exceptional value at **12½ GNS**

**NOT ILLUSTRATED**  
Model 540 DC Superhet Radiogram ..... 21 GNS  
Model 180 Speaker ..... 8 GNS  
Model 170 Speaker ..... £4 15 0  
No. 11 pick-up unit ..... 32/6



**MODEL 442 RECEIVER**  
Five-valve (inc. rect.) AC superhet receiver with "fluid-light" tuning, AVC and static suppressor **13½ GNS**



**MODEL 463 MAINS PORTABLE**  
Six-valve (inc. rect.) AC superhet portable receiver with "fluid-light" tuning. Built in aerial. Low consumption **13½ GNS**



**MODEL 341 DC/AC CONSOLE**  
Four-valve (inc. rect.) universal electric DC/AC superhet with AVC, in latest style console cabinet **15 GNS**



**MODEL 444 CONSOLE**  
Five-valve (inc. rect.) AC superhet receiver with QAVC. Can be operated sitting or standing **17 GNS**



**MODEL 541 QAVC RADIOGRAM**  
Seven-stage five-valve (inc. rect.) AC superhet with Quiet or ordinary AVC at will. Silent running electric gramophone **22 GNS**



**MODEL 570 AUTORADIOGRAM**  
Five-valve (inc. rect.) AC superhet with "fluid-light" tuning, AVC, Interference suppressor, Automatic Record-Changer and latest type electric gramophone **33 GNS**



**MODEL 580 "Duo-Diffusion" AUTORADIOGRAM**  
Nine-valve (inc. rect.) AC superhet with "fluid-light" noiseless tuning, static suppressor, QAVC, automatic tone-compensated volume control, and duo-diffusion elliptical cone speaker. Latest type electric gramophone. Quick change Automatic Record-Changer **52 GNS**



**MODEL 800 High-Fidelity AUTORADIOGRAM**  
Fifteen-valve (inc. two rectifiers) AC superhet, for all-wave reception. The finest instrument ever produced **110 GNS**

**"HIS MASTER'S VOICE"**

Radio  
STAND NO  
**77**

**1936 Pedigree RADIO**

Records  
STAND NO  
**82**

# Complete Guide to the Show—See Page 608.



## 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. VI. No. 152. August 17th, 1935.

# ROUND *the* WORLD of WIRELESS

### New German Interval Signals

**B**OTH Leipzig and Cologne have now discarded the signals they had been using for some considerable time. The former station has now adopted three chords in D major played on an electrical musical box, and the latter studio also uses one of a similar character.

### And New French Ones

**T**HE Co-ordination Committee of the French P.T.T. transmitters has now adopted a series of individual interval signals for the State broadcasting stations. With the exception of Radio-Strasbourg, which will broadcast in future the boom of the big bell of the Strasbourg Cathedral, all studios have been allotted local folk songs associated with their neighbouring district. In some instances the first few bars only are heard, in others the complete melody. The interval signals will be recorded and electrically transmitted.

### Holland's Super-power Stations

**T**HE power of the Kootwijk and Hilversum transmitters on 1,875 and 301.5 metres respectively has been considerably increased. The former station already broadcasts on 150 kw. and the latter on 120 kw.

### Austria's World Broadcast

**O**N the occasion of the Salzburg Musical Festival Austria will establish this summer a world record. In 1934 open-air performances and concerts during the season were taken by 407 transmitters, but this year applications have already been received for relays to so many foreign countries that the transmissions will be heard through 751 different stations, of which number the United States alone is responsible for 448.

### Short-wave Radiotelephony in Iceland

**T**HE Reykjavik short-wave transmitter has been officially opened and a regular radiotelephone service has been inaugurated between Iceland and England. The station is also to be used for the exchange of wireless programmes with Copenhagen as well as for the telegraphic transmission of weather reports and forecasts to other countries.

### French Liner's Public Address System

**M**ICROPHONES have been installed in the trans-Atlantic liner *Normandie* on the captain's bridge, theatre, grill-room, and grand saloons. From his bridge through seventy-four loud-speakers the captain is able to broadcast to both passengers and crew almost throughout the ship. Through the medium of the same network concerts given by the ship's orchestra or gramophone recitals are transmitted at fixed intervals during the day and evening.

## RADIOLYMPIA

Meet the Editor

and Staff at

STAND No. 9

Ground Floor!

### The Latest Czech Transmitter

**T**HE Banska-Bystrica broadcasting station, which is situated in Central Czechoslovakia, is rapidly approaching completion and it is expected that it may be ready for its initial tests during August. The aerial masts, when finished, will be the highest in the country, namely over 660 feet.

### Interesting Statistics

**I**T is computed that the world's radio audience has now reached a total of some two hundred million listeners. The United States of America with a population of 127,900,000 in 1934, tops the list with 20,750,000 wireless receivers in use, or roughly 162.23 sets per 1,000 inhabitants. In Europe the percentage is highest in Denmark, namely, 160 listeners, followed by Great Britain with 147.25 per thousand.

In the figures recently issued by the International Broadcasting Union at Geneva it is interesting to note that Italy with her ten transmitters can only interest roughly one per cent. of her population of 42 million souls in her broadcast programmes.

### A Rose By Any Other Name!

**N**OW that Heston is closed down the Air Ministry reports are officially transmitted through a new station at *Borough Hill* (Northamptonshire). This is our old friend Daventry 5XX working on 1,186 metres for a Government department.

### Radio-Nations News Bulletins on Long Waves

**F**ROM September 6th, on behalf of the League of Nations, HBC, Prangins (Switzerland), a 50-kilowatt telegraphy transmitter working on 4,225 metres (71 kc/s) is putting out a weekly news bulletin service in slow morse every Friday between 09.00-10.00 B.S.T. in the French language. It is destined to all European States. A similar service in English and Spanish will be broadcast the same day on 31.27 metres (9,595 kc/s) and 38.48 metres (7,797 kc/s) from HBL and HBP, Prangins, respectively.

### Hearing Worms Masticate

**T**HE recent aim of an investigation made by the Royal Institution of Great Britain was to ascertain whether a fifteenth-century panel painting contained worms, although to all appearances there was no trace of such damage. By means of a microphone and super-power amplifying outfit officials equipped with headphones listened with a view to hearing the worms working. Such a process of examination would prove of great utility to museums, for the examination of recent purchases or gifts, as otherwise wood-worms might be introduced into valuable collections.

### Marconi's Micro-wave Experiments

**T**ESTS are to be carried out shortly by the Marchese Marconi in ultra-short-wave transmission between the s.y. *Elettra* now at Santa Margherita and specially erected receiving stations situated on the slopes of the Monte Rosa and on the Monte Burrone (near Livorno).

# ROUND the WORLD of WIRELESS (Continued)

## City of Birmingham Orchestra

**B**ROSA will be the solo violinist for the Mozart Concerto in D which is to be given by the City of Birmingham Orchestra in the third of their Malvern Festival Concerts, to be relayed from the Winter Gardens on August 18th. This is the last of the series of three concerts, and the conductor will be John Barbirolli.

## "Wit, Fun and Humour"

**A** TALK on "Wit, Fun and Humour" will be given for Western listeners on August 21st by Gilbert Norwood,

## INTERESTING and TOPICAL PARAGRAPHS

### Kettering Rifle Band

**T**HIS popular band, which broadcasts from the Birmingham studio for National on August 19th, has had an interesting history. It had its origin over a hundred years ago, beginning as a Yeomanry Band. Each Christmas it plays in the kitchen at Chesham House, Northants, where it is said to have formed.

### Military Band Concert

**T**HE Lancashire Military Band—which won the last championship contest at Belle Vue—will broadcast to Northern listeners on August 18th. The band was formed in 1899, and is now composed of ex-Servicemen living in the Manchester district. A former conductor of the band, Mr. Edward Dunn, is at present director of the Buxton Spa Orchestra, which broadcasts regularly in the Northern summer programmes. The band's present conductor, Mr. Seth Shaw, is a late member of the Hallé Orchestra.

### Regimental Band Concert from Belfast

**T**HE Band of the 2nd Battalion, the North Staffordshire Regiment (The Prince of Wales's) will be in the Belfast studio on August 14th to give a short concert for Northern Ireland listeners. The programme will include the Regimental March, "The Days we went Gypsying" and, of course, the Regiment's March Past, "God Bless the Prince of Wales."

### "Show of Shows"

**A** RELAY for Western listeners will be taken from the "Show of Shows" presented by Geoffrey Hope and Vivian Palmer, Limited, at The Alexandra Gardens Theatre, Weymouth, on August 22nd.

### Macnaghton String Quartet

**A** PROGRAMME for the discriminating listener will be provided from Belfast on August 15th, when the Macnaghton String Quartet is to give a concert of Chamber Music.

### "Portrush Night"

**T**WO concert parties and a dance band will be included in the attractive Northern Ireland programme items to be heard on "Portrush Night"—August 16th. On this evening most of the available microphones in Northern Ireland will be found in Portrush. Listeners are to be treated to a regular conducted tour round the places of amusement in this popular resort. The concert parties which will be heard will be the "Town Topics" and the "Society Entertainers."

VISIT THE "PRACTICAL AND AMATEUR WIRELESS" STAND—  
No. 9 GROUND FLOOR!



Mr. F. J. Camm and members of the technical staff will be in attendance daily to answer queries. Readers are cordially invited to inspect the special "Practical and Amateur Wireless" receivers, blueprints and books exhibited.

Professor of Classics and Director of Classical Studies at the University College, Toronto.

### The North Regionals

**F**RED. E. RAYNE'S concert party, formerly the "Morecambe Follies," and the "Regional Follies," and now re-constituted as the "North Regionals," will broadcast to Northern listeners from the Floral Pavilion, Bridlington, on August 20th. Immediately following, Herman Darewski and his Band will broadcast from the Spa Royal Hall, Bridlington.

### "Garlands of Summer"

**T**HIS is the title of a programme of summer choruses which will be broadcast in the Western programme by the Glan-yr-Afon Glee Party, conducted by T. Emlyn Owen, from a Cardiff studio on August 24th. This Party comes from the old iron town of Rhymney.

### "Wings Everywhere"

**O**N August 20th an interesting talk, entitled "Wings Everywhere," will be given for Western listeners by Flying Officer C. R. Cubitt. For the last three years he has been chief pilot to Western Airways Limited, Bristol, flying on regular routes, and doing special flights all over England and the Continent. He served in the Royal Air Force as a pilot for five years, flying single-seater fighters, and he is still in the Royal Air Force Reserve.

### Bath Guitar Octet

**A** CONCERT by this octet will be given for Western Listeners from a Bristol Studio on August 24th. This recently formed musical combination has evolved from the Original Bath Banjo Band of 1908. The Director of the Octet, Frances Tarrant Bailey, was viola domra player in the Bath Balalaika Orchestra in 1912, and in 1918 she took up the study of the Hawaiian steel guitar. The instrument she uses is a genuine native one, differing very much in tone and construction from the instruments generally used in this country, practically all of which have been converted for use as steel guitars by the adaptation of special fittings.

### "Holiday from Grocery"

**T**HE next talk in the "Seeing Life" series, which has ranged from Calgary Rodeo to treasure hunting on Cocos Island, is entitled "Holiday from Grocery." On August 19th James Critchlow, a grocery assistant in Leicester, will tell how he puts his annual holiday to good use by holidays in the Baltic countries. His vacation is short, but he gets completely away from lard, bacon and "fine grain" by visiting Swedish lakes and the battlements at Elsinore.

### Variety from Blackpool

**T**HE "Arcadian Follies," with Harry Korris, the popular Manx comedian, will broadcast to Northern listeners from the South Pier, Blackpool, on August 22nd.

## SOLVE THIS!

### PROBLEM No. 152.

Robinson's receiver was completed and put on test. When he switched on there was a rushing noise in the speaker, but no signals. Tuning was carefully carried out, but nothing happened. The coils and condensers were tested and found in order, and a milliammeter in each anode circuit showed normal currents for each stage. Grid Bias was correct and all voltages were found approximately correct. When a pick-up was joined to the detector grid circuit it was still impossible to obtain signals. What was wrong? Three books will be awarded for the first three correct solutions opened. Address your attempts to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 152, and must be posted to reach here not later than the first post Monday, August 19th, 1935.

### Solution to Problem No. 151.

Jordan's fault was caused by a broken-down grid-bias by-pass condenser. This had short-circuited the biasing resistance and thus had caused an increase in current and consequent hum.

The following three readers successfully solved Problem No. 150, and books are accordingly being forwarded to them: G. H. Lomas, 9, Berlin Road, Edgeley, Stockport, Cheshire; R. Craggs, Weldon Crescent, High Heaton, Newcastle-on-Tyne, 6; J. Riley, 401, James Reckitts Avenue, Hull.



# Open Letter to Our Readers and the Trade

## And an Announcement Concerning Our New Service Data Sheets and Future Policy



Mr. F. J. Camm.

**G**ENTLEMEN,— Radiolympia affords an appropriate annual platform from which to address old readers, new readers, and our friends in the trade. Retrospect is valuable in that it enables us to appreciate the ground whereupon we now stand, to gauge future prospects and to plan for them. The past year has indeed seen a vast change in the home-constructor market. It has witnessed the competition of the cheap commercial receiver, and has seen the ingress of some thousands to our ranks as a result. A miracle ceases to be such when it can be performed a second time, and much of the glamour and the scientific interest of communication through the ether has vanished never to return to the older experimenter. But, gentlemen, as in all sciences, the old school passes on, and the new generation arises and passes through the same phases. A schoolboy to-day extracts the same enjoyment and intense interest from building a receiver as you did twelve years ago. With many it may become just a passing phase, but the residue, the cream of the experimental section of the public, remains. In all industries there are the jeremiads of those who foretell the death of an industry with monotonous regularity each year, and Radiolympia seems to be the appropriate time for their appearance. It has been regularly forecast every year since my first association with radio more than fifteen years ago, and yet home construction continues to prosper, and in many cases the turnover of the firms who cater for its needs has increased to an astonishing degree.

### A Lively Following

An industry cannot live upon its losses, and I am entitled to conclude that home construction is a profitable industry. It has its set-backs, of course, and its slump periods, but the tendency of an industry cannot be gauged by the temporary hard knocks of adversity. If you need evidence in support of this contention may I direct your attention to the astonishing success of this journal from its inception three years ago? The paper was started at a time when members of the trade forecast its early death. I am aware that in some cases the wish was father to the thought; and yet this journal has not looked back in any one particular since its first issue. It came into a market in which it was said by interested parties that there was no further room. It carved its way, however, to the forefront by what I may not immodestly claim to be sheer merit. It was started on sound lines. Firstly, we guaranteed our receivers under a Free Advice Guarantee to perform in the manner claimed, so that readers who were invited to spend a few pounds in making up our receivers could do so with the assurance that they would have satisfaction.

### Our Guarantee

For the first time in the history of radio journalism, therefore, home-constructed receivers were placed on the same footing as the commercial counterpart. A second important plank in our platform was that we undertook to answer all technical queries free of charge. Here again we gathered to our ranks many thousands of readers who felt that they had behind them in their hobby an unrivalled technical service which would rapidly and freely as well as cheerfully help them out of their difficulties. When a reader has been unable to make one of our receivers work we have adjusted it for him. The next important service which I personally undertook (it was indeed a heavy task, bearing in mind my other activities) was the preparation of popular works dealing with wireless, and to make them available to every reader under extremely generous terms. The success of that effort is reflected in the hundreds of thousands of copies which have been sent to

readers in every country in the world. In these and in many other ways this journal has stood for all that is best in home construction. It has acted as an effective link between the reader and the trade; it has guided the trade in many instances; it has led design; it cleaned up the design of home-built receivers by standardising the metallised wooden chassis system of building; its solus policy, namely, the specification of only those parts used in the original model, has done an enormous amount to remove the set-backs and the bugbears which sometimes surround the home constructor when a multiplicity of specifications are used for a given receiver.

### Our New Service Sheets

This year we carry our campaign a further step. With every one of our receivers we shall, in future, publish a service data sheet, showing the voltages and currents at every part of the circuit, so that the reader may rapidly check up and locate a particular fault should it arise. The importance of this scheme cannot be over-estimated. Every manufacturer of a commercial receiver issues these sheets for the use of dealers only. A purchaser, therefore, must consult his dealer. These service sheets place our receivers on exactly the same footing as a set purchased through a dealer. It is backed by our guarantee, technical advice is free, and you will, in future, have our service sheet always to hand for checking and testing purposes.

This is merely the first of a succession of developments which we shall place before our readers during the ensuing season. Within a few weeks we shall celebrate our third birthday, when another interesting announcement will be made in our greatly enlarged Birthday Number.

I should like to address a word, of thanks to the many thousands of loyal supporters of this paper, many of whom it is my pleasure to know personally. The amalgamation of that old established weekly, *Amateur Wireless*, with PRACTICAL WIRELESS (hence the combined title, PRACTICAL AND AMATEUR WIRELESS) has brought into our ranks a further army of genuine constructors. I should like to meet as many as possible at our Stand No. 9, on the ground floor of Olympia, since this is the first opportunity I shall have of welcoming them in person as Editor of the joint journal. If you cannot call do not hesitate to drop me a line; I reply to all letters personally.

### Welcome to New Readers

Welcome also to the new readers, many thousands of whom join our ranks at this time of the year. The foregoing will explain to you our policy and the principles for which we stand. It is, however, necessary to say, since you will be unaware of what has gone before, that this is not a normal issue. Many of our regular features have necessarily been held over in order to accommodate the Show Report justifiably warranted by the importance of Radiolympia. Normal issues cover every practical radio interest. There is a special section for beginners, a regular short-wave section (the largest given in any weekly), and sets to suit all needs, all pockets, and all purposes.

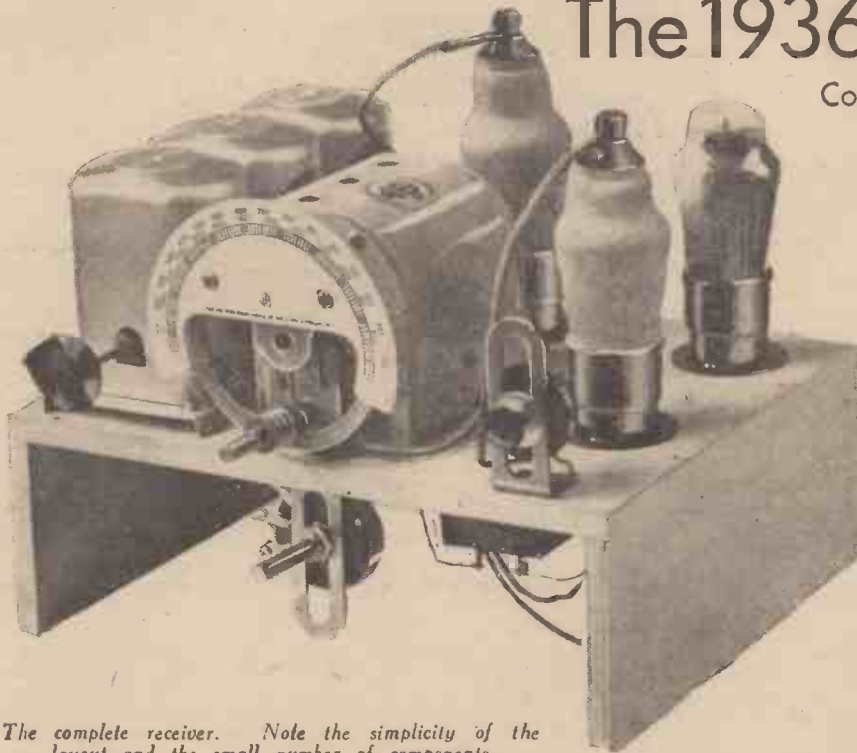
### To the Trade

Gentlemen of the trade, television will shortly be here. It is my considered opinion that the real boom in home construction will be produced by it. Ponder not therefore upon your temporary set-backs, but prepare for the new industry which will create new followers and resuscitate the interest of those who have abandoned it. In the early years television will be for the home constructor and experimenter, since few will be able to afford the £70 or £80 which the commercial television receivers will cost. Do not let the new hobby arrive while you are unprepared; radio did that. Take a lesson from it. I shall continue, as in the past, to pass along to you the accumulative opinions and experiences of our readers for your guidance. If I may close on a high note, it is this: When trade is bad do not attempt to economise by switching off the lights in your show-rooms; the moral of which will be obvious to you. I would conclude by tendering my sincere thanks for the friendly and cordial co-operation you have accorded to this journal and myself, and which has contributed so much to its success.

I am, Gentlemen,  
Yours faithfully,  
THE EDITOR.

# The 1936 SONOTONE

Constructional Details and Operating  
tive Straight



The complete receiver. Note the simplicity of the layout and the small number of components.

is a simple matter to incorporate a reaction circuit in the preceding H.F. stage. Experiments indicated that the coils are so efficient that the H.F. valves are on the verge of oscillation when the 50,000 ohms volume control is set at maximum, however, and therefore it was not thought advisable to unnecessarily complicate the design by adding a reaction control.

## L.F. Amplifier

The Westector proved a very efficient detector in our superhet series of receivers,

**THREE HIGH-EFFICIENCY  
PENTODES  
IN A FOUR-STAGE  
RECEIVER.**

and therefore we decided to incorporate it in the Three-Four, thus enabling us to obtain four-valve results with only three valves in use. Provided that the Westector is sufficiently loaded—the required input voltage is easily obtained from the efficient two H.F. stages incorporated in this receiver—linear rectification is provided, and therefore detector distortion, which is often present when a valve detector is used, is absent in this set. The Westector is coupled to the L.F. transformer by means of a .5 mfd. condenser, thereby insuring adequate bass response, and as there is no direct current flowing through the trans-

**N**OTWITHSTANDING the continued success of the two- and three-valve superhets described in PRACTICAL AND AMATEUR WIRELESS during the past twelve months, our correspondence indicates that hundreds of readers favour the straight type of receiver. This is probably due to the simplicity of the latter, or perhaps in many cases to the fact that the term superheterodyne frightens the beginner and makes him conjure visions of complicated trimming adjustments. Although, in actual practice, trimming a superhet is a moderately simple procedure, our experi-

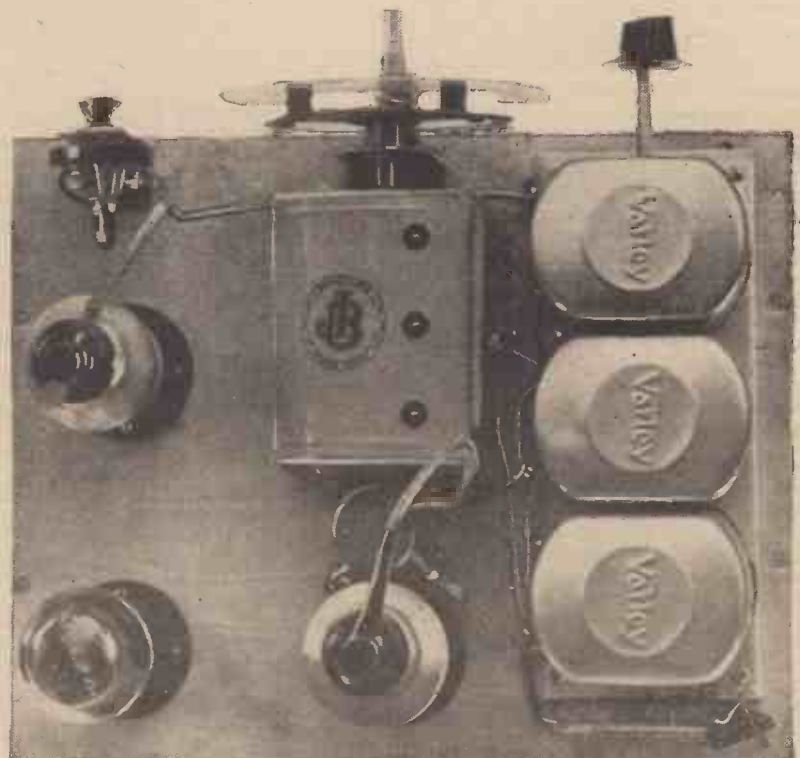
.0003 mfd., and therefore prevents excessive aerial effect when a very long aerial is used. The coupling between the first and second H.F. valves is of the tuned grid type, whereas the second H.F. valve is coupled to the Westector by means of an H.F. transformer. The use of different methods of coupling in these two stages helps to provide complete stability in the H.F. amplifier. The employment of a Westector precludes the use of reaction in the detector stage, but it

**SIMPLE TO OPERATE!  
NO REACTION!  
TWO VAR.-MU. H.F.  
STAGES!  
SMOOTH VOLUME  
CONTROL!**

ence indicates that the straight set offers less trouble to the average constructor. The majority of straight receivers are less selective than a well-designed superhet, however, and therefore are less suitable for modern reception conditions. In the Battery Three-Four we have accomplished the difficult task of designing a straight receiver the selectivity of which closely approaches that of the superhet, whilst retaining the advantages of the former type of set. This has been made possible by the inclusion of three tuned stages, incorporating well-designed, selective iron-core coils.

## Circuit Arrangement

An inspection of the theoretical diagram will indicate that the aerial is coupled to the aerial terminal of the first coil by means of a fixed condenser. This condenser limits the aerial-earth capacity to less than

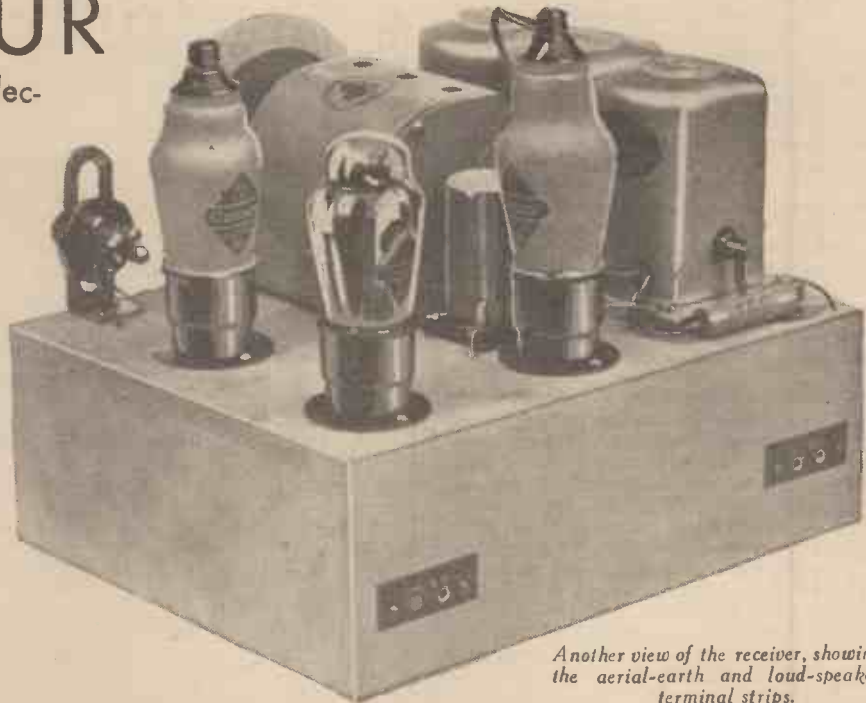


A simple, clean, and neat layout.

# THREE-FOUR

## Instructions of an Efficient and Select-Receiver

former primary winding it has been possible to use an efficient nickel alloy component having the exceptionally high primary inductance of 90 henries. As only one L.F. stage is used a high efficiency pentode has been employed in the output stage. A power pentode has been chosen as this gives better quality reproduction than the economy type, and although its consumption is high when the normal bias voltage of 9 volts is applied, this may be reduced to a low value by increasing the bias voltage to 12 volts, or by reducing the



Another view of the receiver, showing the aerial-earth and loud-speaker terminal strips.

**A POWERFUL  
TWO H.F. RECEIVER  
FOR  
BATTERY OPERATION.**

priming grid voltage to approximately 100 volts. The 1mfd. condenser C10 has been connected across the H.T. supply leads in order to prevent instability due to battery internal resistance when the H.T. battery is partly run down. It will be noted that the H.T.— plug incorporates a fuse. The receiver would function satisfactorily with an ordinary H.T.— plug in use, of course, but a fuse is a worth-while addition to any receiver, as it safeguards the valve filaments should the H.T.+ lead be accidentally short-circuited to the L.T.+ lead.

### Construction

An examination of the wiring diagram and photographs will reveal no intricacies; all the components are easily accessible, and therefore no constructional difficulties should be experienced. For the sake of beginners a few constructional hints will be given, however. Although the three valve-holders are not of the same type, a 1/4 in. drill may be used for all the holes. It is advisable to remove the metallised coating around the edge of these holes in order to avoid the possibility of the valve pins making contact with the earth terminal

through the metallising. A 1/4 in. drill may be used for the socket holes of the A.E. and L.S. terminal strips, and the foregoing instruction concerning the metallised coating should be adhered to. In the articles concerning some of our previous receivers constructors have been instructed to scrape off the metallised coating underneath the component brackets, but as the spindle of the potentiometer chosen for this set is not making contact with the moving arm this precaution need not be taken. It is not necessary to fix the components in any particular sequence, as all the wiring points are easily accessible.

### Wiring

After the components have been mounted they may be wired together, commencing with the aerial terminal and continuing from V1 to V2, and thence to the Westector and output stage. It will be noted that there are a few soldered joints, but no difficulty should be experienced with these, provided that a clean, well-tinned iron is used. A word of warning may be necessary concerning the screened leads. The screening covering must be kept clear from the

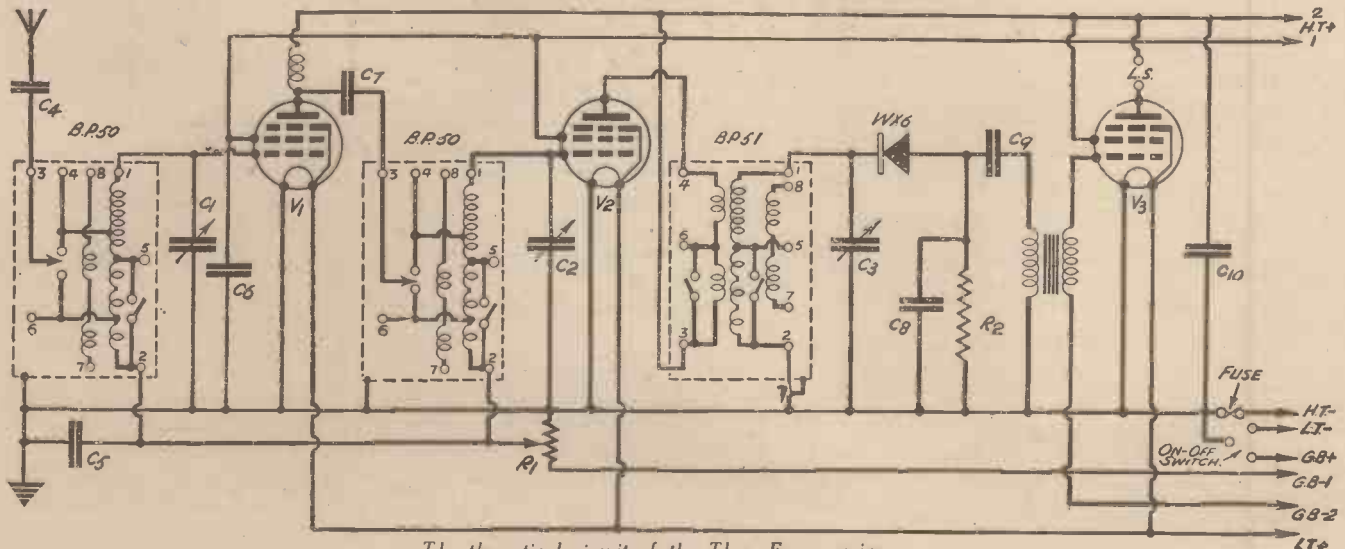
barc ends of the wire, and a bared wire must be joined between the covering and the earth points, as shown in the diagram.

### Adjusting and Operating

After the wiring has been completed and carefully checked, the battery, speaker and

**SUP.-HET. SELECTIVITY.  
A STRAIGHT CIRCUIT  
OF  
HIGH EFFICIENCY.  
THREE TUNED  
IRON-CORE CIRCUITS.**

and aerial-earth leads may be connected. H.T.+2 lead should be plugged into the 120-volt socket of the H.T. battery and H.T.+1 and H.T.— leads into the 60-volt and negative sockets respectively. G.B.—1 should then be plugged into the —9 socket



The theoretical circuit of the Three-Four receiver.

of the G.B. battery and G.B.—2 into the —9 or —12 socket, according to the current consumption desired. As previously mentioned, the consumption of the pentode may be reduced to a low value by using the —12 socket of the G.B. battery.

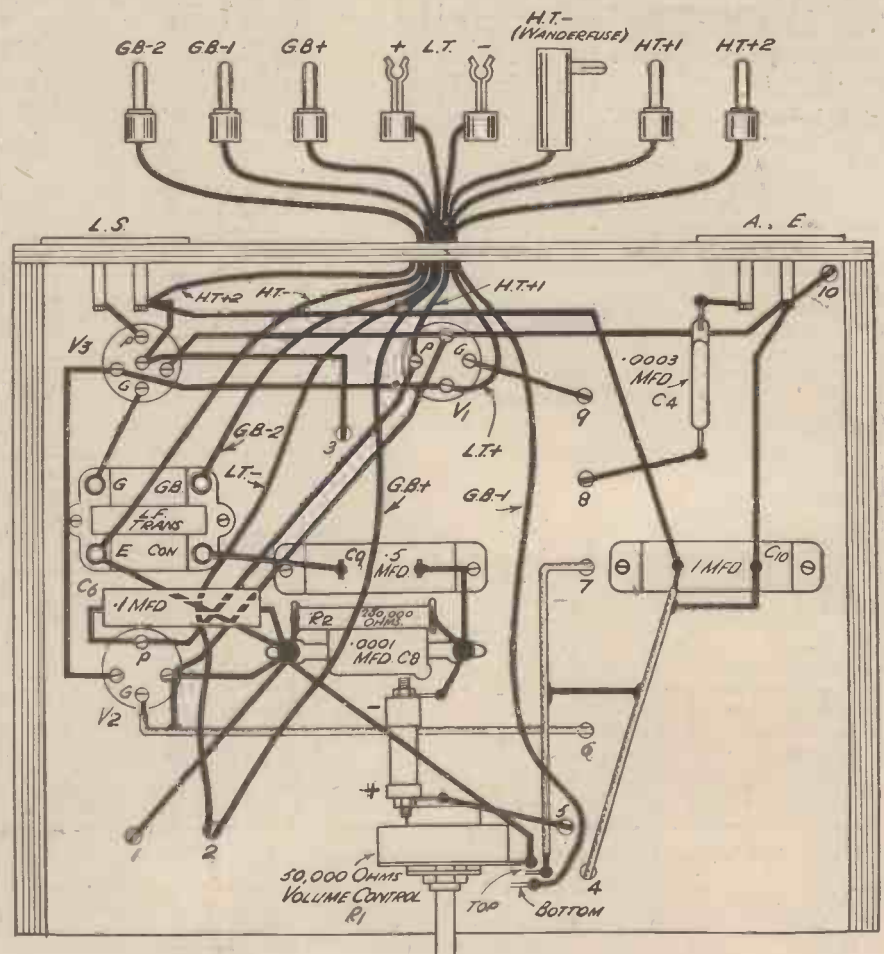
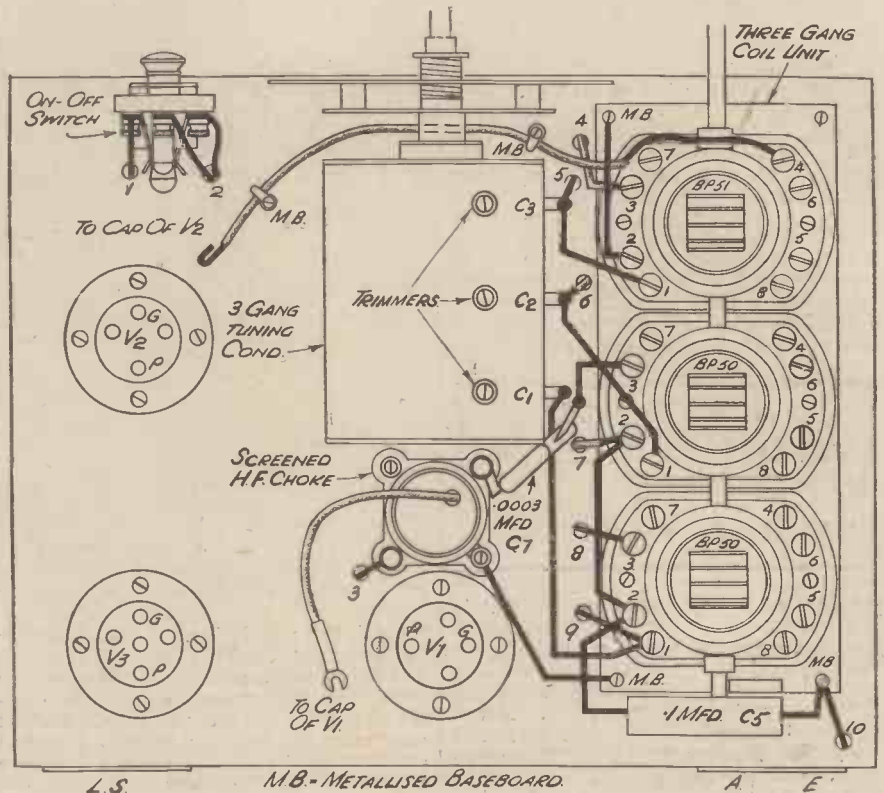
It is probable that good reception will be experienced as soon as the set has been switched on and the volume control has been set near maximum, but before best results can be obtained it will be found necessary to adjust the trimmers of C1, C2, and C3. This is not a difficult procedure, however, it being only necessary to tune to a weak transmission with the trimmers at approximately half-way setting and then adjust the trimmer screws until maximum volume is obtained.

**Short-wave Reception**

Although this receiver has been designed for reception on the medium- and long-wavebands, it can easily be made into a very efficient short-wave receiver. There are two methods of using a set of this type for short-wave listening. One of these is to substitute a short-wave detector unit for the receiver-detector stage, and the other is to employ a reacting detector unit as a frequency changer working on the autodyne principle, and connecting its output circuit to the aerial circuit of the receiver. The Three-Four is, in fact, an ideal receiver for use in conjunction with a reacting detector unit, or converter as it is commonly called, as the two H.F. pentode valves become efficient intermediate frequency amplifiers and the Westector will act as a reliable second detector. A suitable short-wave converter is fully described on page 831 of PRACTICAL AND AMATEUR WIRELESS dated February 23rd, 1935. When this has been added to the set, the combination constitutes a four-valve short-wave superheterodyne, which may be relied upon to pick up a large number of short-wave transmissions. It will only be necessary to connect the battery leads of the converter to the requisite battery terminals, and the output lead to the aerial terminal of the set. Tuning is then effected by means of the converter tuning condenser, the receiver wave switch being set to long waves, and the receiver tuning condenser control to its maximum setting.

It is not likely that any trouble will be experienced in the construction and operation of this efficient three-valver, but should any reader encounter difficulty we shall be glad to offer helpful advice through our Free Advice Bureau.

**WIRING DIAGRAM OF THE 1936 SONOTONE THREE-FOUR**



**LIST OF COMPONENTS.**

- One three-gang coil unit, type BP57, Varley.
- One three-gang .0005 mfd. Baby condenser with drive, J. B.
- Seven fixed condensers. Two .1 mfd., type 250 (C5, C6); one 1 mfd. (C10); one .5 mfd., type 65 (C9); two .0003 mfd. (C4, C7); one .0001 mfd. type M (C8). T. C. C.
- One fixed resistance. 250,000 ohms 1 watt type (R2), Erie.
- One potentiometer 50,000 ohms (R1), Erie.
- One L.F. transformer L.F.12, Bulgin.
- One Westector WX.6., Westinghouse.
- One three-point switch, type S.36, Bulgin.
- Two terminal strips, A.E., L.S., Clix.
- Three valve holders. Two 4 pin, one 5 pin, Clix.
- One H.F. choke, type H.F.P.A., Wearite.
- Five plugs. HT1, HT2, GB-1, GB-2, GB+, Belling Lee.
- One H.T. — fuse plug with 60 m.a. fuse, Belling Lee.
- Two spades LT+, LT-, Belling Lee.
- Metaplex chassis (10x8x3), Peto Scott.
- Three valves. Two 210 V.P.T., one 220P.T., Cossor.
- Batteries, 120 volts H.T., Drydex.
- 16½ volts G.B.
- 2 volts L.T., Exide.
- Two component brackets, Peto Scott.
- One permanent magnet speaker, W. B.
- 18in. Screened lead, Ward and Goldstone.

# “CAN THERE BE A BETTER SPEAKER?”

—asks Mr. F. J. Camm.

Read this message, received from Mr. Camm within three days of receiving his first 1936 Stentorian:—

*“Every constructor owes your engineers a debt of gratitude for your 1936 Stentorian. Once again they have beaten their best—excellent precision workmanship, even wider frequency response, higher degree of magnetic flux, entrancing tone at which the most critical could not cavil—and above all, outstanding sensitivity.”*

*“Can there be a better speaker?”*

*F. J. Camm*



**RADIOLYMPIA**

**SEE THEM ON**

**STAND No. 95**

Have you ever heard such spontaneous enthusiasm from a responsible technician of Mr. Camm's standing? When you hear the 1936 W. B. Stentorian yourself, you will realize that Mr. Camm, as always, is confining himself to solid facts. This great new speaker does in fact represent an historic triumph for W. B. research engineers. Its new magnificent volume, beautifully clear-cut, smooth reproduction, and the impressive illusion of actuality it brings far transcend all previously accepted standards.

Point by point, from cone periphery to “Microlode” switch, W. B. engineers during the past year have explored their highly successful first Stentorian to find possible avenues of improvement.

They have designed a larger “Microlode” device with new section winding and interleaving to increase frequency range. They have found a new cone material to eliminate “focussing” and frequency-doubling. They have perfected a better form of speech coil former, and have revolutionised methods of manufacture to provide a new minute accuracy of assembly and consequent “cleaner” reproduction. The famous “Mansfield” magnet, remarkable for its enormous flux density, is now still larger and more powerful.

Only by hearing one of these new instruments can you appreciate the full benefit of these and the innumerable other improvements incorporated in 1936 Stentorians. Ask your dealer to demonstrate to-day, and judge for yourself!

**PRICES:**

Senior Chassis ..	42/-
Junior „ ..	32/6
Baby „ ..	23/6
Midget „ ..	17/6
Stentorian Duplex	84/-



# Future Prospects

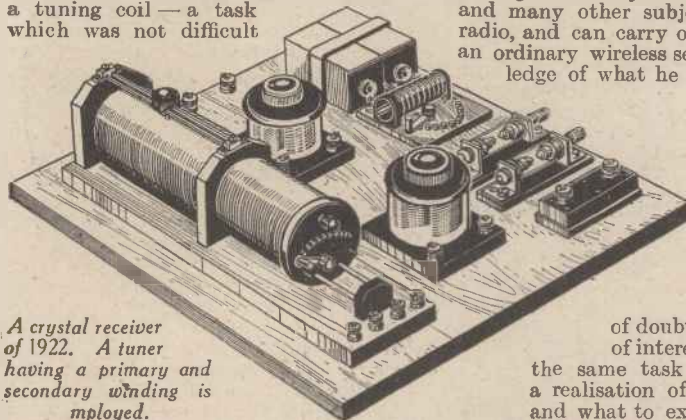
Present Indications Show That There is a Most Interesting Era Developing for the Home Constructor. By W. J. DELANEY

**A**N examination of the activities of the wireless constructor will show that there is an apparent "cycle of operations" occurring from time to time. In the early days, of course, the home constructor held the field, and very few commercial receivers were available even for those who wished to purchase rather than buy a wireless set. The cost too, was a prohibitive factor for those who did not make their own set. Gradually, however, the cost of commercial receivers was lowered and the amateur felt that it was not worth while building his own set. Unfortunately, this idea seemed to gain ground, although all the advantages were still with the constructor.

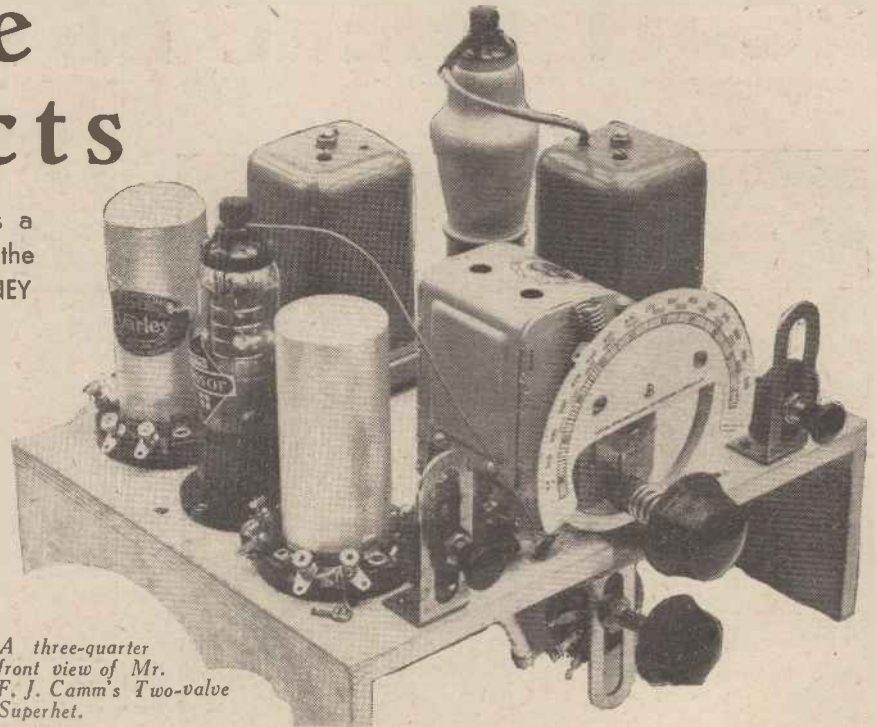
If you cast your minds back over the past few years you will find that the home set-builder has always paved the way for the commercial set. For instance, with the introduction of the Class B and the Q.P.P. valves, there were no complete commercial receivers available with this feature included until some time after the valves themselves had been placed on the open market.

## Apparent Inactivity

During the past year there has apparently been a period of inactivity on the part of inventors in general. There has been no outstanding development which has aroused the interest and the curiosity of the home-constructor and consequently there appears to have been a falling-off of interest. This may, however, be regarded as the calm before the storm, and present indications show that there is likely to be a re-awakening of interest which will excel even the period when wireless was first introduced to this country. Then, all that the ordinary man concerned himself with was a crystal receiver. He had to wind a tuning coil—a task which was not difficult

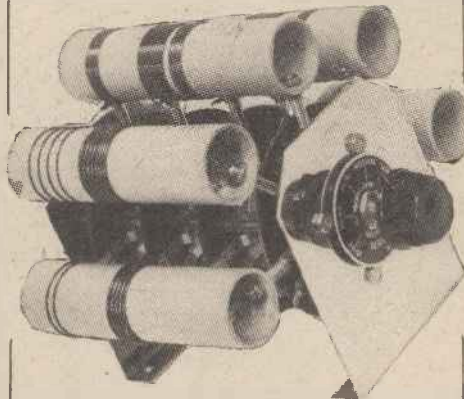


A crystal receiver of 1922. A tuner having a primary and secondary winding is employed.



A three-quarter front view of Mr. F. J. Camm's Two-valve Superhet.

but which was wrapped in a certain amount of mystery. Now, however even the



A Bulgin multiple short-wave coil chassis. Average schoolboy understands Ohm's Law and many other subjects connected with radio, and can carry out experiments with an ordinary wireless set with a full knowledge of what he is doing.

## Greater Interest

When you carry out some task without a full knowledge of just what is being done, there is a certain amount of doubt and consequent lack of interest. When, however, the same task is carried out with a realisation of what is being done and what to expect, there is added

interest to see if the supposition is justified. Therefore, the present-day constructor is in a much more envied position than the constructor of six years ago, as he may carry out construction and experimental work without unnecessary expenditure or waste of money, and with a fairly certain expectation of the results he is going to obtain.

## Television

The forthcoming television era bids fair to offer to the home constructor a period of activity which cannot be compared with any era in the past. There will be many experiments to be conducted in the new science, but there will be no such "hit-and-miss" methods which have characterised past activities. As I have just mentioned, the greater knowledge which everyone possesses will lend increased interest to the building and testing of television apparatus, or the adaptation of the ordinary wireless set to work on the ultra-short waves for television sound reception. Such terms as "time bases," "the gun," "deflector plates," etc., are perhaps foreign to many, but when they are explained they become quite simple matters and will readily be understood and appreciated. Hundreds of amateurs have already commenced to build short-wave apparatus in anticipation, and have found that this sphere of activity is to be preferred to ordinary listening to the regularly transmitted programmes. The variety, the phenomenal range of reception, the peculiar effects of daylight and darkness on reception, and the low cost of the apparatus required should be an inducement for every listener to commence short-wave activity at once,

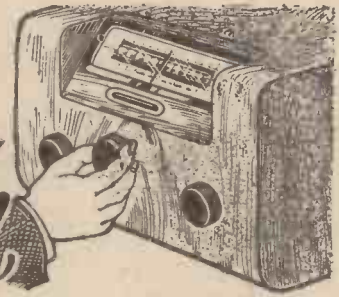


# 1936 STENTORIAN

NEW HANDMADE PAPER CONE



# On Your Wavelength



By Thermion

## Radiolympia

ONCE more the turn of the wheel brings me to Radiolympia, Mesdames et Messieurs. Once more into the breach, dear friends, once more! Let my footsteps never fail to tread the well-worn paths, to jostle the same crowds, to imbibe the libations from those four corner bars, and to stand four-square to all the winds that blow. Responsibility bears heavily upon me, and having lived through the wireless industry for a quarter of a century, watched its vicissitudes and the ever-changing mosaic of design, my view perhaps grows a trifle jaundiced. But when Radiolympia opens its portals the same old glamour assails me. I perceive a new gadget and immediately wish to build a new receiver. I still wish to indulge in heated argument with the salesmen when they try their high-pressure stuff on me. The most amusing aspect of my annual perambulation is to wander round the show as an unknown member of the public and listen to the very good parrots with super-greased trousers and super-greased hair who try to sell me a radio set. Fan me! Those specious arguments as to why Smith's set is better than Brown's, those jealous accusations that a rival manufacturer's goods have been copied from another's, the vacuous countenances which appear should you ask ever so elementary a question, are to me a source of excruciating amusement. Thermion can do this whilst the madding crowd passes by. Are they a radio crowd? Are they mere sight-seers, killing time until the opening of the cabaret? Have you ever mused upon the proportion of sight-seers and those genuinely interested in the new season's products? You can easily do this by standing hard-by any particular stand. They are mostly ships that pass in the night but speak not to each other in passing; and yet, the sales will soar. The attendance will break all previous records. Shall I see you there? Will home construction assume its old proportions? Will there be the same exhibition of glittering cabinet work hiding in many cases a tawdry interior, or shall we see the lavish internals laid bare for all to see? Vain hope that the component section will be easily recognised. The bits and pieces in which I am interested must be hunted like jewels of great price. For real enthusiasm lead me to the stand of PRACTICAL AND AMATEUR WIRELESS. There will you see a constant stream of genuine enthusiasts and money-spenders. Take me thereafter to the galleries and finally, guide my erring footsteps round the aisles. As I write, news reaches me that an effort is to be made

to stage a representative television exhibit. I pass the hint along without prejudice. All the portents indicate that next season will see a marked revival of interest in home construction. The annual event which I so keenly anticipate approaches. I shall go to it.

## Drawing Fire

THE gauge by which a successful free-lance journalist is measured is his ability to draw fire. Anyone can write the namby-pamby gossip with which everyone will agree. By that gauge I am a most successful free-lance journalist, for my friendly baiters can always be relied upon to send me a snorter should I, for one reason or another, stray from the paths of rectitude or accuracy owing to what they conceive to be my technical juvenescence. Yet still I speak, and still the wonder grows that one small head could hold one half it knows! Readers have asked for me to be sacked when I speak the unpopular truth; an equal following write in in entire agreement with my point of view. On balance, therefore, I stand at par. After all, my writing can only represent my thoughts, and they are genuine. If you don't agree with me, I still respect your point of view.

My recent note about religious broadcasts engendered a fruity crop of letters from the ayes and nays. I shall not endeavour to sort them out, nor to apportion percentages; the subject is far too dangerous for a hardened sinner like Thermion. Many thanks, however, to the dozens of readers (even the rude ones) who took the trouble to write to me.

## Loud-speaker Design

THREE separate loud-speakers on one baffle; two loud-speakers, one inside the other; a moving-coil speaker with a flat diaphragm; and a three-cone speaker, are some of the interesting devices which I have come across in reading through some of the manufacturers' advance Show details. It would appear that there is really a strong effort being made to improve reproduction, and undoubtedly this has arisen owing to the improvement in receiver design, but I cannot associate all of the above ideas. I can see snags in all of them, but I suppose I must bow to superior knowledge and look forward with interest to hearing some of these. The flat diaphragm reminds me of an effort many years ago, when a round table, such as is found in many old houses, was used as a speaker. The table top was made from balsa wood, coloured to resemble the old-fashioned walnut, and was provided with reinforced edges to resemble a really solid top. The speaker unit was fixed in the centre and although the table could be used, it was not advised. The reproduction was certainly very good, considering the

state of the art at this time, and it will be interesting to hear all these new models. Of course, there is always the danger that the improvements will necessitate the rebuilding of my set, and that would be a pity as I am rather proud of it, but I am always looking for better reproduction, and if I can get a better unit than the dual arrangement I now use, I shall be quite prepared to experiment with and improve the amplifier—if this be possible!

## Car Radio

I AM fortunate (or unfortunate—according to the point of view) in living in a house where the back garden is situated about 300 yards from a rather busy road. I have been very much impressed lately with the volume which has been coming from car radio receivers. On several occasions I have heard the strains of music before even the noise of the car has reached me, and the car and the music go by in a burst of noise. Does this indicate that one more curse has been added to mankind? I don't mind radio in the car, but it seems that the modern car has been improved to such an extent and the noise of the machine and associated works has been so reduced—to the benefit of everyone—that now it is necessary to go the other way and produce something which will make the car noisy again. I think there should be a limit to the power of these receivers, for after all, they are intended only for the enjoyment of the passengers, and it should not be necessary to have the volume at such a pitch that it can be heard for a quarter of a mile.

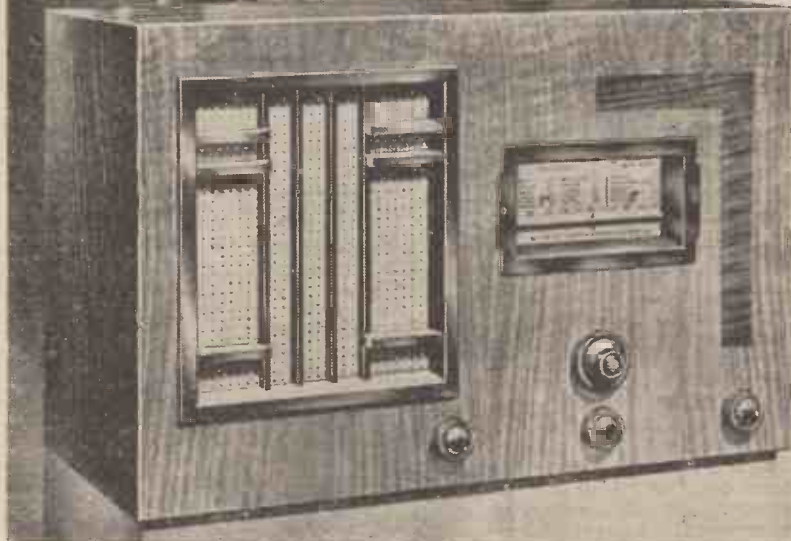
## Extension Speakers

HAVE you tried the special impedance-matching speakers yet? They do make a difference when you are using two or more extra speakers and want the very best in the way of volume and quality. I have two extension lines at home and seldom use both together. Recently, I wished to do so and attached a spare speaker to the second listening point. The quality was badly marred, in spite of an adjustment of the transformer on the first extension speaker which had a matching device. I obtained another similar speaker and joined this to the second point, and it was most interesting to vary the tappings on both and to perceive the difference in reproduction. There is no doubt that this is a valuable feature to be incorporated in a speaker, and if you use the extra speaker arrangement, you should try one of the matching devices. I notice, by the way, that a special output transformer will be on show at Olympia which will incorporate this matching idea and it may be used with any existing speaker so as to obtain the advantages of the adjustable impedance.

(Continued on page 601)

Inspect Our Complete Range of  
Wireless Books on Our Stand—  
No. 9, Ground Floor.

# COSSOR



IN these splendid new models Cossor offers the greatest value obtainable in up-to-date radio. Behind their production is one of the finest research laboratories in the country—a big staff of highly qualified engineers and a vast organisation (the largest of its kind in the country) operating in no less than six factories, each planned on the most modern lines. Little wonder that Cossor Radio is so efficient—so reliable!

Illustration shows Models 368 & 436B. Models 360, 363 and 369A are generally similar.

## BATTERY MODELS

### Model 360 (Power Output)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. and Triode Power Output. Sensitive Moving Iron Speaker. Cabinet accommodates Batteries. **£5.15.0**

(Exclusive of Batteries)

Hire Purchase Terms: 12/6 deposit and 12 monthly payments of 10/-.

### Model 363 (Pentode Output)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. and Economy Pentode Output. Sensitive 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries. **£6.15.0**

(Exclusive of Batteries)

Hire Purchase Terms: 13/- deposit and 11 monthly payments of 13/-.

### Model 436B

(Class B Amplification)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., High Slope Power Driver and Class 'B' Output. Special 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries. **£8.8.0**

(Exclusive of Batteries)

Hire Purchase Terms: 16/- deposit and 11 monthly payments of 16/-.

## ALL-ELECTRIC MODELS

### Model 368 (A.C. Mains)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Triode Power Output, Heavy Duty Rect. 8" Energised Moving Coil Speaker. For A.C. Mains only 200/250 v. (adjust.) 40/100 cycles. **£8.18.6**

Hire Purchase Terms: 15/6 deposit and 12 monthly payments of 15/6.

### Model 369A (D.C./A.C. Mains)

Universal Receiver similar to illustration above. Specification as model 368 but with 8" Energised Moving Coil Speaker. For D.C. 200/250 v. (adjust.) and A.C. 200/250 v. (adjust.) 50/100 cycles. **£8.8.0**

Hire Purchase Terms: 14/6 deposit and 12 monthly payments of 14/6.

### De Luxe Model 367 (A.C. Mains)

(illustrated on right)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Directly Heated Power Pentode Output. Heavy Duty Rect. "Thermometer Tuning" with illuminated wavelength scale. 8" Energised Moving Coil Speaker. For A.C. Mains only 200/250 v. (adjust.) 40/100 cycles. **£9.19.6**

Hire Purchase Terms: 17/- deposit and 12 monthly payments of 17/-.

**COSSOR**  
*SUPER-FERRODYNE*  
REGD.  
**RADIO**

*The De Luxe Model 367*





# 1935-36 Quality Radio



### A.C. MAINS MODEL 364

(Similar to illustration above)

With Pentagrid Frequency Changer, H.F. Pentode I.F. Amplifier, Double Diode Detector, High Slope Pentode Output, Full Wave Rect., Thermometer Twin illuminated and detachable Scales. Combined On/Off, Wavechange and Pick-up Switch, Volume Control. 8" Mains Energised M.C. Speaker. Complete with plug and sockets for extension Speaker and for pick-up. A.C. Mains only 200/250 volts (adjust.) 40/100 cycles.

Hire Purchase Terms: 20/- deposit and 12 monthly payments of 20/-.

## 11 GNS.

Prices do not apply in I.F.S.

### BATTERY MODEL 366A

(illustrated above)

A Battery operated Superhet with Pentagrid Frequency Changer, H.F. Screened Pentode I.F. Amplifier, Double Diode Detector and Economy Pentode Output. 8" Moving Coil Speaker. Cabinet with accommodation for suitable Accumulator and Batteries.

Hire Purchase Terms: 17/6 deposit and 11 monthly payments of 17/6.

## 9 GNS.

(Exclusive of Batteries.)

### DE LUXE A.C. MAINS MODEL 365

(illustrated on right)

With a performance unsurpassed by any receiver regardless of price, this model incorporates every possible refinement that gives greater efficiency, simplicity and dependability. With Pentagrid Frequency Changer, H.F. Pentode I.F. Amplifier, Double Diode Triode Detector/Amplifier, Super Power Triode Output, Full-Wave Rect. Improved Superhet compensated Anti-Fading circuit with NEON Visual Tuning. Illuminated and detachable Scales. Combined On/Off Wavechange and Pick-up Switch. Volume Control. 10" Concert Grand Mains energised M.C. Speaker. Variable Tone control. Special switch plug for extension speaker. Connections for pick-up. A.C. Mains only 200/250 volts (adjust.) 40/100 cycles.

Hire Purchase Terms: 25/- deposit and 12 monthly payments of 25/-.

## 14 GNS.

See them all at  
**RADIOLYMPIA  
STAND 70**

or send coupon for free literature giving fullest particulars.

## COSSOR SUPERHET RADIO

The De Luxe Model 365



**THIS  
COUPON  
BRINGS  
FULL  
DETAILS**

To A. C. Cossor Ltd.,  
Melody Dept., Highbury Grove, London, N.5.

Please send me free of charge, literature giving full particulars of the \*Model.....

Name.....

Address.....

\*Please state Model required.

PRAG. 17/8/35

720 t



And if you cannot get to Olympia, write to Dept. W.P., Ferranti Ltd., Radio Works, Moston, Manchester 10, for these four new booklets. They contain details of most of the Ferranti Components — components which challenge the world for reliability and accuracy. The four booklets are:—

R102 Mains Components: R104 Valves  
R103 Audio Transformers  
R201 Radio Meters

They are the books for which every real enthusiast has been waiting.

All four, post free for 1½d. each, or 3d. for the four.

By the way, if you do go to Olympia, don't forget to see the new Ferranti Straight-line Amplifiers.

(Continued from page 597)

**Jazz Item**

**A**CCIDENTALLY twiddled the knob the other evening and tuned in a dance band just in time to hear its leader announce that he was about to play "A Noo Toon." I gathered that it was to be a farx trart. Listened for a few bars and came to the conclusion that any child of three could have written the lyrics and the score. The orchestration could have been performed by a couple of Zulus or a chimpanzee allowed to roam unrestricted in a china shop. Got fed up with it and so to bed.

**Useful Arts**

**I**F you look through the catalogue of any library you will find a small heading entitled "Useful Arts," which includes radio. Apparently the assumption is that all of the other books deal with useless arts, particularly those on religion, of which there seem to be more published than on any other subject. Aren't you glad that radio is not so controversial and is more of exact science?

**Who Listens?**

**H**AS it ever struck you that the majority of the broadcasting stations are radiating dance music between ten and midnight? Have never been into a home and seen people dancing to it, and have formed the conclusion that the tempo is all wrong. What does one do when they sound those vulgar glissandos on the saxophone? Does one tremble like a jelly in a March wind, or is that the shimmy-shake? My creaking bones are unaccustomed to these exotic movements, but you should see me dance the polka!

**A Nation of Tired Listeners**

**I**SUPPOSE some people do listen for a couple of hours until midnight to this tintinabulating rubbish and the crooning ululations and clickety-clack work of the modern £2,000 a year idiots comprising the average dance band with their signature anthems. Before radio most people retired at eleven o'clock at night. Is radio, therefore, training us to go to bed late? Do we have too much radio? Would it not be more appreciated if there were only a couple of programmes a week? Would you not suffer from *ennui* if you went to the pictures or theatre every evening?

**B.B.C. Promenade Concerts**

**I**UNDERSTAND that programmes for the coming season's B.B.C. Promenade Concerts, from August 10th to October 5th, are, for the most part, on well-established lines, although a number of new features are included. Monday evenings will be devoted to Wagner, but in the second part of the programme a number of interesting and rarely heard works are to be played, such as "La Péri" (Poème Dansé) by Paul Dukas, Suite "L'Attaque du Moulin" (Bruneau), Symphonic Variations "Istar" (D'Indy) and the Three Fragments from Berg's "Wozzeck." Fridays, as before, will be Beethoven nights; all the Symphonies will be played, with the Ninth, and, on the last Friday of the series, October 4th, the Choral Fantasia. Wednesdays are divided between Bach, Handel and Brahms, and

**Using 'Phones**

**O**UR correspondence indicates that many readers find it difficult to decide how to connect a pair of headphones to a receiver designed for speaker reception. In the case of the battery-operated set, using a small power valve or an economy pentode in the output stage, the 'phone leads may be connected directly to the speaker terminals. When a super-power valve is used, however, it is advisable to fit an output filter circuit. If it is desired to use the speaker and the 'phones at the same time, it will only be necessary to connect one of the 'phone leads *via* a 1-mfd. condenser to the L.S.-socket, and the other 'phone lead to H.T.-lead. In cases where it is desired to discard the speaker, however, an L.F. output choke must be connected across the L.S. sockets. This choke should have an inductance of approximately 30 henries, and a rated current carrying capacity slightly in excess of the total current consumption of the output valve.

**Isolating Output Stage**

**W**HEN a set has two L.F. stages, it is advisable to connect the phones in the output circuit of the second valve. This can be done by means of a change-over plug and jack. If the jack is correctly wired it may be added to a mains or battery-operated receiver without fear of causing damage. One of the end terminals should be connected to the coupling condenser, the other end terminal to the common negative line, and the centre terminal to the grid terminal of the output valve. When 'phone reception is desired it is only necessary to insert the 'phone plug into the change-over jack. This will connect the 'phones in the output circuit of the second valve, and will automatically isolate the output valve without affecting the total consumption of the receiver.

**Extra Speaker Connection**

**T**HE connection of an extra speaker to a receiver is a fairly easy problem, but if best results are to be obtained, and damage is to be avoided, it is necessary to adopt the correct method of connection to suit the particular type of output circuit used in the set. If a choke capacity filter is employed, it is only necessary to connect the extra speaker across the set speaker, but if the set speaker is connected directly in the anode circuit of the output valve a condenser having a capacity of approximately 1 mfd. should be connected in each of the leads to the extra speaker in order to prevent direct current from passing through the extension leads.

all four of the latter's symphonies are to be played. Tuesdays are allotted in turn to Tchaikovsky, Mozart and Haydn, Mozart by himself, Russian music, Liszt and a Saint-Saëns Centenary Concert; this will be the first time that a "Prom" has been devoted to Saint-Saëns. Stravinsky's Violin Concerto is included in the Russian programmes.

One Thursday will be given to a concert of Debussy and Ravel; that, too, is something of a novelty, as no "Prom" programme has hitherto presented their music side by side. Other Thursday concerts are made up of the music of Mozart and Haydn, Russian music, Sibelius, and one evening of Schubert, which will be notable for the first appearance at the "Proms" of Elisabeth Schumann. Several works of outstanding interest are included in the Russian programmes, among them Prokofiev's Third Pianoforte Concerto and the First Symphony by Shostakovitch. In addition to these specialised programmes, the series is to include Stravinsky's "Fire Bird" Suite, Elgar's First Symphony, Vaughan Williams' Suite for Viola and Orchestra, Kodály's "Háry János," the Harty Violin Concerto, Dvořák's "New World" and Vaughan Williams' "Pastoral" Symphonies and a revival of Bax's Symphonic Variations for Pianoforte and Orchestra.

**The Grid Scheme: A Transformer Hint**

**C**ONSTRUCTORS who have purchased commercial A.C. sets or mains transformers having fixed primary windings, and then find the A.C. mains voltage is "brought into line" under the grid scheme need not despair. A number of transformer-makers list "auto-transformers" which allow the 230-volt A.C. supply to be adjusted to the mains input to the receiver. At least, if the consumption of the set is increased slightly by the use of a new transformer (fixed between the set and the mains), it avoids alterations to the former.

**U.S.A. Programmes**

**N**OTE should be made that W1XAL, Boston, on 25.45 metres (11,790 kc/s), which takes the programmes of the WEEI medium-waver, is on the air daily from B.S.T. 23.00-00.30. It is sandwiched between DJO and DJD, Zeesen, on respectively 25.43 metres (11,795 kc/s) and 25.49 metres (11,770 kc/s), which, owing to their power and relatively close proximity to the British Isles (575 miles) at times may hamper reception.

It is reported from Denmark that the short-wave station which is being built near Reykjavik (Iceland) for the establishment of a public radio telephony service with Copenhagen, *via* Lyngby, is rapidly nearing completion. The short-wave channels will also be used to link up Iceland and Denmark for the interchange of broadcast programmes. The channels to be used are TFI, 59.31 metres (5,058 kc/s); TFK, 36.11 metres (9,060 kc/s), and TFL, 21.48 metres (13,965 kc/s). Tests are now being carried out.

**1936 STENTORIAN**

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NON-RESONANT CABINET

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This attachment renders the Avo-Dapter instantly suitable for testing 9-pin valves. Complete with instructions

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Accurate and simple testing is carried a further step forward by this boxed Kit of "Avo" Testing Accessories. It does away with those nondescript lengths of wire which confuse testing. You can test more quickly and are safeguarded against making dangerous mistakes. For use with any testing meters. Price

**2/6**

The fame of the Avometer, the world's most widely-used combination meter, has given rise to an insistent demand for other combination instruments which would provide similarly dependable testing facilities for all classes of professional and amateur wireless technicians. In response to this demand, a full series of "Avo" Instruments has been produced to meet the needs of everyone. Each instrument is simple to use, self-contained and unexcelled for accuracy.

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This compact moving-coil combination meter gives ten different ranges of readings in milliamps, volts and ohms. It is invaluable for testing circuits, valves, components, batteries, power units, etc. Provides unique testing facilities with a standard of accuracy unapproached by any other instrument at anywhere near its price. In handsome case, with leads, interchangeable testing prods and crocodile clips, and complete instruction book showing how to make every test.

- CURRENT**  
0-6 m/amps.  
0-30 "  
0-120 "  
**VOLTAGE**  
0-6 volts.  
0-120 "  
0-300 "  
**RESISTANCE**  
0-10,000 ohms.  
0-60,000 "  
0-1,200,000 "  
0-3 megohms

**40/-**

DEFERRED TERMS IF DESIRED.

### The UNIVERSAL AVO MINOR

(Regd. Trade Mark.)

This ingenious instrument has met with a reception that testifies to its usefulness and to its fulfilment of a long-felt need. It gives 22 different ranges of readings (A.C. and D.C.). Has 3 in. scale. Total resistance 200,000 ohms. Complete with instruction book, leads, and interchangeable testing prods and crocodile clips.

**£5**

Leather Case

—10/—

Deferred Terms if desired.

22 METERS IN ONE	
D.C. VOLTS	A.C. VOLTS
0- 75 millivolts	0- 5 volts
0- 5 volts	0- 25 "
0- 25 "	0-100 "
0-100 "	0-250 "
0-250 "	0-500 "
0-500 "	
MILLIAMPS	RESISTANCE
0- 2.5 m/amps.	0- 20,000 ohms
0- 5 "	0-100,000 "
0- 25 "	0-500,000 "
0-100 "	0- 2 megohms.
0-500 "	0- 5 "
	0-10 "

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**2/6**

A PAGE OF PRACTICAL HINTS

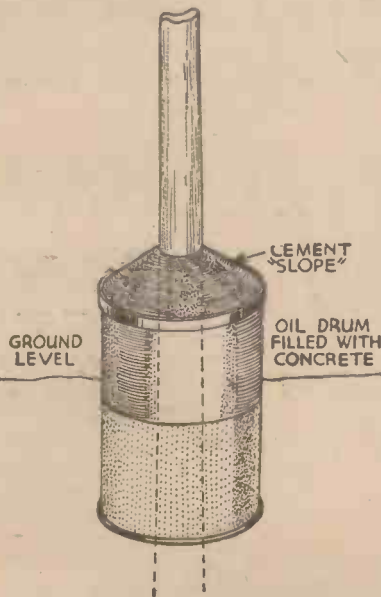
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Protecting Your Wireless Pole

ABOUT eighty per cent. of the wireless poles in use have one particular spot where rapid deterioration sets in, that being the point where the pole actually emerges from the ground. Usually the underneath portion is in a fair state of preservation, and it would appear that the absence of deterioration in this lower portion is due to the exclusion of the effects of "wind and water" and destructive pests. As a remedy which has proved successful the dodge illustrated here has much to commend it as a means of giving a further period of useful service. Remove the pole from the ground and cut back into good sound timber and coat with a preservative. When ready, slip an old oil drum with its lid and bottom removed up over the butt of the pole to a point where half of it will emerge from the ground ultimately, replace the bottom soil



An efficient method of prolonging the life of a wireless pole.

and then fill the tin with concrete, sloping off the top finally with a rendering of neat cement. Do this on a windless day to allow the mixture to set without movement. If the aerial mast is required to be lowered for painting, etc., the mast support may

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., 8-11, 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 Wrinkle.

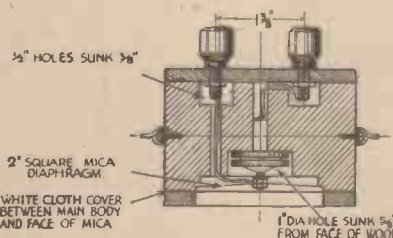
be fixed as described and the mast proper hinged in any desired manner. —W. F. CLARK (Ealing).

A Novel Variable Condenser

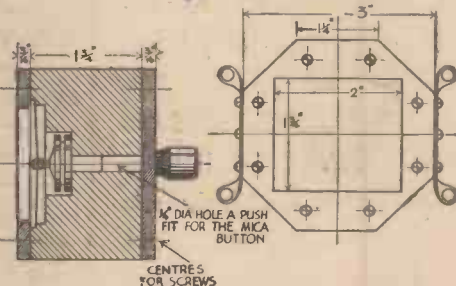
A SMALL capacity variable condenser which will be found handy for by-pass or aerial series use for ultra-short-waves, can be made quickly and cheaply in the following manner. One of the plates is a copper tube and the other a copper wire, the dielectric being a piece of systoflex sleeving. The gauge of the copper wire depends on the diameter of the sleeving used. The copper tubing and sleeving are contained in an ebonite or bakelite tube as shown in the sketch. The wire should fit tight in the sleeving, and the capacity is controlled by pushing the wire in for greater capacity and pulling it out for minimum capacity. One wire is soldered to the copper tubing and the other to the thick copper wire. The whole of the bottom part, and part of the top, can be filled with wax, leaving just the hole in the sleeving. —E. A. SNOAD (Wembley).

A Small Microphone

THIS small microphone can be easily and cheaply made with a microphone button and odd pieces of wood and metal strip. The main body of the microphone is cut

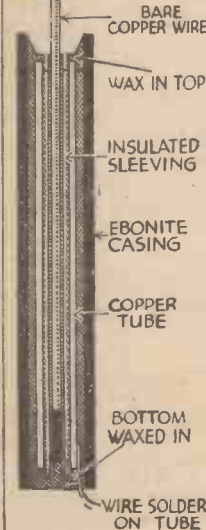


Sectional view of a small microphone giving constructional details.



Plan view (in section) and details of the front plate of the small microphone.

from a piece of 3in. by 3in. oak, the grain running from back to front. The two end pieces each consist of 3in. by 3in. by 3/8 in. plywood. Details of the actual cutting and drilling of these parts can be obtained from the accompanying sketches. The two brackets for suspending the microphone are each made out of a piece of brass 3in. long, 1/4 in. wide and 1/32 in. thick to the design given.



A small capacity variable condenser made with a copper tube and movable copper wire. The latter being admirably set off by the white cloth centre cover. The measurements and colours given, can, of course, be altered to suit individual tastes. Any desired form of mounting may be adopted and a four-spring support in a metal ring will be found as simple as any. Previous issues have described various types of mount suitable for the purpose. —H. L. CARTER (Bolton).



1936 STENTORIAN

NEW PERFECT PRECISION ASSEMBLY

# OUR GREAT RADIOLYMPIA COMPETITION!

HERE IS A GOLDEN OPPORTUNITY to obtain one of the very latest designs of loudspeaker ABSOLUTELY FREE OF CHARGE. A simple competition for which there is *no entrance fee*, and which will only take you a few minutes. An Equal Chance for everyone and no irksome restrictions and rules. You may send in as many attempts as you like. The Competition will be judged quickly and the results will be announced within one month!

WHAT IS YOUR FAVOURITE FEATURE ?	
SHORT-WAVE SECTION	
BEGINNER'S SUPPLEMENT	
LETTERS FROM READERS	
ON YOUR WAVELENGTH	
READERS' WRINKLES	
ROUND THE WORLD OF WIRELESS	
FACTS AND FIGURES	
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SET CONSTRUCTION	
REVIEWS OF COMMERCIAL SETS	
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A PRIZE WORTH WINNING! Below you can see the new W/B loudspeaker, no less than 50 of which are being presented to readers absolutely free. This Speaker represents the very last word in modern speaker design and can be used with practically any receiver—either home-made or commercially made. It can be matched to any circuit, and may be used when an output transformer is fitted or not. The Speaker may actually be matched whilst it is connected to the receiver and is reproducing the signals, thus avoiding all guess-work!

## FIFTY 1936 W/B STENTORIAN LOUDSPEAKERS GIVEN AWAY!

### READ THESE SIMPLE RULES:

1. Above you see a list of ten of the usual features of "Practical and Amateur Wireless." What you have to do is to place these in what you consider is their order of popularity. For example, if you think that Readers' Wrinkles is the most popular feature, place a figure 1 on the space provided at the side of that feature in the above coupon. Then, if you consider that the Beginner's Supplement is next in order of popularity place the figure 2 in the space provided, and so on with the ten items.
2. After filling the coupon in this way, complete it with your name and address in block letters in the space provided, and post in a *sealed* envelope addressed to The Editor, "Practical and Amateur Wireless," Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.



This is the new Stentorian Speaker referred to above.

3. Mark the word **COMPETITION** in the top left-hand corner of the envelope and post to reach us not later than August 31st, 1935.
4. Readers may send in as many attempts as they like in one envelope, provided that each attempt is completed on a separate coupon, each of which must bear the full name and address of the sender.
5. Only one Speaker can be awarded to any one reader.
6. The result will be published in our issue dated September 14th, 1935.
7. The Editor's decision is final and legally binding, and this is an express condition of entry. No correspondence whatever can be entered into regarding this competition.

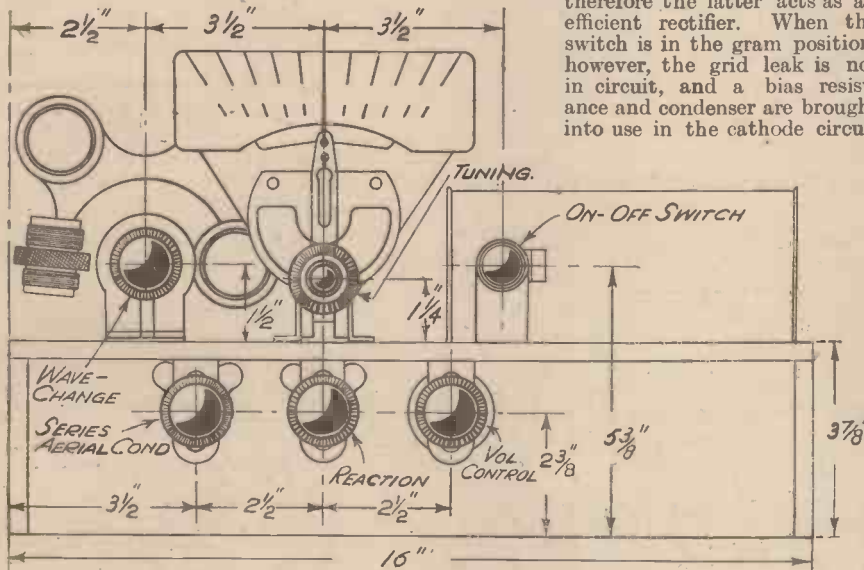
# The "Allwave" A.C. Three

This Article Gives Constructional and Operating Details of an A.C. Operated Allwave Receiver Suitable for Reproduction of Gramophone Records

THERE seems to be a definite increase in the interest taken in short-wave reception, but as the programme value on the short-wave bands is low compared with that on the medium and long-wave bands, short-wave listening is generally confined to one enthusiastic member of the family. The best procedure, of course, is to have two receivers, one for the use of the short-wave enthusiast and the other for broadcast band reception.

are obtained by using a .00016 mfd. tuning condenser. Constructors who prefer to tune between 150 and 600 metres on the medium-wave band should use coil unit number 961 instead of number 960; this modification will not require any wiring alteration. It will be noted that a radio-gram switch is connected in the grid circuit of the first valve. When this is in the radio position the grid leak is connected to the cathode of the detector valve, and therefore the latter acts as an efficient rectifier. When the switch is in the gram position, however, the grid leak is not in circuit, and a bias resistance and condenser are brought into use in the cathode circuit

of the second valve. This potentiometer prevents the possibility of overloading occurring in the L.F. amplifier, and will be found very useful for controlling the volume when reproducing gramophone records. The anode of the second valve is connected by means of a .05 mfd. condenser to the end tag of a change-over 'phone jack, the other end tag of the jack being connected to earth, and the centre tag via a stopper resistance to the grid of the output valve. Only two valves are required for 'phone reception, and therefore we decided to provide a method of change-over from speaker to 'phones that would automatically cut out the last valve without altering the current consumption of the receiver. A study of the theoretical diagram of the jack circuit will indicate that the 'phones are connected in the output circuit of the second valve when the 'phone plug is pushed in, and the connection between the coupling condenser and the grid circuit of the third valve is automatically broken. As soon as the 'phone plug is removed, the output valve grid circuit is completed, and the receiver functions normally as a three-valver. With this method of connection it is unnecessary to remove the speaker when 'phone reception is desired.



Panel lay-out for the "Allwave" A.C. Three.

Fitted with 'Phone Jack and Pick-up Sockets.

The majority of families do not care to go to this expense, however, hence the growing popularity of the allwave receiver.

Most of the short-wave sets we have described in the past have been of the battery-operated type, as there has been a greater demand for this type than for mains receivers. The preference shown for battery sets has probably been due to the absence of background noises when a battery supply is used. The use of modern rectifying and smoothing apparatus has made it possible to design mains receivers having a quiet background, however, and therefore we decided to use A.C. mains valves in the Allwave Three.

The straight receiver employing an efficient amplifier has proved its merit on the short wavelengths as well as on the broadcast band, and, though superhet selectivity cannot be claimed for a set using one tuned stage, this receiver can be relied upon to provide a degree of selectivity that will meet most requirements.

### Circuit Arrangement

An examination of the diagram will indicate that the circuit comprises a reacting detector, resistance coupled to an L.F. valve, this, in turn, being resistance coupled to a power output valve. The coil unit preceding the first valve is of the multi-wave type, which may be tuned from 13.5 to 91 metres on the short-wave band, from 260 to 520 metres on the medium-wave band, and from 1,100 to 1,900 metres on the long waves. These tuning ranges

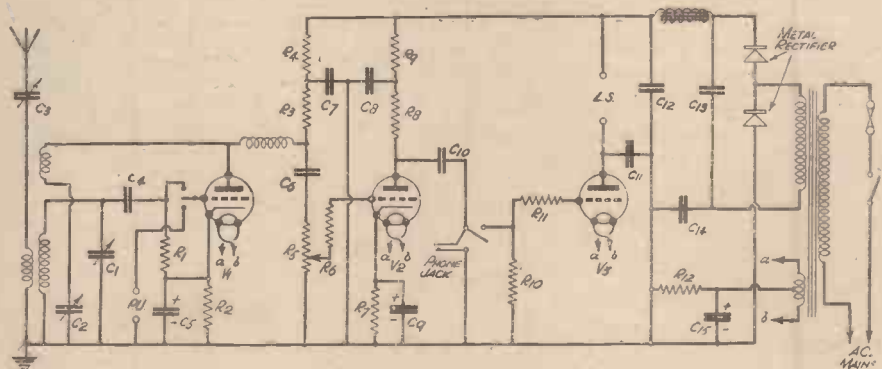
of the first valve, thereby converting the latter into an efficient L.F. amplifier.

As the first valve is followed by a well-designed L.F. amplifier, using a directly heated power triode in the output stage, exceptionally good gramophone reproduction is obtainable. The use of an efficient all-wave choke in the anode circuit of the detector valve, in conjunction with a well-designed reaction control, ensures a smooth reaction control on all wavebands. The choke is connected via a .01 mfd. condenser to one end terminal of a 500,000 ohms potentiometer, the other end terminal of this being joined to the earth line, and its centre terminal via an H.F. stopper resistance to the grid

A directly-heated output valve has been chosen in order to provide good quality reproduction and freedom from voltage surges. If an indirectly-heated valve were used the smoothed voltage would rise to an excessively high value during the heating up process, and would possibly cause damage to the smoothing and by-pass condensers.

### Construction

All the components are well spaced and clearly shown on the wiring diagram, and therefore no trouble should be experienced with the constructional work. A few hints will probably be found helpful, however. It is advisable to drill the holes for the valveholders and terminal strips first,



The theoretical circuit diagram.

using a 7/16 in. drill for the former and a 1/4 in. size for the latter. The sockets of the holders and strips should be kept clear of the metallised surface of the baseboard in order to prevent a short-circuit from the valve and terminal pins to earth. It is not necessary to insulate the component bracket from the top surface of the baseboard, as the spindle of the switch is not joined to the contact tags, but the screws holding the brackets on the underside of the baseboard must be short so as not to pierce the top metallised surface. In order not to damage the coil unit and tuning condenser it is suggested that the components on the underside of the baseboard be mounted first.

The wiring is easily accessible and may be commenced at the aerial terminal, continuing to V1, V2, and V3, and hence to the mains unit.

**Adjusting and Operating**

After the wiring has been carefully checked, the aerial and earth leads, speaker leads, and mains leads may be joined up. The mains leads should be plugged into the mains transformer socket corresponding to the mains supply voltage. For example, if the mains voltage is 230 volts the socket marked 230 should be used, or the 250 socket if the voltage is 240 volts.

To obtain radio reception, the switch at the back of the chassis should be turned in a clockwise direction, and the tuning and reaction controls operated; these are the two centre controls on the front of the chassis. The required waveband is, of

**Excellent Quality Reproduction on Gramophone and Radio.**

course, selected by rotating the coil control on the left side of the chassis. The aerial series condenser, situated underneath the coil unit, need only be used when on the short-wave bands. When receiving wavelengths below 100 metres, operation of this control will be necessary in order to

obtain reaction on all positions of the tuning dial.

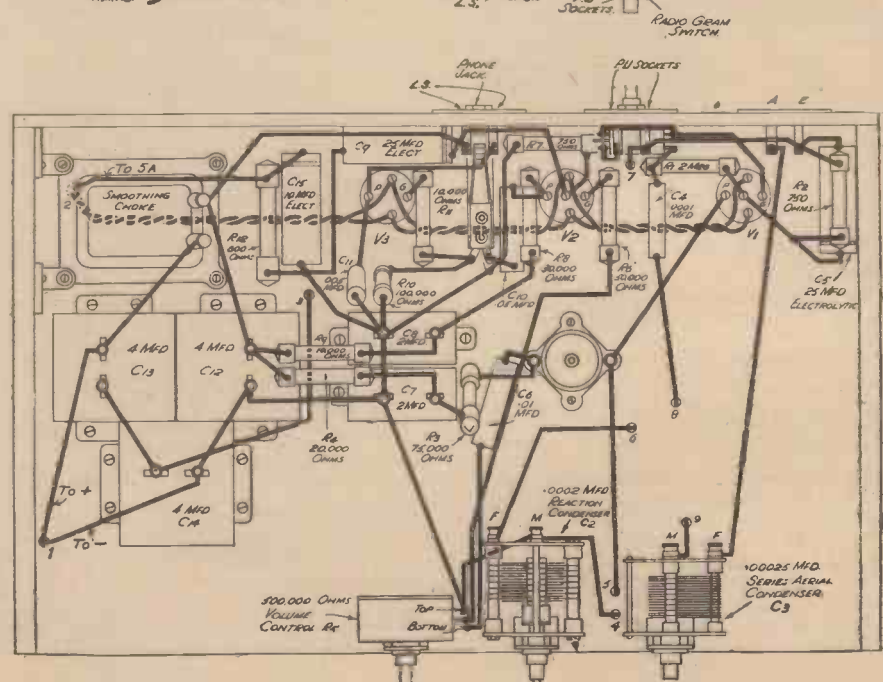
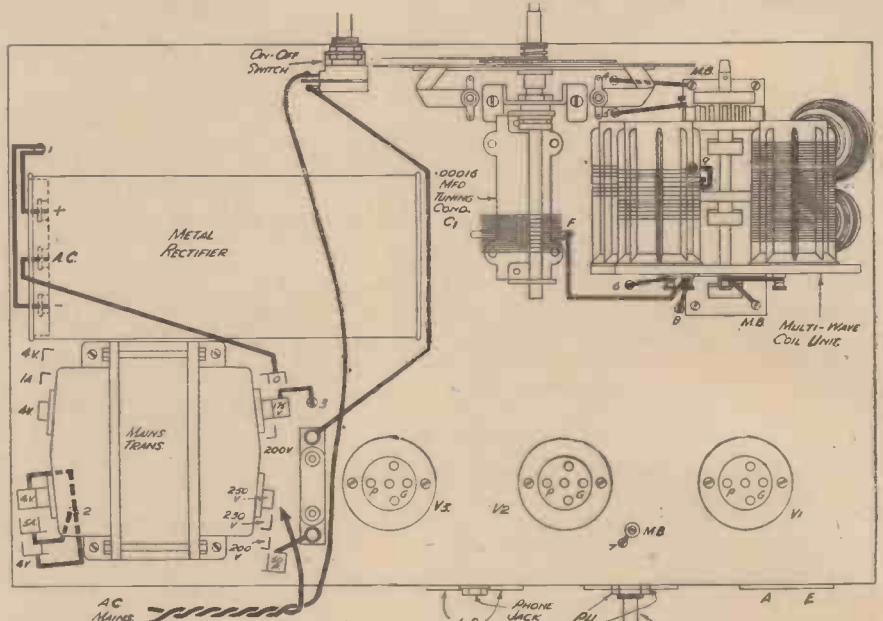
Its purpose is to reduce the effective aerial-earth capacity, thereby eliminating dead spots in the tuning range. On the medium and long wavebands it may be used as a selectivity control, if desired.

**Simple to Operate.  
Smooth Reaction Control. L.F. Volume Control.**

A reduction in the setting of this control will reduce volume on wavelengths of over approximately 150 metres, however, and therefore if maximum volume is required it should be set at maximum.

On the short wavebands it will be found necessary to keep the reaction control near the oscillation point in order to obtain best results when listening to telephony transmissions, but when continuous wave morse signals are to be received the reaction control must be rotated beyond the oscillation point. On the medium and long waves good speaker volume may be expected from approximately six stations during daylight, but many more will be received after dark, of course. On the short wavebands reception conditions will vary from night to night in different localities, and short-wave skip-distance effect will be experienced. It would therefore be misleading to give exact details of the stations which may be heard on wavelengths below 100 metres, but constructors are assured that dozens of morse stations and several telephony stations may be picked up on the lower wavelength ranges.

**WIRING DIAGRAMS OF THE ALLWAVE A.C. THREE**

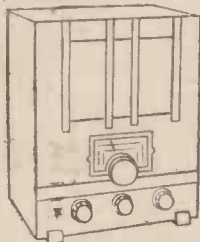


- ALLWAVE A.C. THREE.**
- Multi-wave coil unit, No. 960 (Eddystone).
  - One .00016 mfd. condenser, Type E (C1) with micro drive horizontal (Polar).
  - One .0002 mfd. reaction condenser (C2) (B.T.S.).
  - One .00025 mfd. aerial condenser (C3) (B.T.S.).
  - Eleven fixed resistances: 2 meg. (R1), 100,000 ohms (R10), 75,000 ohms (R3), 50,000 ohms (R6), 30,000 ohms (R8), 20,000 ohms (R4), 10,000 ohms (R9), 10,000 ohms (R11), 750 ohms (R2), 750 ohms (R7), 1 watt type; 600 ohms (R12), 2 watt type (Dubilier).
  - Twelve fixed condensers: .05 mfd. (C10), .01 mfd. (C6), .005 mfd. (C11), .0001 mfd. (C4), Tubular. Two 2 mfd. (C7, C8), three 4 mfd. (C12, C13, C14), Type 40 (T.M.C.).
  - Two 25 mfd. 25v. (C5, C9), one 10 mfd., 50v. (C15) electrolytics (T.C.C.).
  - One Allwave H.F. choke, Type H.F.O. (Wearite).
  - One 500,000 ohms potentiometer (R5) (B.T.S.).
  - One change-over jack with plug (B.T.S.).
  - One L.F. choke, Type H.T.13 (Wearite).
  - One mains transformer, Type W.31 (Heayberd).
  - One rectifier, type H.T.8 (Westinghouse).
  - One fuse with holder, 500 m.a. (Microfuse).
  - One radiogram switch, Type S92 (Bulgin).
  - One on-off switch, Type S91 (Bulgin).
  - Three terminal strips, A.E., P.U., L.S. (Clix).
  - Four component brackets (Peto-Scott).
  - One metaplex chassis, 16in. by 10in. by 3 1/2in. (Peto-Scott).
  - Three valves: two A.C.-H.L. (Hivac), one 4XP. (Cossor).
  - Three valveholders, two 5-pin, one 4-pin (Clix).
  - One permanent magnet speaker, Type F720, P.M.00 (Rola).
  - 18in. screened lead.



# BLUE SPOT RECEIVERS and LOUDSPEAKERS

## A.C.5 TABLE MODEL



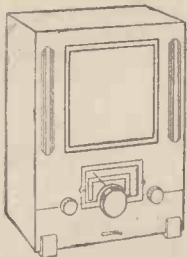
in Walnut  
12 Gns.

## A.C.5 G RADIOGRAMPHONE



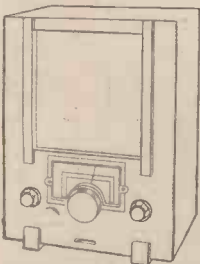
in Walnut  
21 Gns.

## A.C./D.C.4 Universal RECEIVER



in Walnut  
9 Gns.

## BATTERY III



in Walnut  
£6.17.6  
Excluding Batteries

All Blue Spot Receivers may be purchased by easy payments.

To thousands of wireless enthusiasts who have had personal and practical experience of the Quality associated with the name Blue Spot, these new Receivers and Speakers need no recommendation but their name. Blue Spot has invariably stood for the highest excellence in performance and the highest quality in design and construction. Blue Spot Receivers maintain this tradition in presenting the most advanced practice in wireless engineering and many special Blue Spot features.

## OUTSTANDING BLUE SPOT FEATURES

### A.C. Receivers

SEVEN STAGE SUPERHET CIRCUIT. FULLY COMPENSATED A.V.C. FULL VISION STATION NAME DIAL. HIGH FIDELITY REPRODUCTION. UNDISTORTED OUTPUT 2½ WATTS. MODERN WALNUT CABINETS. RADIOGRAMPHONE HAS ENCLOSED CONTROLS AND ARMCHAIR OPERATION FOR RADIO OR RECORD.

### Universal A.C./D.C.4

ALL-PENTODE CIRCUIT. MAINS INTERFERENCE CUT-OUT. INDEPENDENT SELECTIVITY CONTROL. DUAL PROGRAMME CUT-OUT. FULL VISION DIAL. MATCHED MOVING-COIL SPEAKER. 2½ WATTS OUTPUT and other specialised Blue Spot features.

### Battery III

ACOUSTIC OUTPUT EQUIVALENT TO 1 WATT. FULL-VISION STATION NAME DIAL. UNWANTED PROGRAMME REJECTION CIRCUIT. BALANCED BATTERY POWER. QUALITY REPRODUCTION. LOW CONSUMPTION.

### Loudspeakers

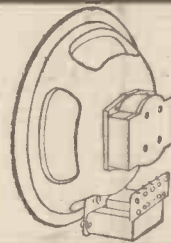
NICKEL ALUMINIUM MAGNETS. NEW DESIGNS. 100% INSULATION.

MATCHING TRANSFORMERS FOR ANY OUTPUT STAGE. DUSTPROOF. EXPONENTIAL CONE (SENIOR MODEL). OTHER NEW FEATURES.

## OLYMPIA STAND No. 28

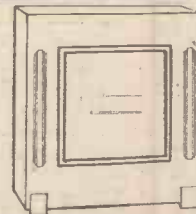


## "POPULAR" CHASSIS



19/6

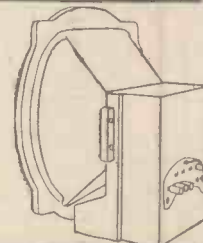
## "POPULAR" CABINET



in Walnut with Volume Control

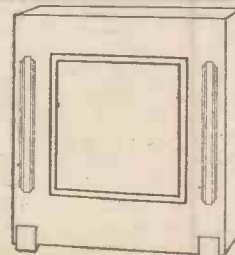
35/6

## "SENIOR" CHASSIS



29/6

## "SENIOR" CABINET



in Walnut with Volume Control

49/6

## BLUE SPOT PICK-UP



with Volume Control 27/6

BLUE SPOT AERIALS improve the performance of any set. Popular Series 8d. to 2/5. De Luxe 11 Strand Series 1/9 to 3/6. BLUE SPOT SCIENTIFIC EARTH 300% greater surface area. Three times greater overall efficiency. Price 3/6.

## COUPON

Please send me catalogue of Blue Spot Receivers, Loudspeakers and other products.

NAME.....

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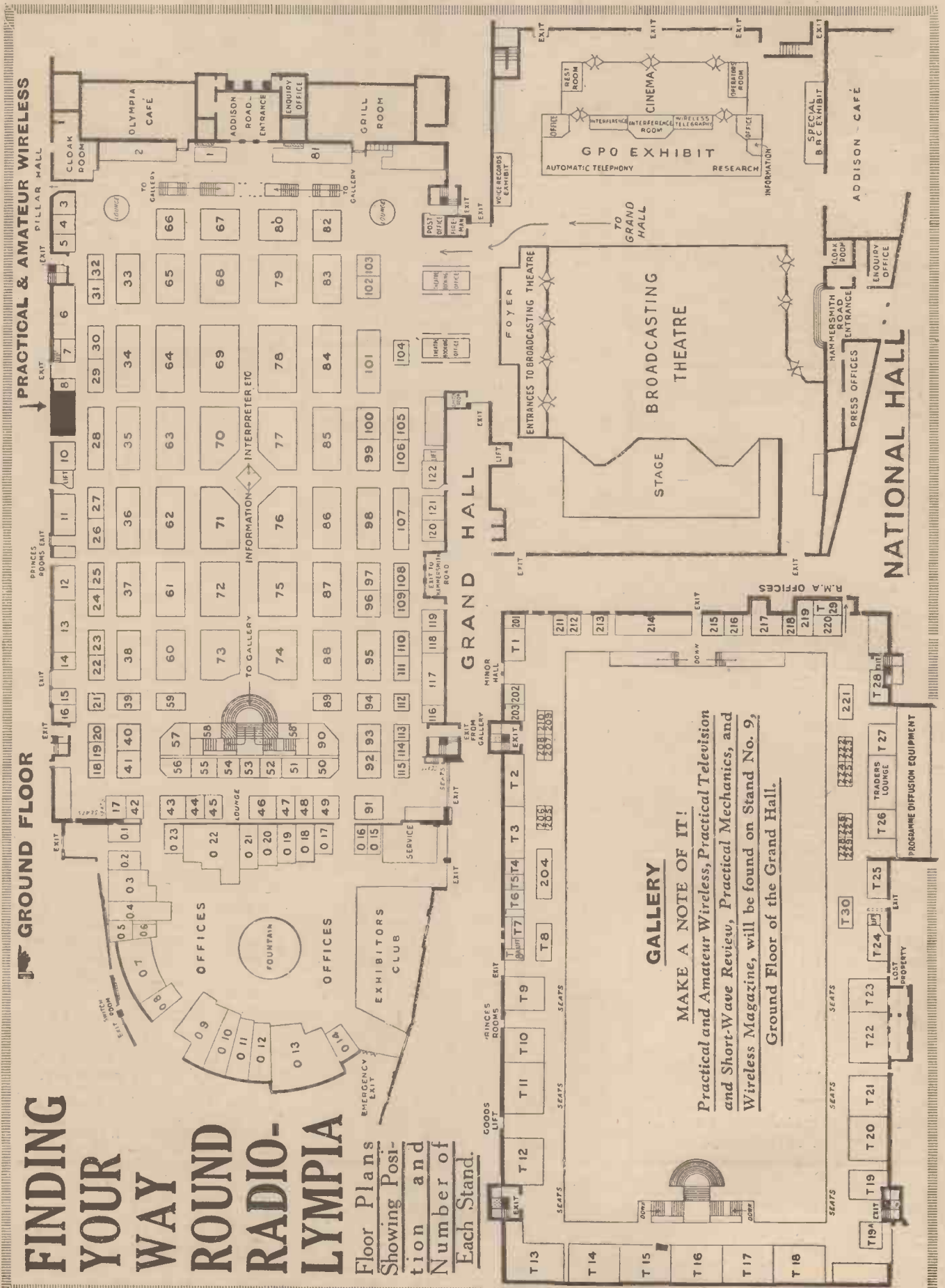
## BRITISH BLUE SPOT COMPANY LTD. STERLING WORKS, DAGENHAM, ESSEX

Telephone: Seven Kings 3486 (Private Branch Exchange).

Sales Concessionaires for Northern England, Wales, Scotland, and Western Counties: ISMA (RAWSON) LTD.

# FINDING YOUR WAY ROUND RADIO-OLYMPIA

Floor Plans Showing Position and Number of Each Stand.



## GALLERY

**MAKE A NOTE OF IT!**  
*Practical and Amateur Wireless, Practical Television and Short-Wave Review, Practical Mechanics, and Wireless Magazine, will be found on Stand No. 9, Ground Floor of the Grand Hall.*

# The Practical & Amateur Wireless Guide

TO THE



**ACE RADIO, 2-5, Dingley Place, London, E.C.1.** Stand No. 97.

A NEAT 3-pentode battery receiver will be shown on this Stand, and this will vie with the 7-valve all-wave Superhet covering from 15 to 2,000 metres designed for Universal mains use. In between these extremes will be seen a 4-valve mains version of the 3-pentode receiver and 6-valve superhets and radiograms.

**ADEY PORTABLE RADIO, 99, Mortimer Street, W.1.** Stand 1. Details not available at time of going to press.

**AERIALITE LTD., Junction Mills, Whittington Street, Ashton-U-Lyne.** Stand No. 8.

MANY ingenious novelties seen on this Stand will prove of interest to the listener. The aerial is usually a difficulty to the flat-dweller, and Messrs. Aerialite have produced some novel types especially suitable for this class of listener. The "Trapeze," the "Invisible" and the "Collite" will, by their names, indicate the types which have been designed, and to these must be added the "Levenstrand" and the ordinary "Aerialite" wire suitable for outdoor use. In addition to H.T. batteries, this firm will also be showing various types of cable, flexible leads and leading-in wires.

**AERODYNE RADIO LTD., Aerodyne Works, Tottenham, N.17.** Stand No. 72.

AN attractive feature of the receivers exhibited here will be the tuning dial. Although semi-circular, the escutcheon has been provided with straight sides, and this lends a neat appearance whilst maintaining the utility of the full-vision scale. The range of receivers includes battery-operated models as well as Universal receivers designed for use on any type of mains. The superhet circuit is employed in some models, whilst others rely upon a simple three-valve circuit using an H.F. pentode in the first stage, with iron-cored tuning coils. Gramophone pick-up sockets

are provided on all models. The models illustrated are the S.G. Pentode Battery Receiver (the "Thrush"), costing £6 17s. 6d., and the "Nightingale," a Band-pass Pentode Battery Receiver with a slightly different circuit and a chromium-relieved cabinet. This model costs £7 17s. 6d.

**ALL POWER TRANSFORMERS LTD., 8a, Gladstone Road, Wimbledon, S.W.19.** Stand No. 211.

THIS exhibit will comprise a complete range of transformers, chokes and associated apparatus for use in wireless receivers, television equipment and

this transformer has a section-wound winding with paper interleaved and is an extremely reliable component. The no-load voltage increase is less than 5 per cent., and the primary is screened.

**ALLWAVE INTERNATIONAL RADIO AND TELEVISION, LTD., 242, High Street, Bromley, Kent.** Stand No. 109.

TWO new Allwave Sets will be introduced and released at this year's show. The first, the Allwave "Commander," is an A.C. Allwave chassis supplied with speaker separate from the set. This instrument is introducing the new Allwave folded chassis method of construction, by which means long grid leads are entirely eliminated as well as the necessity for individual screening coils and transformers.

The circuit is also novel in that it is of the double superheterodyne type. Seven valves are used, one high frequency pentode on all the wavelengths, frequency changer, second frequency changer, I.F. with variable selectivity, double-diode-triode, output stage and full wave rectifier. The wave bands, covered in five ranges, are from 12 to 560 metres without any break and then from 800 to 2,000. The price is £30.

The other new receiver is a midget portable Allwave receiver in an oak case measuring only 9ins. by 7ins. by 3ins. This employs two valves in a super regenerative circuit for the short waves and a super regenerative circuit for medium waves. It covers short-wave broadcasts, the trawler band and the medium broadcast band only, wave changing is by means of a switch. The price of this receiver is £6 6s. 0d.

**AMALGAMATED PRESS, LTD., Fleetway House, Farringdon Street, E.C.** Stand No. 13.

### SPECIAL NOTICE

This guide is arranged in alphabetical order, and gives details of all the new season's programmes released up to the moment of going to press.

**NEXT WEEK'S SECOND ENLARGED SHOW NUMBER.**

Next week's issue will contain a comprehensive stand to stand report of the exhibits. Order your copy to-day.

### AN INVITATION.

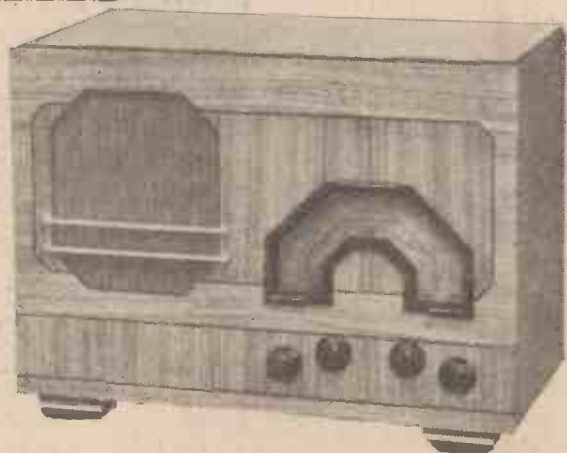
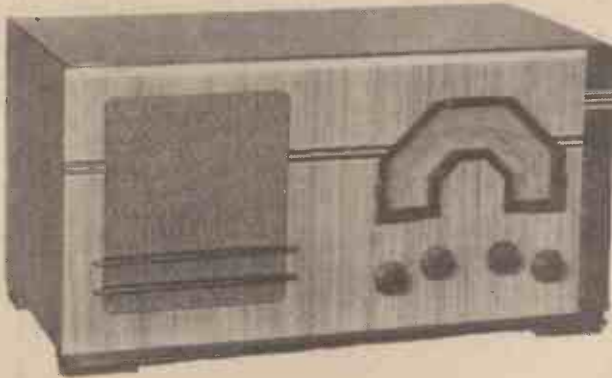
A cordial invitation is extended to every reader to call at our stand, No. 9, Ground Floor, if in need of information, advice or assistance regarding any radio or kindred subject.

Left :

A new Aerodyne receiver. The main attraction about this and the model opposite is the neat and attractive cabinet design. The full-vision tuning scale greatly facilitates tuning operations.

Right :

Another Aerodyne receiver. Notice the offset effect of the grain on this cabinet. A distinctly modern note is struck by these models.



**FOR FLOOR PLAN**

See page 608

public address outfits. Hitherto this firm has concentrated on apparatus for the Trade, but in view of the demand a number of components will be produced for the home-constructor and a new Shrouded Transformer will be seen on this Stand designed for home use. Provided with alloyed high-resistance steel,

**HOW TO GET THERE**

See page 613

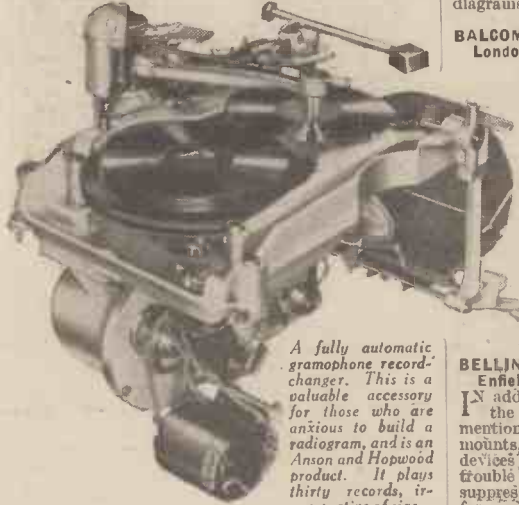


# "PRACTICAL & AMATEUR WIRELESS" GUIDE to the SHOW



**ANSON & HOPWOOD LTD., 11, Berkeley Square, London, W.1. Stand No. 87.**

THE fully-automatic gramophone apparatus on this stand will no doubt attract the mechanic as well as the music-lover. The ingenious methods incorporated to enable from 1 to 30 records to be played consecutively, irrespective of size and playing either one or both sides as desired, will enable the music-lover to hear an entire opera in the comfort of his



A fully automatic gramophone record-changer. This is a valuable accessory for those who are anxious to build a radiogram, and is an Anson and Hopwood product. It plays thirty records, irrespective of size.

armchair without rising to change the disc. No manual attention whatever is required, and this apparatus is incorporated in all the radio-grams shown on this Stand which range from a 12-valve superhet with fluid-light tuning and dual-matched speakers operating from a paraphase amplifier, to a dual-station radio-gram which requires no tuning and which delivers an output of 5 watts. A simple switch changes from Regional to National. For the use of gramophone enthusiasts special fully-automatic gramophones may be obtained (without the radio equipment) and special and useful record-filing units and cabinets.

**AUTOMATIC COIL WINDER AND ELECTRICAL EQUIPMENT CO., LTD., Winder House, Douglas Street, London, S.W. Stand No. 103.**

THIS firm is noted for the ingenious testing equipment which is produced for the amateur as well as the commercial set-builder, and the Avometer



This Anson and Hopwood radio-gramophone has sliding doors to conceal the controls from view when not required and a hinged lid to cover the gramophone equipment. It is thus admirably suited to a modern home and avoids the usual laboratory appearance of wireless apparatus.

needs no introduction. In addition to the ordinary D.C. meter there will be seen the Avometer, the Universal Avometer, an Oscillator, and other similar equipment. A neat selection of testing leads and prods will also be seen and these may be used with practically any modern test instrument. A very useful Service Manual entitled "Radio Servicing Simplified" has been produced and covers every phase of set servicing. It is complete with numerous diagrams and graphs and costs 2s. 6d.

**BALCOMBE, LTD., A. J., 52-58, Tabernacle Street, London, E.C.2. Stand No. 65.**

THE main feature of the Alba receivers may be stated to be "Searchlight Tuning." This is incorporated in every model and enables tuning to be carried out most efficiently and quickly. On certain all-wave models a novel type of circular tuning dial is fitted and this shows exactly what range is being used, and a visual tuning indicator enables accurate tuning to be carried out. The models range from 3-valves for battery-operation, to automatic radiograms incorporating every modern circuit feature for the production of high-quality signals.

**BEETHOVEN RADIO LTD., Chase Road, North Acton, N.W.10. Stand No. 60.**

**BELLING & LEE, LTD., Cambridge Arterial Road, Enfield, Middlesex. Stand No. 91.**

IN addition to the many small devices designed for the home-constructor—amongst which may be mentioned terminals, fuses, battery cords, terminal mounts, etc.—this firm will make a big show of devices which have been produced to cure the greatest trouble of the set-user—namely, interference. Noise-suppressors of all types will be seen, from those intended for use on a car to prevent noise from the magneto or sparking-plug, to small fittings designed for inclusion in ordinary flexible leads feeding fans and similar small apparatus. Motors may be prevented from causing interference by means of a small device connected across the brushes, and no matter what type of interference is experienced, there will be seen a device for coping with the trouble. In addition, Messrs. Belling & Lee will be pleased to go into problems of interference and give advice as to the most efficient and economical way of meeting various difficulties.

**BENJAMIN ELECTRIC, LTD., Brantwood Works, Tariff Road, Tottenham, London, N.17. Stand No. 42.**

THE well-known Magnavox loud-speakers will be the centre of the exhibit, and various models will be on show, including the famous Sixty-Six, which is a powerful-energised speaker having an 11 in. cone and handling up to 15 or 20 watts. Its high sensitivity renders it suitable for use with an output as low as 2 watts or less, and it is a remarkable quality instrument. In addition to other Magnavox models the well-known Benjamin valveholders, Transfeeda coupling unit, output chokes and battery-economisers will also be on view. The latter device is, of course, intended for use in a receiver using dry batteries for the H.T. supply, and it regulates the H.T. consumption according to the strength of signal being received. It may be used with a triode or pentode output valve.

**BERNARD JONES PUBLICATIONS, LTD., Chanister House, Chancery Lane, W.C.2. Stand No. 7.**

**BIRD & SONS, LTD., SYDNEY S., Cambridge Arterial Road, Enfield, Middlesex. Stand No. 118.**  
Details not available at the time of going to press.

**BRITANNIA BATTERIES, LTD., Union Street, Redditch, Worcs. Stand No. 40.**

A COMPLETE range of batteries, famous under the trade name Pertrix, will be seen on this Stand, and in addition to the usual H.T. and G.B. batteries, these will embrace cells designed especially for flash-lamps, cycle lamps, etc. These batteries are of the non-sal-ammoniac type, and the principal point of interest on the stand is the newly introduced "Special Power" battery for H.T. This is the most hotbed-up of all Pertrix batteries, and is a development of the famous Maroon carton range.

OUR STAND  
No. 9  
Ground Floor

**BRITISH BLUE SPOT CO., LTD., Sterling Works, Dagenham, Essex. Stand No. 22.**

IN addition to the popular Blue Spot loud-speakers, pick-ups, and similar equipment three new receivers will be seen on this Stand. These include an A.C. D.C. 4, a Battery three, and an A.C. 5-valve set, designed for use as a table model or as a complete radio-gram. These include many new devices in addition to the



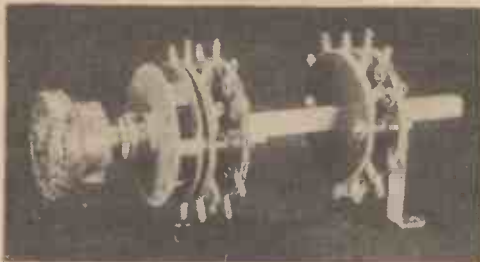
Another scheme for creating a neat appearance. This is a new Blue Spot radio-gram, and it will be seen that doors are provided to cover the controls when not in use.

various modern schemes for high-quality reproduction, and amongst these may be mentioned unwanted programme rejection; variable selectivity control; mains interference cut-out; mains isolation to prevent shocks; image suppression, and A.V.C. In the battery receiver a single H.T. tapping only is employed with automatic voltage dropping inside the circuit to prevent troubles due to uneven discharge, and a special new type of speaker is fitted giving an acoustic output equivalent to 1 watt. The total consumption of this receiver is only 7 mA, and it thus represents a very efficient receiver for the battery user.



The radiogram, which is shown above is here shown with the doors closed, and it will be seen that it avoids the usual dust-collectors and general scientific appearance of the average radiogram.

**BRITISH N.S.F. CO., LTD.**, Waddon Factory Estate, Croydon, Surrey. Stand No. 48.  
**H**ERE will be seen the popular Polar-N.S.F.-components consisting of volume controls, fixed condensers, resistances, etc. The condensers are of



A new Bulgin switch. There are many uses for a switch of this nature and it is only one of the many new items which Messrs. Bulgin are producing at Olympia.

the tubular type with wire ends and the resistors are also of the wire-end type. In addition there will be the semi-dry electrolytic condensers made of the highest quality materials and having a low leakage current. They are designed for a maximum peak voltage of 500 volts D.C. and are obtainable in 4, 6 and 8 mfd. values at 4s. 6d., 5s. and 5s. 6d. respectively.

**BRITISH PERMEL ENAMELLED WIRE, LTD.**, Charlton, S.E.7. Stand No. 50.

**T**HIS company will be in association with Johnson and Phillips, Ltd., on Stand No. 50. The stand will demonstrate Permel wire and its application to the Radio and Electrical Industry. Permel wire, an enamelled copper wire made by the Permel process is claimed to be the most perfect process yet devised for the application of an insulating coating of an enamel to electrical conductors. It results in a wire practically free from pin-holes and capable of being bent and stretched very drastically without damage to the enamel, which is highly insulative. A special pin-hole testing machine will be working on the stand to demonstrate the extreme rarity of pin-holes in Permel wire.

**BRITISH PIX CO., LTD.**, Pix House, 116, Southwark Street, London, S.E.1. Stand No. 201.

**I**N addition to Pix valves, which cover all types for battery and mains use, there will be seen the Pix aerial selectivity device, the Pix earth, the Modular Armchair control, the Pix lightning arrester and the Invisible Aerial. All of these devices have previously been seen, and they form most interesting items for the constructor. The armchair control, for instance, enables any set to be fitted in a simple manner with a volume control which may be operated at a distance. For the flat-dweller the Invisible Aerial will prove a boon as it is adhesive and sticks to the wall. It consists of a metallic surface on an adhesive tape, and if desired the aerial may be removed and placed in another position without loss of its adhesive properties.

**BRITISH ROLA COMPANY, LTD.**, Minerva Road, Park Royal, N.W.10. Stand No. 43.

**T**HIS firm is showing extension speakers, and has produced two large over-size (9 1/2 in. diameter) permanent-magnet speakers which have novel features. One model, F720 P.M.M., is listed at £1 7s. 6d. and is suitable for all extension speaker terminals. The other model, F720 P.M.T., is fitted with a multi-ratio transformer and sells at £1 15s. This model is suitable for all high-impedance extension speaker terminals. These two models are both of the wide-range-response type, and are certainly amazing value for this very popular field. Prominently featured on



A group of aerial insulators for better equipment. These ensure good insulation and, in certain models, provide lightning protection. These are Bulgin products.

this stand are the new G.12 Fidelity speakers. These are available in D.C. types and also work from A.C. supply. The price of the former is £5 10s., and that of the latter, £7 15s. The weight of the D.C. is about 2 1/2 lbs. and the overall diameter is 12 1/2 ins., so it will be appreciated that this new range introduced by the British Rola Co. is a great advance both from the size and from the reproduction point of view. Samples of the new 6 1/2 in. field-excited and permanent-magnet speakers are also shown, as well as the new 8 in. type. Special models of car radio speakers, completely dustproof, are also on show.

**BRITISH TELEVISION SUPPLIES, LTD.**, Bush House, London, W.C.2. Stand No. 14.

**A**LTHOUGH seen at Olympia for the first time, the range of exhibits on this stand will show that British Television Supplies are fully awake to the needs of the home constructor. Here are accessories for broadcast receivers or receivers designed for use on the shortest of wavelengths, as well as for incorporation in television apparatus. Transformers, chokes, condensers, resistances, coils—the range is infinite and practically every component for a receiver may be obtained from this firm. In the range of short-wave equipment great novelty is evidenced in certain components, and the newly introduced Megacite is incorporated in quite a number of parts. The Triple Range short-wave tuning unit will, no doubt, attract considerable attention as it facilitates the construction of a short-wave receiver to cover the band from 12 to 80 metres in three separate ranges without coil changing. A number of short-wave components are to be introduced but no details concerning them have yet been received.



Note the novel tuning scale on this Bush receiver. Another form of tuning is shown in the Bush receiver above, and indicates the new schemes which are being produced to simplify the important operation of station selection.

**BRITISH WIRELESS FOR THE BLIND FUND**, 226, Gt. Portland Street, London, W.1. Stand No. 92.

**O**N this stand will be a display of wireless sets which are provided for the blind. The fund was started on Christmas Day, 1929, by a broadcast appeal by Mr. Winston Churchill, and up to date 26,000 sets have been distributed to the blind in Gt. Britain and Northern Ireland. One thousand of these sets were provided by the R.M.A. free of charge. Everyone should visit this stand and help to make the Fund even more popular, in view of the fact that it is time that a considerable number of the original receivers are now worn out and need replacement.

### THE PRACTICAL GROUP!

Practical and Amateur Wireless  
 Practical Television and Short-wave Review  
 Practical Mechanics  
 Practical Motorist

**BROADCASTER, THE**, 29, Bedford Street, Strand, W.C.2. Stand No. T26.  
**T**RADE periodicals and other literature for the trader and service-man will be seen on this stand.



This receiver is fitted with what is known as "Escalator" tuning. This is another Bush receiver and possesses novel circuit features.

**BROWN BROS.**, Brown's Buildings, Gt. Eastern Street, London, E.C.2. Stand No. T12.

**T**HIS stand will be given over to an exhibition of receivers and radiograms by all the leading makers as well as service equipment and charging plant of well-known makes.

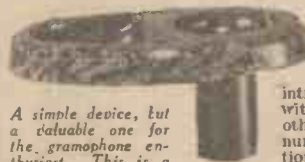
**BROWN RADIO, LTD.**, W.M. F., Ossilo Radio Works, Brierley Hill, Staffs. Stand No. 210.

**H**IGH-CLASS laboratory and service equipment will be shown by this firm, and the exhibits will include the Modulated Oscillator and special portable amplifiers. Apart from the utility of the various testing equipment, such as frequency meters, output meters, etc., the power amplifiers will be found to possess very high standards of workmanship. These amplifiers are battery or mains-operated, and are rated with a power of 20 to 30 watts in the large size, and of 2 watts in the small battery-operated model.

**BROWNING WIRELESS MFRS.**, 18, Shellgrove Road, N.16. Stand No. 228.

**BULGIN & CO. LTD.**, A. F., Abbey Road, Barking, Essex. Stand No. 117.

**M**ANY old favourites will be seen on this stand, and these will include many of the smaller accessories without which no modern wireless set is complete. Coils, switches, chokes, resistors, and dozens of similar small parts will be seen in profusion, and these will this year be augmented by components designed especially with a view to their use in ultra-short wave receivers. A new material known as Frequentite will be seen in some of these and the special valveholders may be mentioned as a sample. In addition, there will be a new nine-pin cable plug, as well as a suitable socket and a seven-pin adaptor and cable socket. A new screened valve connector is also to be introduced and possesses some novel features. For use in cathode-ray apparatus some neat clip-in resistors are to be introduced, and these will be sold in six values, 8 to 1.3 ohms at 9d. each. A community aerial coupler should prove of value to many listeners, and the four-wave-band coils will, no doubt, encourage the design of all-wave superhets and similar receivers.



A simple device, but a valuable one for the gramophone enthusiast. This is a needle cup for new and used needles, the latter being dropped into the tube-like receptacle which goes through the motor-board. This is another Bulgin product.

These are intended for use with 450 kc/s intermediates, and a new switch is being introduced for use with them. Many other items, too numerous to mention, will be displayed and the home constructor should visit this stand with his out-fail.





# "PRACTICAL & AMATEUR WIRELESS" GUIDE to the SHOW



**BURGOYNE WIRELESS (1930) LTD.**, Great West Road, Brentford. Stand No. 2.  
Details not available at the time of going to press.

**BURNDIPT, LTD.**, Light Gun Factory, Erith, Kent. Stand No. 61.

ONE of the oldest firms in the radio industry, Burndipt, Ltd., will be showing an interesting range of receivers and H.T. batteries. The receivers include a superhet portable for battery use as well as one for universal mains use, and it is claimed that maximum superhet workings is obtainable in spite of the fact that the circuit is included in a portable type receiver. There are also some all-wave receivers covering the short waves as well as the normal broadcast bands. Two radiograms will be seen both employing the new Burndipt principle of matched and balanced propagation of sound—a system referred to by the makers as "Sound floodlighting." Burndipt batteries are obtainable in 120 volt with 9-volt G.B., 120 volt, with 6-volt G.B.; 60 volt and 9 volt types.

**BURTON, C. F. and H.**, Progress Works, Bernard Street, Walsall. Stand No. 105.

THE range of exhibits on this stand embrace mains receivers, battery receivers, eliminators, trickle chargers, transformers, switches, coils, and lead-in tubes. In addition, there will be many smaller items, such as chokes, dials, valveholders, angle brackets, battery clips, terminals, and other types of brass work. Full details of all the exhibits have not been received, but a most comprehensive display may be anticipated.

**BUSH RADIO, LTD.**, Woodger Road, Shepherds Bush, W.12. Stand No. 85.

THERE will be many new features in the receivers shown on this stand, and one—"Escalator Tuning"—has already been referred to in our pages. In addition, a further type of tuning dial will be seen on the Type S.A.C.25 receiver, which is a five-valve seven-stage superhet utilising a triode output valve. The tuning in this receiver is known as "Peaceful Tuning" and is an entirely new scheme.

**CADISCH AND SONS, S.**, Red Lion Square, London, W.C.1. Stand No. T20.

ON this stand will be seen a comprehensive and attractive range of radiograms and radio receivers by the well-known manufacturers. In addition, in their capacity as wholesalers, Messrs. Cadisch will be showing various battery chargers, public address equipment, gramophone motors, loud-speakers, and similar equipment.

**CELESTION (C. FRENCH)**, 29, High Street, Hampton Wick, Kingston-on-Thames. Stand No. 26.

CELESTION speakers are, of course, very well-known, and at this year's exhibition we shall see some new types of popular models. A novel feature of most models will be the universal switch control for matching impedance to any output stage and for use when the speaker is used as an "extension" model. An entirely new type of speech coil is being utilised, and the general appearance of the speakers is changed somewhat.

**CENTRAL EQUIPMENT, LTD.**, 188, London Road, Liverpool. Stand No. 3.

THE main exhibit here is a revolutionary type of new aerial. This new aerial—the "Shorlorn" Variable Aerial—is a development of the brush type aerial, and incorporates seven distinct aerials in one. Its object

is to supply its owner with an aerial which can be automatically adjusted to local receiving conditions and thus eliminate the annoyance of overlapping programmes. Its price is 15s. 6d. From the same firm come three other interesting products. The No-Mast Brush Type Aerial, which has, of course, been before the public for some little while, and which is fixed to the side of the house or the chimney stack in the same manner as the "Shorlorn," is claimed to increase range and improve tone. Prices are 9s. for the Standard Model, 9s. 6d. for the De Luxe Model with Anti-corrosion antennae and 4s. 6d. for the Junior Model. The Siltit Chemical Ever-Moist Earth is a device with spreading antennae which ensures maximum contact. The surrounding ground is kept perpetually moist by the action of the chemical incorporated in the Siltit. Prices are 2s. 3d. for the Standard Model and 3s. for the De Luxe Model. The Fletch Lightning Safety Switch is a highly efficient safety device which can be fitted in a few moments and which calls for no alteration to the wiring of the set, are other products which will be found on the same stand at Olympia. It is quite unobtrusive, is definitely reliable under all circumstances, and imparts to its owner that very pleasing peace of mind which comes from the knowledge that however terrifying may be the storm, the home is always safe from lightning's peril. Incidentally, a free £100 Insurance Policy is presented to every purchaser of the Fletch Lightning Safety Switch. The price of this accessory is 1s. 3d., but it is supplied with all models of the No-Mast Aerial at an extra cost of 1s.

**CHLORIDE ELECTRICAL STORAGE CO., LTD.**, 205-231, Shaftesbury Avenue, W.C.2. Stand No. 59.

THE recently introduced Exide Ironclad radio battery—"the battery with the submarine battery plate," as it has been called—having an Exide Ironclad slitted-tube positive plate, and incorporating the visible charge indicating dial, which was the outstanding feature in last year's Radio Exhibition, will be shown on the Exide stand, together with examples of other low-tension and high-tension batteries. A number of entirely new radio batteries are shortly being introduced. Details will be issued later. Specially-designed polished wood crates to hold Exide 60-volt batteries will also be shown. The range of Drydex dry batteries has been extended still further and the exhibit will include a number of types developed for the latest battery-operated receivers.

**CHURCHMANS, LTD.**, 79, Maidenburgh Street, Colchester. Stand T.30.

Details not available at the time of going to press.

**CITY ACCUMULATOR CO., LTD.**, 18-20, Norman's Buildings, Central Street, London, E.C.1. Stand No. 38.

THE "Austin" receivers are being exhibited by C. A. C. and, in addition to the ordinary models, there will also be seen some "luxury" models incorporated in various types of furniture. Amongst these may be mentioned the "Grandfather Clock," which is a combined bookcase, clock, wireless receiver, and automatic record player. The clock is of the electric (mains-operated) type. For home-constructors the cabinet alone is obtainable at 18 guineas, but it may be obtained with any desired type of receiver fitted. Another feature for the home-constructer is the Heptode "Superpak," a complete tuning unit for incorporation in a superhet using a heptode valve for frequency changing. This costs 52s. 6d., and is, of course, the most vital part of the receiver. A car-radio receiver, incorporating five valves of the 13-volt universal type, will also be seen, together with some new 4- and 5-valve receivers incorporating modern circuits.

**CLARKE AND CO. (M/CHR), LTD.**, Atlas Works, George Street, Patricroft, Manchester. Stand No. 83.

THE main feature on this stand will be the mains units and battery eliminators. A new model is the A.C. 2, which is illustrated on this page and which is designed for receivers requiring 12 mA at 120 volts. There are three positive tappings and the unit is neat



A new battery eliminator from the Atlas range. This is designed for a small battery receiver and delivers an output of 12 mA. at 120 volts.

and compact. Other models include the C.A.25, delivering 25 mA at 150 volts; Model T.10/30 suitable for Class B and Q.P.P. circuits, and delivering 30 mA at 120 or 150 volts. In addition to these and other A.C. models there will also be seen some units designed, especially for use on D.C. mains, and it should be noted that where the user is unfortunately restricted to 25-cycle A.C. mains, certain of the A.C. models may be obtained for their use without extra charge.

**CLIMAX RADIO ELECTRIC, LTD.**, Haverstock Works, Parkhill Road, N.W.3. Stand No. 22.

ALL-WAVE and superhet circuits will be seen in the Climax receivers, and the main item will be the "Sports Model." This is a straight mains receiver, incorporating band-pass tuning and delivers an output of 3.5 watts. It is available for A.C. or universal mains use. A 3-valve battery receiver is also to be seen and this uses the well-tried detector-2L.F. circuit. At the other end of the range is the 5-valve all-wave A.C. superhet, covering from 10 to 2,000 metres in four separate bands. Amplified-delayed-A.V.C. noise suppression, and other modern features are incorporated, and the complete receiver costs only 10 guineas.

**COLE, E. K., LTD.**, Ekco Works, Southend-on-Sea, Essex. Stand No. 76.

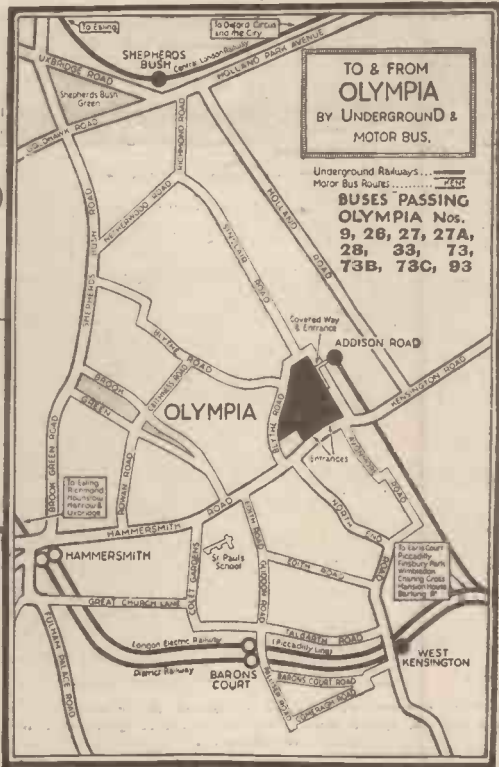
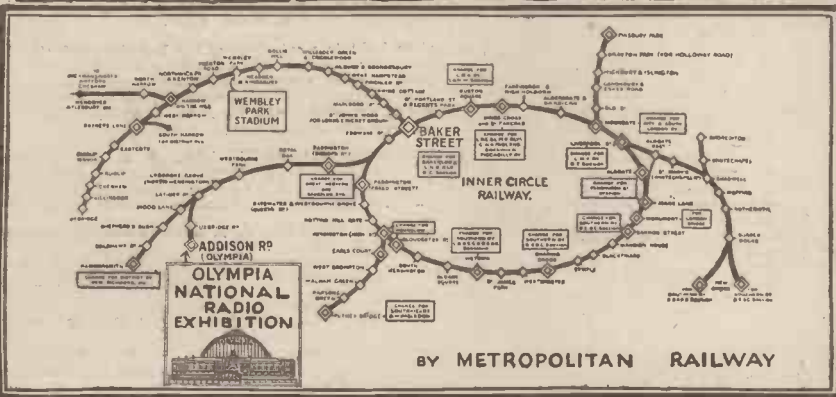
THE makers state that "Clear-cut Reality," "three-way sound diffusion," and revolutionary changes in chassis design with streamlined cabinets are the outstanding features of the new Ekco range. These include an 8-stage superhet with H.F. triggered automatic noise suppression and station pre-selection, fully delayed A.V.C., etc. Battery receivers, radiograms, and universal receivers are also to be seen, and one of the most important features is the moulded cabinet and new method of sound reproduction. It is claimed that cabinet resonance is entirely removed, and much better reproduction is obtained than ever before. The large tuning scales and method of station



Two new Celestion loud-speakers. On the left is a new auditorium speaker capable of a really large output, but which is capable of working from quite a small input. On the right is a small permanent-magnet model which has a new magnet system.



A new Ekco receiver in a moulded bakelite case. The large tuning dial is one of the important features of the Ekco receivers, and a novel form of tuning indicator—light-band and shadow—is employed.



indication are well known and there will be no departure from the original designs in this part of the receiver. The cabinets of walnut pattern will be seen to be darker this year—a change which has been dictated by the change in furnishings desired by the modern home-builder.

**COLVERN, LTD.,** Mawneys Road, Romford, Essex. Stand No. 55.

SOME new types of Ferrocart coil will be seen on this stand, together with some new short-wave components and I.F. transformers. The new Ferrocart coils are designed for use with the triode-pentode frequency-changer and for 465 kc/s working, whilst the tuning units comprise these coils with a ganged condenser complete. Three new air-cored coils will also

be exhibited and these consist of type K.5 for an H.F. circuit with reaction; type T.D.—an H.F. transformer with tapped primary and a reaction winding; and type T.D.S.—a dual-range screened coil mounted on base with integral switching for single H.F. sets. A special short-wave condenser will be seen, together with the familiar strip resistances, pre-set condensers, and other well-known Colvern accessories.

**CONCORDIA ELECTRIC WIRE CO.,** New Sawley, Nr. Nottingham. Stand No. 218.

**COSMOCORD, LTD.,** Cambridge Arterial Road, Enfield, Middlesex. Stand No. 221.

UNDOUBTEDLY the "Playing Desk" will enable many users of the ordinary table receiver to convert their apparatus into a radiogram, and thus this particular item alone will attract many to Stand No. 221. The desk is illustrated on this page, and it will be seen how conveniently the conversion may be carried out. In addition to this item, there will be shown the Cosmocard pick-up, the pick-up head, the gramochassis model, and the de Luxe pick-up. These components are, of course, the same as were seen at last year's exhibition, and no changes have been made.

**COSSOR, LTD., A. C.,** Cossor Works, Highbury Grove, London, N.5. Stand No. 70.

IN addition to the vast range of Cossor valves the cathode-ray tubes will attract many in view of the forthcoming television transmissions. In addition to these items there will be the various Cossor receivers, and no doubt the Thermometer tuning device will be inspected with interest. We have already mentioned in these pages how the tuning is carried out by means of a column of light instead of the orthodox pointer, and there will be several other interesting features in the Cossor range. These include battery receivers, A.C. and D.C. models, and receivers designed for use on either A.C. or D.C. mains without alteration. The circuits include straight three and "Super-Ferrodyne" features, the latter being a superhet with iron-cored coils. A notable feature is the inclusion of station names on the tuning scale as a separate portion which may

readily be replaced in the event of a wavelength change.

**CRYPTO EQUIPMENT CO.,** Acton Lane, Willesden, N.W.10. Stand No. 215.

THIS firm will be showing at Olympia the Rotax battery charging rectifiers, constant potential chargers, commutating rectifiers, rotary transformers, combined motor-generator sets, and similar products.

**DALLAS AND SONS, LTD.,** 6-10, Betterton Street, W.C. Stand No. 73.

MESSRS. DALLAS are strictly wholesalers and therefore will confine their display to representative items from the various exhibits in the exhibition.

**DARWINS, LTD.,** Fitzwilliam Works, Sheffield. Stand No. 107.

NEARLY every loud-speaker depends for its function upon the magnet, and on this stand will be seen magnets of all descriptions, as Messrs. Darwins specialise in this class of apparatus. In addition to apparatus constructed from the well-known cobalt-steel, Messrs. Darwins will be exhibiting items made from the new nickel-aluminium and nickel-aluminium-cobalt alloys.

**DAVIES WOODWORK, D. M.,** Trading Estate, Slough. Stand No. 45.

**DAYZITE, LTD.,** 17, Lisle Street, London, W.C.2. Stand 75.

ALTHOUGH wholesalers, and as such only exhibiting specialised items from various manufacturers' ranges, Messrs. Dayzite will also be showing the Campro Home Camera and Projector. This is a combined cine camera and projector.



Another Ekeo receiver. The controls are all concealed and the cabinet work is very elaborate and in strict modern design.



A Cosmocard playing desk. An instrument of this type facilitates the construction of a radiogramophone





# "PRACTICAL & AMATEUR WIRELESS" GUIDE to the SHOW



DECCA GRAMOPHONE CO., 1-3, Brixton Road, London, S.W.9. Stand No. 34.

THE Decca gramophones are very well known and the popular Decca portable has for a long time been a favourite item for the river, etc. The newly-



A new Decca receiver. Notice the vertical tuning scale and the compact size of the complete receiver, when compared with the tuning control.

introduced portable radiogram will undoubtedly attract considerable attention as it combines a superhet and radio-gramophone in a small portable cabinet very little larger than a stand portable gramophone. For the flat-dweller this model may also be obtained for mains operation. In addition will be seen the combined home and car radio operated from car battery or A.C. mains and table model receivers. A six-valve superhet combined in a cabinet radiogram will also prove attractive, as this is obtainable for A.C. or Universal operation at only 19 guineas.

DE LA RUE AND CO., LTD., THOS., 90, Shernhall Street, E.17. Stand No. 5.

DENT, R. H. (ARDENTE), 309, Oxford Street, London, W.1. Stand No. 46.

ALTHOUGH originally designers of deaf-aid apparatus, Messrs. Ardenite have now produced some interesting public address apparatus and specialised equipment where a knowledge of acoustics has proved invaluable. In addition to various public address equipment to be shown on this stand will be seen an interesting radio-gramophone incorporating a 5-valve receiver, automatic record changer, and input arrangements for two moving-coil microphones. A control panel enables the microphone input to be varied.

DEPARTMENT OF OVERSEAS TRADE, 35, Old Queen Street, S.W.1. Stand No. 52.

DEW AND CO., LTD., A. J., 32-34, Rathbone Place, Oxford Street, London, W.1. Stand No. T21.

A REPRESENTATIVE display of well-known makes of radiograms and receivers will be shown by these wholesalers, who will also include components and accessories for the home constructor.

DIBBEN, LTD., H., 34, Carlton Crescent, Southampton, Stand No. T1.

AS factors, Messrs. Dibben will only be showing proprietary makes of receivers, etc.

DIGGLE AND CO., LTD., A., Jane Street, Rochdale, Lancs. Stand No. 16.

THE well-known Reliance battery charging plant will be exhibited on Stand No. 16. Various models are available, from a small unit for use in the home to complete plant suitable for commercial use. Type 4, for instance, is sold at the figure of £103, and will charge 220 cells of various capacities every twelve hours.

DUBILIER CONDENSER CO. (1925) LTD., Ducon Works, Victoria Road, North Acton, London, W.3. Stand No. 67.

THE name of Dubilier is, of course, familiar to every listener, and on this stand will be seen a most comprehensive array of condensers and resistances suitable for every purpose. From the small fixed condenser at 6d. to the large 30s. models there is a condenser for every type of wireless circuit. Mica, paper, tubular, electrolytic are all included, and the display will be supplemented by an exhibition of resistances of various types, designed for wireless apparatus, for car noise-suppression, for television apparatus, and so on. In addition, there will be seen some special interference filters for use with neon and other lighting apparatus, and every constructor

Bring Your Problems to Stand No. 9. The Technical Staff are there to help you!



An all-purpose mobile amplifier. This is another Dent product and is designed to operate from a 6-volt car battery. The control unit (on the right) may be fitted on the steering column of a car.



The Decca Portable Radiogram.

should obtain a catalogue of the Dubilier products for future use. There will be several new lines in this year's display, amongst which may be mentioned the oil-immersed paper dielectric condensers suitable for use on high-voltage circuits. Some metallised volume controls will also be seen.

DULCETTO-POLYPHON, LTD., 2 & 3, Newman Street, Oxford Street, London, W.1. Stand No. T16. THIS display will consist of a wholesale exhibit of representative and leading makes of apparatus.

DYSON & CO., LTD., J., 5, Goodwin Street, Bradford. Stand No. T17.

MESSRS Dyson are also wholesalers and this will be showing items from various manufacturers' lists.

EAST LONDON RUBBER CO., LTD., 29, Great Eastern Street, E.C. Stand No. T18.

AS in former years this firm's exhibit will consist of items from well-known manufacturers and the usual wholesale display.

EASTICK AND SONS, J. J., 118, Bunhill Row, E.C. Stand No. T9.

THE stand of Messrs. J. J. Eastick is a pocket exhibition in itself for it gives a magnificent show of the ranges of the leading radio manufacturers whose goods are marketed under the F.T.A. In addition, they are exhibiting the well-known range of "Ealex" short-wave converters. The three models shown are: The Duplex Converter, a single-valve instrument for battery, A.C., or D.C. mains receivers (with separate batteries) which covers 15/60 metres, and costs 52s. 6d. without valve, the B2. Converter, a two-valve model for battery operation which covers 15/60 metres and costs £4 without valves, the M2 Super Converter, a two-valve A.C. mains-operated, highly-sensitive instrument covering 15/60 metres and costs £7 without valves.

ECONASIGN, Ltd., 92, Victoria Street, S.W.1. Stand No. 208.

EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, London, W.C.2. Stand No. T9.

THE greater part of this stand is devoted to the display of Mazda radio valves, including the very latest types. There is also a range of special Ediswan valves, of which the power output types and short-wave transmitters are of particular interest. An entirely new product calling for special note is the B.T.H. PEZOELECTRIC Pick-Up and Arm. Its operation depends upon the well-known piezo effect, whereby an electric potential is produced across certain crystalline substances when under pressure. In addition to an excellent frequency response, this new pick-up has a comparatively high voltage output. The Ediswan Cathode-ray Oscilloscope, which is particularly suitable for visual investigation of wave forms, checking I.F. stages, and other research work, is also exhibited. Ediswan are also showing the well-known BK Senior A.C. and D.C. loud-speakers, and the B.T.H. Needle Armature and Minor Pick-Ups. Other exhibits include "Extratite" Accumulators and Tungar Battery Chargers for home and battery charging station use.

EFFICIENCY MAGAZINE, 87, Regent Street, W.1. Stand No. 209.

ELECTRICO (CROYDON) LTD., 97, George Street, Croydon. Stand No. 114.

THE exhibits on this stand will include walnut tables to match various commercial wireless receivers, from the usual table up to the bookcase model ranging in price from 10s. 6d. to 45s. A further novelty in the exhibit will be the Carryset, designed to protect receivers whilst being taken out on demonstration. This is a case made from canvas and felt and costs 21s. It will, of course, only appeal to dealers and service men.



A useful radiogram from the Ardenite range. This incorporates arrangements for the use and control of microphones. Mixing and fading controls operate on pick-up, radio, or microphone.



**ELECTRO DYNAMIC CONSTRUCTION CO., LTD.,**  
Devonshire Grove, S.E. Stand No. 112.

ROTARY converters will form the centre-piece of this exhibit, and a most interesting range is obtainable. The display will include D.C. to A.C. converters, alternator sets, constant current charging dynamos, A.C. to D.C. converters, D.C. to A.C. and L.T. to H.T. apparatus.

**EMPIRIC LTD.,** 51, Calthorpe Street, W.C.1. Stand No. 41.

**ENSIGN LTD.,** 88, High Holborn, W.C. Stand No. T13. UPON this stand a series of windows, set well back, will be given over to displays of apparatus by individual manufacturers. In front of these windows is a small piazza which has comfortable seating accommodation—for trade visitors only. The general appearance of the stand is enlivened by a bright awning and the displays are arranged to avoid confusion to the eye. In the rear of the stand is a further compartment of considerable size (360 sq. ft.) in which further more general displays are arranged, and here again there is comfortable accommodation for trade friends. As usual, Houghtons have endeavoured to make their stand interesting to the Trade, and to emphasise on it the benefits to be gained by collective buying. It is possible to secure practically every line in the Show with a single order placed at this stand.

**EPOCH REPRODUCERS, LTD.,** Aldwych House, Aldwych, W.C.2. Stand No. 47.

THE Epoch speakers need no introduction, and in addition to familiar models we shall see on this stand the following new items: Model 66—a new 2 OC model with Alnu magnet; a new Super Dwarf and a new Moving-Coil Microphone Type 55. The new 66 Model will handle 6 watts (undistorted speech) without any trace of overloading and has a 10in. diaphragm. It costs £4 12s. 6d. The Super Dwarf is a 5in. loud-speaker with permanent magnet and will handle 2½ watts, yet will give splendid results with an input as low as 250 milliwatts. The price is £1 1s. Many other interesting speakers may be seen on the stand, and those who are interested in real volume and quality should not fail to inspect the Super-Cinema model.

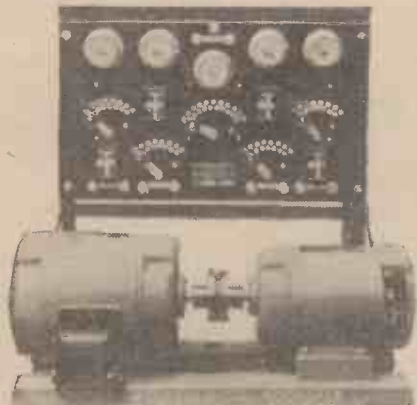
**ERIE RESISTOR, LTD.,** Carlisle Road, Hendon, N.W.9. Stand No. 15.

**EVER READY CO. (G. B.), LTD.,** Hercules Place, Holloway, N.7. Stand No. 71.

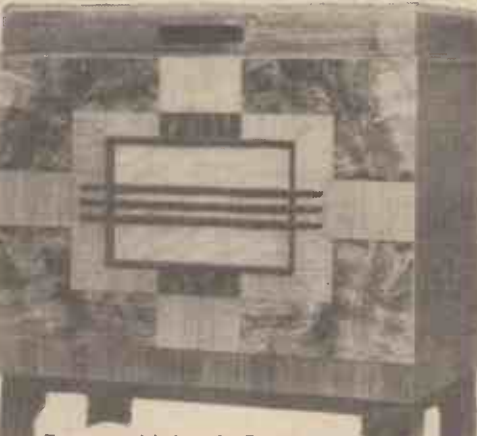
IN addition to a vast range of batteries—for wireless receivers and other purposes—there will be shown on this Stand some interesting Ever Ready valves and complete receivers. The "Winner" range of batteries is, of course, already popular and is available in four separate ranges, 60, 99, 108 and 120 volts at prices from 3s 9d. to 7s. 6d. There is also the "Radio" range at a slightly lower cost, 120 volts costing 6s. and a 66 volt costing 3s. 6d. A feature of the complete receivers is the black dial with station names and wavelength calibrations in white. Two of these receivers are seen below.

**EVERETT, EDGCUMBE & CO., LTD.,** Colindale Works, Hendon, N.W.9. Stand No. 229.

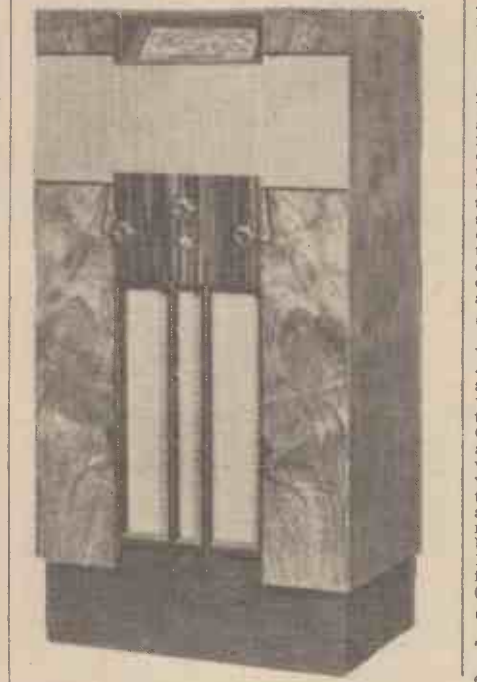
A MOST interesting range of test apparatus will be on show at this stand, and the name of Everett Edgcombe needs no emphasis with regard to the type of meter which for many years has borne it. Universal oscillators, set analyser and valve testers, output meters and similar equipment will attract both the keen experimenter and the service man, and it should be noted that these products are now known as the Everett Edgcombe Radiolab instruments.



A complete charging plant from the range of equipment manufactured by Messrs. A. Diggle. These Reliance plants cover all purposes and are obtainable in various types.



Two new models from the Ferranti range. Above is a handsome inlaid radiogram, and below a neat console model. The setting of the tuning scale at an angle is a useful arrangement and facilitates tuning.



Two of the new Ever Ready receivers. The differences in the loud-speaker openings are worthy of note as there are many schemes to improve the general appearance of the average set. The avoidance of a fretted grille is a step in the right direction.

**FERRANTI LTD.,** Radio Works, Moston, Manchester. Stand No. 74.

THE major portion of this exhibit will consist of complete receivers, and these will be supplemented by amplifiers designed for home construction and of sundry components, including transformers, resistances, volume controls and similar items. The Ferranti valves will also be seen. Amongst the complete receivers may be mentioned the Una Consolette, a 3-valve H.F., Detector and L.F. receiver, and the Gloria A.C. Autogram, which is a superbet receiver incorporating all modern circuit refinements plus a 6-watts push-pull output stage and with an automatic record changer. This costs 52 guineas, and between these two extremes will be found various complete receivers of the table or console type. For the home constructor there are some interesting amplifiers, obtainable in various models delivering 2½, 6½, and 12½ watts undistorted output, the main feature of which is that transformer-coupling is employed throughout. It is claimed that the quality delivered is difficult, if not impossible, to obtain by resistance coupling. The well-known measuring instruments will also be a feature of this exhibit.

**FILM INDUSTRIES, LTD.,** 60, Paddington Street, W.1. Stand No. 4.

**FLINDERS (WHOLESALE), LTD.,** 14-20, St. Peters Street, Ipswich. Stand No. T6.

AS will be seen, this firm is wholesale only, and thus the exhibits will be selected items from various ranges.

**FULLER ACCUMULATOR CO. (1926), LTD.,** Woodland Works, Chadwell Heath, Essex. Stand No. 119.

A NEW type of Free Acid Unspillable accumulator, suitable for certain commercial portables, will be seen on this stand. It has a capacity of 27 a.h. and measures only 4ins. by 2ins. by 6ins. approximately. It costs 12s. 3d. The only other alteration to existing lines is the fitting of a new type carrier to the Standard Plate range. The new carrier is one that ensures the safe conveyance of the accumulator to and from the charging station, and the design is such that the accumulator cannot accidentally become detached. Slight alterations in prices have been made to existing lines and these include the super range of H.T. and G.B. batteries. An interesting feature of the exhibit will be the display of both accumulators and dry batteries in various stages of manufacture.

**GARRARD ENGINEERING AND MANUFACTURING CO., LTD.,** Swindon, Wilts. Stand No. 57.

HERE will be seen every type of gramophone motor—clockwork, induction, and universal. In addition there will be automatic stops, fittings, and various lubricants which are essential to obtain good trouble-free operation from the gramophone. The Garrard motors are, of course, already very well known and need no introduction, but the radio constructor will be especially interested in the radiogram units, which consist of a motor board carrying the motor and turntable in addition to needle cups and pick-up with arm, thus facilitating the construction of a complete radiogram. An automatic record changer will also be seen, and this will play consecutively either eight 10in. or eight 12in. records of any make. It costs £10 for the A.C. model and £10 17s. 6d. for the Universal (A.C.-D.C.) model.

**GENERAL ELECTRIC CO., LTD.,** Magnet House, Kingsway, London, W.C.2. Stands Nos. 35, 44, and 63.

THE exhibits on these three stands will be divided up between valves, receivers, batteries, and other electrical equipment. Only two new receivers will be





# "PRACTICAL & AMATEUR WIRELESS" GUIDE to the SHOW



Introduced, a battery S.G.3 and a Fidelity A.C.4, which is also obtainable in a Universal form. In addition to models which are retained from last season will be seen a new H.T. and G.B. battery,

that it is a tubular device having both ends formed into box spanners to take 2, 4 and 6 B.A. nuts, and two screw-drivers of different sizes, which are provided with ends fitting into the body of the instrument. A clip is provided and enables the tool to be carried in the pocket in the same manner as a fountain pen or pencil and it will prove invaluable to the constructor.

**GOODMANS (CLERKENWELL), LTD.,** Broad Yard Works, Turnmill Street, London, E.C. Stand No. 51.

An interesting range of loud-speakers is produced by this firm and will be seen on their stand. Ranging from a "Standard" extension speaker at 50s., which is fitted with a volume control, to an "Auditorium" 12-watt model at £8 8s., these speakers have many interesting points. The large model, for instance, is of the permanent-magnet type and has a 12in. diaphragm. It will provide a large output with only 2½ watts input and thus may be used with quite small apparatus. The massive casting is of aluminium, and the speaker is shown on this page. The magnet is of the specially developed nickel aluminium. A constant impedance volume control will also be on view and this is fitted as standard to all the Goodmans Extension speakers. It has eight positions and an off position, and gives bass compensation on low volumes.

**GRAHAM FARISH, LTD.,** 153, Masons Hill, Bromley, Kent. Stand No. 64.

In addition to the many Graham Farish components which are already popular, there will be seen here the Formo components which are now produced by this firm. The interesting range has now been considerably extended and now includes some new short-wave components which will be introduced for the first time at Olympia. These include a 2-way short-wave coil stand costing 2s. 6d., and the short-wave coils costing 3s. 6d. and which are obtainable in three types to cover ranges of 12 to 25, 21 to 50, and 38 to 102 metres. These coils are wound on Frequentite formers

QAVC, giving silent tuning between stations, forms the basis of both the H.M.V. model 441 radio receiver and the popular priced 541 radio-gramophone, which cost 12½ and 22 guineas respectively. A similar radio-



A complete automatic radiogram from the H.M.V. list. This is a majestic piece of apparatus and will appeal to all music lovers.

which is claimed to have a longer life than any types previously produced by the G.E.C. Absence of noise in operation and uniform discharge throughout its life are two of the many features which will contribute largely to the popularity of this new product. It is obtainable in 60, 100, and 150-volt types at prices ranging from 3s. 9d. to 11s. Other exhibits include the G.E.C. pick-up, an automatic gramophone record changer, an A.C./D.C. conversion unit, microphones, transformers, switches, accumulators, and the extensive range of Osram valves.

**GILBERT & CO. C.,** 73-81, Arundel Street, Sheffield. Stand No. 123.

On this stand will be seen the Gilbert H.T. battery, which is obtainable in two types—a 60 volt at 3s. 6d. and a 120 volt at 7s. Another interesting item will be the Gilbert Combination Tool, which created so much interest at last year's show. The price of this instrument has now been reduced from 2s. 6d. to 1s., and for the benefit of those readers who have not seen this useful little accessory we would mention



A useful modulated-oscillator made by Messrs. Haynes Radio. No service man or keen experimenter should be without a piece of apparatus of this nature as it covers a multitude of test purposes.

and are provided with spring contacts designed to prevent many of the difficulties usually associated with plug-in coils. The tuning dials in the Formo range will no doubt attract many constructors, as they enable a home-built receiver to be finished off in a really commercial style and provide splendid tuning facilities. The Snail drive clock-face dial already reviewed by us is a particularly good device and costs 6s. 6d. complete. The drive may be obtained separately at 3s., and it is the intention of Messrs. Graham Farish to produce various esutchions and dials to fit the drive.

**GRAMOPHONE COMPANY, LTD.,** 108, Clerkenwell Road, London, E.C. Stands Nos. 77 and 82.

Among the instruments to be shown on the "His Master's Voice" Stand at the 1935 Radio Exhibition will be the following models: The "Battery Long Three," a sensitive three-valve receiver with moving-coil loud-speaker in an attractive cabinet retailing at £7 19s. 6d., and the "Superhet Battery Four," which, as its title implies, is a superheterodyne receiver, having moving-coil loud-speaker and large capacity H.T. batteries, costing 12 guineas.

A modern five-valve radio chassis incorporating



A most useful tool for the experimenter. It fits the pocket like a fountain-pen and will adjust various sizes of B.A. nuts as well as combining two sizes of screwdriver. This is known as the Gilbert Service Tool.

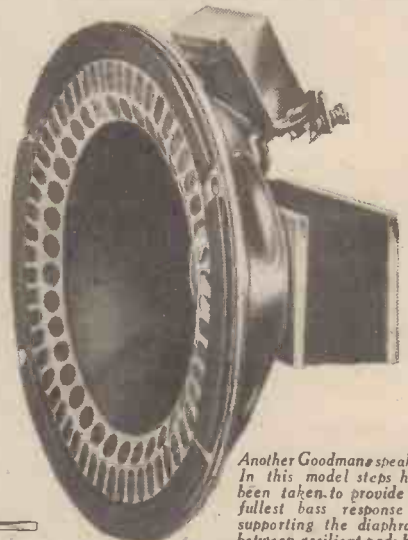


In this Haynes receiver a milliammeter is mounted on the tuning dial to facilitate accurate tuning.

gramophone for operation off D.C. will also be on view. The A.C. chassis is also used in the 17-guinea model 444 "Console Superhet Five," which will be much admired as a fine piece of furniture, besides providing high-quality radio performance.

Listeners who require a radio receiver or radio-gramophone incorporating more refinements will want to see the two fluid-light instruments. The "Superhet Fluid-Light Five" radio receiver at 13½ guineas, on which the ingenious fluid-light tuning device shows when stations are being received dead accurately, and the "Superhet Fluid-Light Autoradiogram" incorporating an eight record changing mechanism. This instrument, housed in an attractive walnut cabinet, of modern design, is priced at 33 guineas.

The radio and record connoisseur who requires the very best possible radio performance, coupled with all the refinements of a high-quality radio-gramophone, will wish to inspect the Model 530 "Duo Diffusion Autoradiogram Nine," priced at 52 guineas, and the "High Fidelity 15-Valve Autoradiogram" costing 110 guineas. Both these instruments incorporate such features as double-cone loud-speakers to cater for both high and low frequencies, variable selectivity controls, which enable foreign transmissions to be



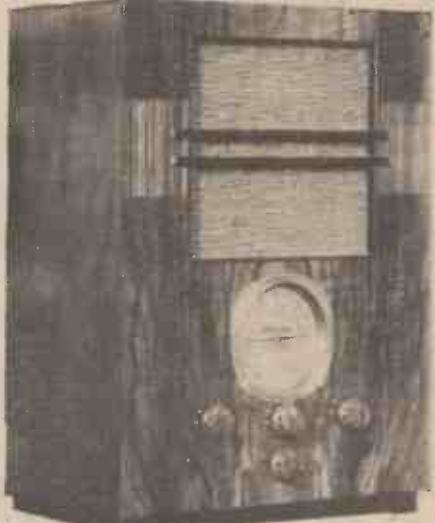
Another Goodmans speaker. In this model steps have been taken to provide the fullest bass response by supporting the diaphragm between resilient pads held by the perforated chromium grille and thus there is no "restoring" force, and the diaphragm may be considered as "dead," or fully floating. This model costs 45s.



A new Goodmans speaker. This is an auditorium model capable of delivering 12 watts undistorted, and costs 8 guineas. The Goodmans range also includes small models and extension speakers.

received with the best possible quality compatible with selectivity, besides fluid-light tuning, and figured walnut cabinets of the highest possible craftsmanship.

**GRAMPIAN REPRODUCERS, LTD.,** Station Avenue, Kew Gardens, Surrey. Stand No. 111.  
 THIS exhibit will consist in the main of loud-speakers, including a Major permanent-magnet model at £5 5s., and a small energised model at 25s.



The Dynatron "Toreador" receiver. This is made by Messrs. Hacker and Son, and possesses a novel tuning dial.

In addition there will be seen an extension speaker in cabinet with volume control at £3 15s., which may also be obtained without the volume control or without the transformer. In addition to these items a moving-coil microphone and microphone floor and table stands will also be shown. A new P.M. speaker known as the "Pantone," which costs 42s., and which incorporates a nickel aluminium magnet, is the principal item upon which Messrs. Gramplan will concentrate, and it will no doubt appeal to every constructor as it embodies many interesting and novel features.

**HACKER & SONS, H.,** Perfecta Works, Ray Lea Road, Maidenhead. Stand No. 32.

A RANGE of Dynatron high-fidelity radiograms and receivers will be the feature of Stand No. 32. All existing models have been re-designed, especially to incorporate the very special Dynatron super iron-cored coils, and a number of new models have been added. The Ether Emperor model incorporates a startling arrangement of loud-speakers, details of which will not be released until the doors of Olympia are opened to the public. It is claimed that the reproduction reaches a very high standard. In the all-wave models a novel circuit has been employed to avoid the difficulties and losses attendant upon the usual switching mechanism. The short-wave tuner is built as a separate unit, and operates ahead of the main tuner, two extra valves being used on short waves, and the controls are separate. The Searchlight tuning device is also an interesting item and consists of two neon tubes, one for medium and one for long waves.

**HALCYON RADIO, LTD.,** Sterling Works, Dagenham, Essex. Stand No. 36.

HIGH-CLASS apparatus will be shown here, and the illustration of the model A.C.7.G Radiogram will give some indication of the novel lines adopted.

Other models will consist of superbets for the broadcast bands and for all-wave use, and modern circuit refinements, such as audio suppression, A.V.C. tuning indicator, and visual silent tuning, are incorporated.

**HARTLEY TURNER RADIO, LTD.,** Thornbury Road, Isleworth, Middlesex. Stand No. 23.

SOME interesting loud-speakers will be shown by Messrs. Hartley Turner, and it is claimed that a very high overall response is obtained. In addition some home-constructors, receivers will be seen, and these incorporate a push-pull output stage. A device to prevent cabinet resonance, known as "True-Bass Baffle," will also be shown.

**HAYNES RADIO, Queensway, Enfield, Middlesex.** Stand No. 10.

IN addition to some high-quality radiograms, there will be shown some useful testing equipment. The oscillator, for instance, is an entirely new production and provides a ready means for finding a given transmission of identifying a transmission, of producing a tone-corrected and modulated transmission from a pick-up, and for testing a receiver. This item is illustrated on page 616. An interesting feature of the radiogram is the inclusion of a meter on the tuning dial, and this ensures accurate tuning. The circuit incorporates a duophase L.F. amplifier, delivering an output of 6 watts in one model and 14 watts in another. Quality speakers will also be shown.

**HEYBERD & CO.,** F.C., 10, Finsbury Street, London, E.C. Stand No. 25.

ALTHOUGH known for many years as manufacturers of mains apparatus, a novelty will be struck at this year's show by the display of complete receivers. The outstanding feature is a new all-mains 4-point receiver. It is a 4-valve superhet for A.C. mains,



The first of the Heyberd mains receivers. Designed on extremely novel lines, this receiver also avoids the usual laboratory appearance by concealing the controls.



The H.M.V. "Long Receiver." This is a battery receiver and is designed to cater for the listener of modest means who requires the very best quality from the average programmes without high maintenance costs. It is fitted with an M.C. speaker and costs £7 19s. 6d.

and it is claimed that no hum is audible.

A full range of mains transformers will be shown as well as a range of battery chargers, D.C. chargers, mains units, chokes and resistances.

**HELLESENS, LTD.,** Hellesen Works, Morden Road, Sth. Wimbledon, London, S.W.19. Stand No. 21.

THE main feature of this exhibit will be dry batteries, amongst which will be specially-designed batteries for various commercial receivers.

**HENDERSONS WHOLESALE ELECTRIC AND RADIO, LTD.,** Electric House, Queens Road, Brighton. Stand No. T28.

THIS stand will display all the leading makes of receivers and radiograms and associated apparatus.

**HENLEY'S TELEGRAPH WORKS, LTD.,** Holborn Viaduct, London, E.C. Stand No. 53.

THE principal exhibit on Henley's stand this year is their well-known Solon Electric Soldering Iron. The popular Domestic model, retailing at 7s. 6d., is being demonstrated on the stand. This is a handy size and consumes only 65 watts. It can be obtained in two voltage ranges, viz., 200/220 or 230/250 volts, and is complete with 6ft. of Henley flexible cord and lampholder adaptor. Industrial type "Empire" model Solon Electric Soldering Irons are also being exhibited. These models have been specially designed for industrial use, and tested under the most rigid workshop conditions. The bit is of tinned copper of oval section allowing work to be done in a narrow space. It is designed to provide the maximum amount of heat at the working end with a minimum of heat loss due to radiation, as the heating element is totally enclosed in the bit. Six feet of Henley tough rubber sheathed 3-core flexible (two cores rubber insulated, and the third earthing core, cotton covered) is provided with the ends trimmed to take a 3-pin plug. Connections between this flexible and the element are made in a patent bakelite terminal box fitted to the handle so that all connections are well away from the source of heat. An efficient cord grip is fitted, and consists of a moulded rubber sleeve which grips the sheath of the flexible. This sleeve prevents the possibility of bending the flexible too sharply where it leaves the handle. These irons are made in three sizes, of 65, 125, and 240 watts, for the voltage ranges of 100/110, 110/120, 200/220, 230/250. The prices are, respectively, 9s. 6d., 22s. 6d., and 37s. 6d.

Another exhibit is Solon Resin Cored Solder.

A further interesting feature on this stand is the alcove exhibiting Henley Slideback Wires. To expose the conductor for soldering it is only necessary to press back the insulation between the thumb and finger. It is insulated with a thin coat of rubber next to the conductor, over which is placed



A Halcyon receiver of new design. Note the single control knob, which is visible, and the corner-less cabinet design.



1936 STENTORIAN

NEW "MICROLODE" DEVICE—  
 SECTION-WOUND & INTERLEAVED



# "PRACTICAL & AMATEUR WIRELESS" GUIDE to the SHOW



a loose cotton braiding waxed overall. Henley's are also showing fine rubber covered wires which are manufactured in various colours and also used for internal wiring in sets.

**HIGH VACUUM VALVE CO., LTD., 113, Farringdon Road, London, E.C. Stand No. 27.**

**THIS** year HIVAC will be showing a range of 30 2v. battery valves and 4v. mains valves. In addition to the above types, the following new valves will be presented to the public. **HIVAC MIDGETS**—will be of particular interest, (since they are the only 2-volt, high-efficiency multi-electrode midget valves on the world market. The midgets make possible the construction of a genuine Pocket Radio Receiver, and, in fact, such receivers using HIVAC Valves are in daily use by members of the Brighton Police Force. **SHORT-WAVE VALVES.** A series of midget valves are being manufactured with Frequentite bases, especially for use on ultra-short waves. These valves will be of particular interest to the ultra-short-wave enthusiast. **EXPANDED VOLUME CONTROL.** The HIVAC AC/V is a valve specially designed for expanded volume control, the latest development in high-fidelity reproduction. **HIVAC HARRIES OUTPUT VALVES.** These valves operate on an entirely new principle, and are claimed to be the most advanced output valve on the market, and will, therefore, be of interest to all our readers.

**HILLMAN BROS., 123 and 125, Albion Street, Leeds. Stand No. 18.**

**HERE** will be seen a very comprehensive display of all the various receivers, including Marconi-phones, Philips, Ekco, Ultra, Aerodyne, etc.

**H.M.V. (See Gramophone Co., Ltd.). Stands Nos. 77 and 82.**

**HOBDAY BROS., LTD., 21-27, Great Eastern Street, London, E.C.2. Stand No. T22.**

**THIS** stand will comprise an exhibition in miniature. It will present in an attractive manner the range of instruments of the leading radio manufacturers and unique lighting effects will enhance the general appearance of the stand.

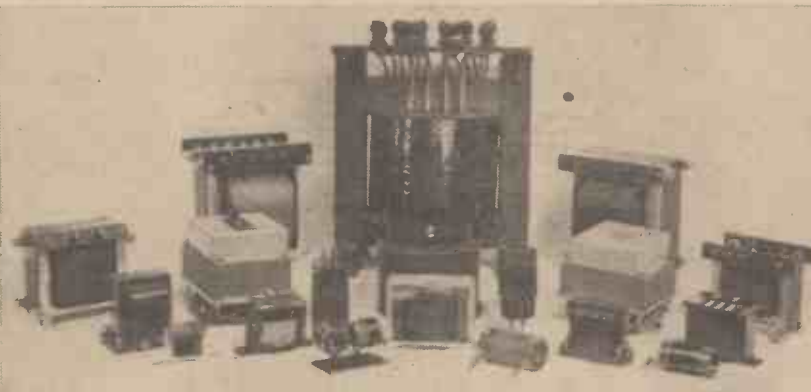
**HOUGHTONS. (See Ensign, Ltd.). Stand No. T13.**

**ILIFFE AND SONS, LTD., Dorset House, Stamford Street, S.E. Stand No. 6.**

**ITONIA, LTD., 58, City Road, E.C. Stand T14.**

**JACKSON BROS., 72, St. Thomas Street, London, S.E.1. Stand No. 110.**

**VARIABLE** condensers, tuning dials and pre-set condensers will be the main portion of this exhibit and certain models will be found to have disappeared from the standard lines. In addition, the Baby Gangs have been entirely re-designed with ball bearing



In addition to the various transformers, chokes, and other components shown in the above illustration, Kingsway Radio also handle the Simpson's Electric Turntable which is shown below. This is a synchronous motor and rotates at the correct speed without any speed controlling device when connected to a 50 cycle A.C. supply.



rotors, but are otherwise unchanged so far as the electrical characteristics are concerned. A Baby Superhet gang, tracked for 465 kc/s and 473 kc/s, may also be obtained in two and three gangs. In future all midget condensers will be fitted with 1/4 in. spindles as standard. Some new dials will be seen, and amongst these may be mentioned the Airplane pattern with large circular scale and double ended pointer, bold wavelength calibration, dual lamp holder, and escutcheon fitted with glass. The escutcheon and scale may be obtained in various finishes—white scale with chrome or bronze escutcheon is the standard style. The price is 5s. 9d.

**JOHNSON TALKING MACHINE CO., 96, Clerkenwell Road, London, E.C. Stand No. T11.**

**KINGSWAY RADIO, LTD., 3 to 9, Dane Street, High Holborn, London, W.C.1. Stand No. 17.**

**IN** addition to the Simpson Electric Turntable which has been on the market for some time, a number of interesting new items will be seen on this stand. These include transformers, chokes, short-wave coils, and inverters. One item which will no doubt attract considerable attention is an H.F. choke for use on the ultra-short waves, and this follows a very novel construction. It has been already described in these pages, and is one of the first liquid-filled components to be seen on the amateur market.

**KOLSTER-BRANDES, LTD., Cray Works, Sidcup, Kent. Stand No. 78.**

**AT** this stand there will be seen seven new receivers, three for A.C. mains, two for A.C. or D.C. (the so-called Universal type) and two for battery operation. These include variable selectivity devices, a feature which has this year been extended to certain other models. In each of these receivers a tone control is combined with the variable selectivity control. An exclusive feature of these receivers is the "Fototune" Dial, a device which projects the name of the tuned station on a space in the dial, together with the wave-range to which the set is adjusted. The Rejectostat system of interference elimination will also be seen.

**LAMPX RADIO AND ELECTRIC CO., 62, Brewery Road, N.7. Stand No. 24.**

**LECTRO LINX, LTD., 79a, Rochester Row, S.W.1. Stand No. 115.**

**THE** popular Clx connectors will form the main attraction on Stand No. 115, and these will be augmented by the various types of valveholder, including the newly-introduced short-wave baseboard-mounting holder which has already been reported upon in our Facts and Figures page. The Type "A" panel terminals are being discontinued and the chassis-mounting valve-holders of the floating type will also be discontinued and replaced by a rigid type. Prices will remain as before. The exhibit will also include socket strips, master plug, heavy duty space terminals, voltage selector plates, and similar small items.

**L.E.S. DISTRIBUTORS, LTD., 15/16, Alfred Place, Tottenham Court Road, London, W.C.1. Stand No. T25.**

**A**s wholesalers this firm will be showing a representative range of all the leading manufacturers' models.

**LEVICK AND SONS, LTD., SWIFT, Clarence Steel Works, Sheffield. Stand No. 113.**

**THIS** exhibit will consist of a comprehensive display of finished permanent magnets for M.C. speakers made from all grades of magnet steel, including chrome steel, cobalt-chrome steel, nickel aluminium alloys, and the very latest magnet alloy known as "Alnico." In addition will be seen the latest types of magnets developed for use in headphones, pick-ups, ammeters and other instruments.

**LISSEN, LTD., Worpole Road, Isleworth. Stand No. 86.**

**TEN** new models will be on view on the Lissen Stand and these include an A.C. mains superheterodyne and a battery version of the same receiver.

In addition, many of the original receivers will be on view, together with batteries, valves, and other components for the home constructor.

**LUGTON AND CO., 203, Old Street, London, E.C.1. Stand No. T10.**

**IN** addition to a show of receivers and radiograms marketed by well-known manufacturers this exhibit will also include various products which are marketed under the trade name "Maxitone." The centre of the stand will be set off by a large record on which is mounted the trade names of all the leading manufacturers in silver with a coloured spot-light playing on them.

**McMICHAEL RADIO LTD., Danes Inn House, 265, Strand, W.C.2. Stand No. 68.**

**SOME** novel receivers will be shown here and amongst these will be the newly released Model 135 superhet. This receiver is illustrated on page 619, and it embodies a number of novel features. The flood-lit dial of the McMichael receiver, which we have already reviewed, will no doubt appeal to many visitors, and the dual loud-speaker arrangements will also prove very attractive.

**MANUFACTURERS ACCESSORIES CO. (1928), LTD., 85, Great Eastern Street, London, E.C.2. Stand No. 77.**

**IN** addition to their own Maco accumulators and Beliomac H.T. batteries, this firm will be showing all types of sets, components and accessories by leading manufacturers. A 6-valve superhet all-wave receiver, listed at 10 guineas, will also be shown.

**MARCONIPHONE CO., LTD., 210, Tottenham Court Road, W.1. Stands Nos. 11 and 69.**

**MILNES RADIO CO., LTD., Church Street, Bingley, Yorks. Stand No. 204.**

**THE** H.T. supply unit which can be charged from an accumulator will attract many to this stand, and at this year's show we shall see some improvements on the original design, together with a special moving-coil loud-speaker and some complete receivers. The speaker has an 8 in. diaphragm and a nickel aluminium ring-type magnet. The receivers include a 3-valve battery model, a straight 5-valve battery model, and a 6-stage A.C. mains superhet. In addition a radiogram for the battery-user will also be on view.

**MULLARD RADIO VALVE CO., LTD., Mullard House, Charing Cross Road, London, W.C. Stand No. 75.**

**THE** main feature of the Mullard exhibit will be the extensive range of valves. The two-volt range has now been widened by the addition of two or three valuable new types. In addition, we understand that in the near future Mullard will release an interesting new output valve.

During the past twelve months Mullard have improved the construction of the A.C. range. The modifications are both mechanical and electrical.

By the time the Exhibition opens there will be several new types added to the Mullard A.C. range. Full details are not yet to hand, but we learn that at least two of them will be H.F. pentodes of outstanding efficiency. A new receiver, the M.U.35, an efficient superhet receiver employing six valves, full vision dial and "geographical" tuning; volume control, continuously variable tone control; delayed A.V.C. noise suppression control for silent tuning will also be seen.

The M.B.4, designed for high-quality reproduction and large output with battery economy from four valves will also be included with other complete receivers. It is interesting to note that the "Giant" valves which are on view are perfectly made. They are manufactured—literally "made by hand"—to the precise scale of their prototypes, and of the correct materials.



One of the new Kolster-Brandes receivers. There will be no less than seven new models to be seen on the K.B. stand, and they include models for battery, A.C., D.C., and Universal use.

**GEORGE NEWNES, LTD.**, 8/11, Southampton Street, Strand, London, W.C.2. Stand No. 9, Ground Floor.  
**MESSRS. GEO. NEWNES, Ltd.**, probably publish more technical Wireless handbooks, blue prints, and wireless and television periodicals than any other publisher. On this stand, therefore, you are bound to find a book or a periodical which appeals to you.

**PRACTICAL AND AMATEUR WIRELESS**, *Practical Mechanics*, *Practical Television and Short-Wave Review*, *The Wireless Magazine*, and the *Practical Motorist* are but a few of the leading journals on show here. A full range of blue prints of wireless receivers ranging from crystal sets to multi-valve superhets will be on sale, as well as a full range of technical books, including "The Wireless Constructor's Encyclopaedia," "Everyman's Wireless Book," "Television and Short-Wave Handbook," "The Practical Motorist's Encyclopaedia," "The Home Mechanic's Encyclopaedia," "Ralph Stranger's Wireless Library." You will also be able to inspect Mr. Camm's series of three-valve and two-valve superhets, and the receivers described in **PRACTICAL AND AMATEUR WIRELESS** during the past year. Mr. F. J. Camm and Mr. Percy W. Harris, with their technical staffs, will be available to answer readers' queries free of charge. Call and see us.

**NUVOLION, LTD.**, Meredith Works, Park Crescent, Clapham Park Road, S.W.4. Stand No. 220.

**OLDHAM AND SON, LTD.**, Denton, Manchester. Stand No. 66.

**UNDOUBTEDLY** the greatest interest will be displayed at the new self-indicating accumulator shown on this stand. No more doubts will arise as to whether the accumulator will last for the evening as the indicator on the side shows at a glance the condition of the cell. In addition to this model will be seen numerous cells for portables and other receivers, in addition to H.T. accumulators of various designs. A range of dry H.T. batteries will also be on view.

**ORMOND ENGINEERING CO., LTD.**, Ormond House, Rosebery Avenue, E.C.1. Stand No. 33.

**IN** addition to already popular items, such as loud-speakers, condensers, dials, switches, knobs, etc., some new items will be displayed on this stand. They include a P.M. loud-speaker in two different designs, a variable condenser, and three complete receivers. One is a 3-valve battery model, whilst the other two are for mains use, one for A.C. and one A.C./D.C. The circuit employed is a straight band-pass.

**ORR RADIO, LTD.**, 79a, Parkhurst Road, London, N.7. Stand No. 96.

**HERE** will be seen a complete range of Invicta receivers amongst which is a model designed especially for use on trawlers at sea. It is known as the Fisherman's set and is illustrated on this page. It covers, in addition to the ordinary long and medium broadcast wavebands, the 90 to 220 metre waveband.

**OSSICAIDE, LTD.**, 447, Oxford Street, London, W.1. Stand No. 121.

**IN** addition to Deaf-Aid apparatus, this firm will be exhibiting an entirely new and ingenious apparatus which amplifies clock chimes without the use of microphones, bells, or records. The whole apparatus is entirely automatic, and requires no attention whatsoever. In addition, there will be a complete range of Public Address Equipment including A.C., universal and car-battery type amplifiers, and special high-quality loudspeakers.

*The new McMichael receiver which is notable for the very large and flood-lit dial.*



*A radio-gramophone made by the makers of the well-known Milnes battery. This instrument is designed for the battery user.*

*Two Orr receivers. These are known as the Invicta models, and the left-hand model is manufactured especially for use in trawlers, etc., and is known as the Fisherman's set. It covers a wave-band from 90 to 200 metres in addition to the normal broadcast bands.*

**PARTRIDGE WILSON AND CO., LTD.**, Evington Valley Road, Leicester. Stand No. 104.

**THE** chief items of interest on the stand of Partridge Wilson and Co., Ltd., to radio enthusiasts will be examples of the well-known range of Davenset Class "A" mains transformers and smoothing chokes, suitable for filament heating, and use with valve and dry metal power units; A new design feature is the variety of speech output components available, both transformers and chokes, for straight and push-pull circuits. In addition to the above, examples of sliding resistances, rated from 120 to 360 watts, will be shown, together with charging accessories such as cell testing voltmeters, hydrometers, clips, etc., etc.

**PETO AND RADFORD**, 107a, Pimlico Road, S.W.1. Stand No. 94.

**THIS** display consists of an exhaustive range of accumulators of all types and the tell-tale device to indicate the condition of the cell is a notable feature.

**PHILIPS LAMPS, LTD.**, 145, Charing Cross Road, London, W.C.2. Stand No. 62.

**THE** Philips receivers are already very popular and this year's models will do a great deal towards increasing their popularity. Various standard circuit details, such as A.V.C., tone control, mains aerial, and so on, are fitted and it should be noted that in addition to the popular superhet circuit Messrs. Philips make a great feature of the straight circuit employing two H.F. stages.

**PIANOMAKER**, 204 6, Great Portland Street, London, W.1. Stand No. T29.

**PLESSEY CO., LTD.**, Vicarage Lane, Ilford, Essex. Stand No. 20.

**THE** majority of the items on this stand are designed for set manufacturers only and therefore the exhibit will not be of much interest to the home constructor.

**PORTADYNE RADIO**, Gorst Road, North Acton, N.W. Stand No. 80.

**PRIMUS MFG. CO.**, Primus House, Willow Street, E.C.2. Stand No. 19.

Details not available at the time of going to press.

**PRISM MFG. CO.**, California Works, Brighton Road, Belmont, Surrey. Stand 117.

Details not available at the time of going to press.

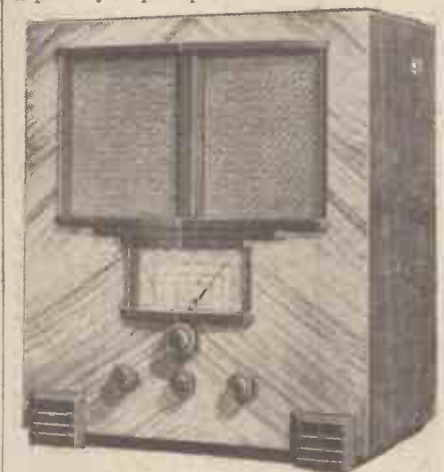
**PYE RADIO, LTD.**, Radio Works, Cambridge. Stand No. 83.

**R. A.P. Ltd.**, Ferry Works, Thames Ditton, Surrey. Stand No. 106.

Details not available at the time of going to press.

**RADIO GRAMOPHONE DEVELOPMENT CO., LTD.**, Frederick Street, Birmingham. Stands Nos. 88 and 89.

**RADIOGRAMS** designed on novel lines will be shown on this stand and a new model will be seen in No. 704 Auto-radiogram. This is a 7-valve superhet having A.V.C. applied to 3 H.F. valves and a triode output stage. Twin matched moving-coil speakers with energised fields are provided. Other models include an All-wave auto-radiogram costing 76 guineas and a special auto-radiogram at 100 guineas which incorporates a 12-valve superhet. A piezo-crystal pick-up is fitted.



**1936 STENTORIAN** NEW MORE POWERFUL MAGNET



# "PRACTICAL & AMATEUR WIRELESS" GUIDE to the SHOW



**RADIO INSTRUMENTS, LTD., Purley Way, Croydon.**  
Stand No. 102.

A COMPREHENSIVE range of components including chokes, transformers, short-wave coils and special iron coils will be shown on this stand, together with some interesting receivers. These, in addition to the already well-known Airflo and other models, will include some special receivers designed for schools use. Five of these models have been approved by the Central Council for School Broadcasting and are being exhibited on the stand. They include a 3-valve straight receiver and a 9-stage 5-valve superhet. The controls are covered by a locked door or flap when not required, to prevent unauthorised use, and a number of borough councils have already equipped their schools with these sets. The exhibit will also include some short-wave converters.

**RADIO SOCIETY OF GT. BRITAIN, 53, Victoria Street, London, S.W.1.** Stand No. 202.

ON this stand will be seen some interesting amateur equipment, consisting of transmitting and receiver sets for the short and ultra-short waves.

**RAWPLUG CO., LTD., Rawplug House, Cromwell Road, London, S.W.7.** Stand No. 120.

A MATERIAL which is extremely handy to the constructor is Durofix, and this will be shown on this stand in addition to Plastic Wood and Plastic Metal.

**REGENTONE PRODUCTS, LTD., Worton Road, Ixworth, Middx.** Stand No. 93.

**REPRODUCERS AND AMPLIFIERS, LTD., Frederick Street, Wolverhampton.** Stand No. 56.

THERE will be three separate P.M. models on this stand, including the Multex, the Multimu, and the Alpha. The Multimu is illustrated on page 621, and consists of an 8½ in. P.M. speaker embodying "R. and A." system of impedance tuning by which the reproducer may be instantaneously and permanently matched to the receiver by adjusting one knob. The speaker costs 42s., and is rated for a maximum input of 4 watts. In addition, there will be an output transformer listed at 18s. 6d., having sixty-five separate ratios, ranging from 1 to 3.8 up to 120 to 1, including twelve push-pull ratios.

**RISTS WIRES AND CABLES, LTD., Freemantle Road, Lowestoft.** Stand No. 213.

WIRES for every purpose will form the main feature of this exhibit and will include battery leads, lead-in wires, wander leads, twin screened tinned copper braided tubing, connecting wire in various colours, mains leads, aerial wire, loud-speaker cords, and similar materials.

**SELECTA GRAMOPHONES, LTD., 81, Southwark Street, S.E.1.** Stand No. T24.

**SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD., 39, Upper Thames Street, London, E.C.4.** Stand No. 100.

THIS exhibit will consist of Full o' Power batteries, which are obtainable in various sizes, some of which are designed for use in various



Here is the well-known Milnes H.T. Unit. This has the advantage that it may be recharged from an accumulator, and it delivers a steady current, and is more or less trouble-free.

commercial receivers and which are consequently of special dimensions. Many prices have been revised, and in addition to radio batteries there will be special types designed for flashlamps, cycle lamps, etc.



A handsome Philips radiogram. Again in this model may be seen the avoidance of control knobs, except for the important volume-control which may be required on record reproduction, and thus avoids raising the lid.

**SONOGHORDE REPRODUCERS, LTD., Rothermel House, Canterbury Road, London, N.W.** Stand No. 54.

THIS exhibit will consist mainly of the piezo-electric devices, such as pick-ups, loud-speakers, and microphones. The piezo-electric "Tweeter" kit will appeal to listeners who are looking for quality equipment. It increases the brilliancy of reproduction and is a valuable asset to a receiver which already delivers a high-quality output. The price is 32s. 6d.

**SOUND SALES, LTD., Tremlett Grove Works, Junction Road, N.19.** Stand No. 108.

**STRATTON AND CO., LTD., Eddystone Works, Bromsgrove Street, Birmingham.** Stand No. 30.

THE Eddystone stand will, as usual, be specially attractive to the short-wave and ultra-short-wave listener and experimenter. Continuing their policy of specialisation in the short-wave field, Messrs. Stratton and Company offer a greatly extended range of components for home and overseas use. New parts include: Low-loss coils, ultra-short-wave coils, ultra-short-wave I.F. transformers, high-frequency chokes, variable condensers, vernier dials, valveholders, insulators, 5-metre aerials, and welded steel cabinets. Special use is made of new high-frequency dielectrics. There will be short and medium-wave receivers for overseas use in full tropical finish. Of particular interest is a

new Super Six receiver, a 6-valve superheterodyne with switched coils and automatic volume control.

**SUFLEX, LTD., Aintree Road, Perivale, Greenford, Middlesex.** Stand No. 205.

THIS firm will be exhibiting insulating sleeving of all diameters and colours in various qualities, also screened sleeving, taped and braided, and special sleeving for use up to 10,000 volts.

**SUN ELECTRICAL CO., LTD., 118, Charing Cross Road, London, W.C.2.** Stand No. T15.

THIS firm operates simply as wholesalers and thus the exhibit will consist of items from well-known manufacturers' lines.

**TANNOY PRODUCTS, Canterbury Grove, S.E.27.** Stand No. 90.

SEVERAL new amplifying equipments will be seen on this stand, as well as microphones and loud-speakers, the most interesting being a new projection type with a "flat" horn suitable for mobile use or where space is limited and where the sound source should be hidden from view.

**TELEGRAPH CONDENSER CO., LTD., Wales Farm Road, Acton, W.3.** Stand No. 37.

T.C.C. condensers need no introduction and the familiar green cased components will make this stand readily distinguishable. The exhibits will include all types of mica and paper fixed condensers, including non-inductive paper tubulars, together with special types for use under tropical conditions and for car radio work. Dry and aqueous electrolytic condensers from 12 volts to 550 volts working, the former being contained in waxed cartons, metal boxes, and aluminium cans; low and high-voltage electrolytics in tubes.

**THE 362 RADIO VALVE CO., LTD., Stoneham Road, Upper Clapton, London, E.5.** Stand No. 212.

THIS display will cover a complete range of valves suitable for every requirement—battery, A.C., transmitting and other types. Some novel features are incorporated in these valves which, in addition to the smaller types suitable for battery operation, include some high power output triodes such as the PX25 and PX50. The latter delivers an undistorted output of 13 watts and has a 6-volt 4-amp. heater. In addition there is a pentode (ME25) capable of delivering an undistorted output of 9 watts.

**THOMPSON DIAMOND AND BUTCHER, 34, Farringdon Road, E.C.** Stand T19.

**T.M.C. HARWELL (SALES), LTD., Britannia House, 233, Shaftesbury Avenue, London, W.C.2.** Stand No. 29.

THE T.M.C.-Hydra condensers will form the main portion of this exhibit, and these include tubulars and high-voltage test condensers. For television equipment and other high-voltage apparatus condensers are also available for working voltages of 1,500 and 750, the latter being available in various capacities from 1 to 2.0 mfd. A special model of 8 mfd. is available at 27s. 6d.



R.G.D. receivers have many novel features and may be obtained with a triple-speaker unit designed to give a good straight-line overall response from 70 to 10,000 cycles.



TRADER PUBLISHING CO., LTD., Dorset House Stamford Street, London, S.E.1. Stand No. T27.



A "Schools" radiogram. This model is included amongst a number which have been produced by Radio Instruments for use in schools.

TUCKER EYELET CO., LTD., Jameson Road, Aston, Birmingham 6. Stand No. 122.

AMONGST the items on this stand may be mentioned sundry small metal presswires used in wireless receiver and component construction, including eyelets of all types in various lengths, diameters, and finishes; valve eyelets.

ULTRA ELECTRIC, LTD., Western Avenue, Acton, W.3. Stand No. 73.

RECEIVERS of various types and possessing novel features will be shown by Ultra. Clock-face tuning is one of the most important details of these receivers.

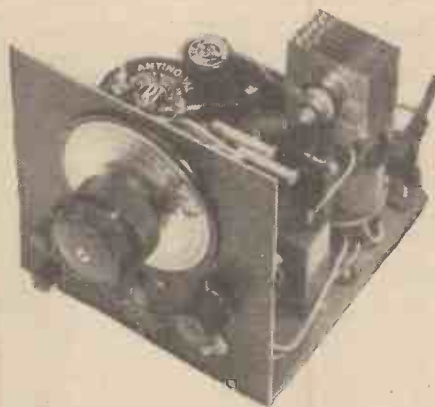
UNION RADIO CO., U.R. Works, Carphell Road, Croydon. Stand No. 18.

VANDERVELL, LTD., C. A., Well Street, Birmingham. Stand No. 214.

A COMPLETE range of accumulators, including jelly-acid non-spillable types, H.T. accumulators, and mass-plate cells will be featured on this stand, and the exhibit will also include dry H.T. batteries in various types.

VARLEY, LTD., 103, Kingsway, London, W.C.2. Stand No. 31.

THE four-gang superhet type permeability tuner will be seen for the first time on this stand and it will also be the first appearance of the three-gang superhet type tuner. In addition to these new components, Messrs. Varley will be showing a new variband I.F. unit in which the coupling between the primary and secondary is adjustable from the panel, and an air-tuned I.F. transformer in which the coils are of Litz wire and the parallel capacities are formed by air-dielectric pre-sets. These are designed for an intermediate frequency of 405 kc/s. A multi-volt mains transformer will also be introduced, and this



A short-wave converter for the home set-builder. This is entirely self-contained and the metal rectifier may be seen on the right. It is, of course, an A.C. model.

for use with measuring instruments. In addition there will be the H.F. rectifiers which have been popularly known for some time as the "cold valve" and which are obtainable in several types. The H.T. rectifiers are obtainable in many different patterns.



The R. and A. Multimu—a loud-speaker which can be used in any output circuit with correct matching which is achieved by means of the unit seen at the base.



An air-tuned I.F. transformer. This is one of the new components to be introduced by Messrs. Varley at Olympia.

is designed to supply all the voltages needed in a receiver designed for both sound and television. In addition to these new items all the existing components, such as volume controls, R.C. units, resistances, L.F. transformers, will be on show.

VIDOR, LIMITED, West Street, Erith, Kent. Stand No. 98.

IN addition to many types of complete receivers and radiograms, Messrs. Vidor will be showing a complete range of H.T. batteries.

WATERHOUSE, LTD., F., Ashwood Street, Dudley Hill, Bradford. Stand No. 219.

THE principal exhibits on this stand will be tables and stands for radio receivers, but, in addition there will also be some speaker and receiver cabinets. A special cabinet is being manufactured to house the Milnes H.T. Unit and this is shown on page 622. The tables and stands are designed to match practically any commercial receiver on the market.

WEBBER AND CO., LTD., J. M., 39, Gt. Eastern Street, E.C.2. Stand No. T2.

WESTINGHOUSE BRAKE AND SIGNAL COMPANY, LTD., 32, York Road, King's Cross, London, N.1. Stand No. 101.

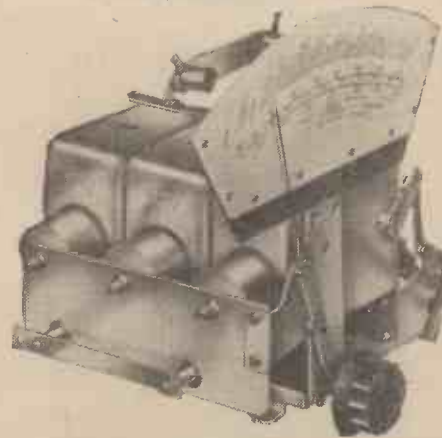
THE complete range of Westinghouse metal rectifiers will be shown on Stand No. 101, and these include large types for mains receivers and very small models



This rear view of the Stentorian Duplex speaker shows the ingenious connecting schemes which have this year been introduced by Messrs. Whiteley Electrical.

WESTON ELECTRICAL INSTRUMENT CO., LTD., Kingston By-Pass, Surbiton, Surrey. Stand No. 216.

HIGH-CLASS testing apparatus for the laboratory, the experimenter, and the service man will be seen here. Two interesting items are exhibited and include an Oscillator and an Analyser. With the



The Varley Permeability tuner and a panel-controlled I.F. Unit. This is a valuable arrangement as it enables the band-width to be adjusted according to the type of reception and thus a compromise may be obtained between sensitivity and selectivity.



1936 STENTORIAN

NEW PRECISION "FORMER" FOR WHITELEY SPEECH COIL

**"PRACTICAL & AMATEUR WIRELESS"**  
**GUIDE to the SHOW**



A cabinet speaker in the W/B range. There are several models from which to choose.



A Waterhouse cabinet designed especially to house the Milnes H.T. Unit.



A new tester which is being introduced by Messrs. Wright and Weaire. A number of useful instruments suitable for the Service man or experimenter will be seen on Stand No. 217.

latter it is possible to carry out practically every test that is required in a modern receiver, from ganging to a test of every part of the circuit. The Weston instruments have, of course, been known for years as high-class instruments and a very high degree of accuracy is achieved.

**WHARFEDALE WIRELESS WORKS, 62, Leeds Road, Bradford. Stand No. 203.**

**T**HIS exhibit will comprise high-class speakers of all types. Permanent magnets with special dust-proof devices and auditorium models fitted with a new type of exponential cone avoiding resonance and the focusing effect of high notes will be seen. These are obtainable for 32s. 6d., whilst the energised auditorium model costs 70/- without transformer. Special output transformers will also be seen, and these are designed in order to obtain perfect matching and include a special universal type with a wander lead for matching purposes.

**WHITELEY ELECTRICAL RADIO CO., Victoria Street, Mansfield, Notts. Stand No. 95.**

**T**HE 1936 models of the popular Stentorian speakers will form the centre of this exhibit and will be accompanied by some new items, such as valveholders, etc. The new speakers incorporate many novel improvements, such as a new method of centring, which enables this important operation to be done with an accuracy and certainty never before achieved. This point is vital, of course, and affects the sensitivity and power-handling capacities of the speaker. A new type of "baked" speech coil former is also included, and the magnets are still larger and stronger than in previous models. The Microlode unit has been improved and the range of reproduction is increased together with a slight increase in volume owing to the reduction of losses. These speakers are, of course, obtainable as a chassis or in a cabinet. A new departure in design is shown in the Duplex Stentorian. This is a P.M. speaker having an ordinary cone reproducer and a high-frequency speaker (Tweeter), the horn of which protrudes through the hollow centre of the main magnet pole piece. There are claimed to be definite advantages from this method of mounting the two speakers in one. It costs £4 4s. The Tweeter may be obtained separately at £2 2s.

**WINGROVE AND ROGERS, LTD., 188-9, Strand, London, W.C.2. Stand No. 49.**

**T**HIS exhibit will include many items already popular to the home constructor and the range will be augmented this year by a four-gang Midget costing 22s. A new short-wave condenser will also be seen for the first time, and this has zinc alloy vanes and in the two-gang model is provided with insulated spindle. Tuning scales, of the full-vision pattern, with straight or arcuate scales, vertical drives, horizontal drives, drum drives, single and ganged condensers, reaction condensers, and pre-set condensers.

**WIRELESS FOR HOSPITALS FUND, Shell Mex House, Strand, W.C.2. Stand No. 81.**

**WIRELESS AND GRAMOPHONE TRADER, Dorset House, Stamford Street, S.E. Stand No. T27.**

**T**HIS exhibit will consist of Trade publications and various items of printed matter suitable for the trader and service man.

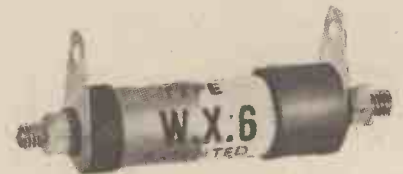
**WIRELESS RETAILERS' ASSOCN., 316, First Avenue House, High Holborn, W.C. Stand No. T4.**

**WRIGHT AND WEAIRE, LTD., 740, High Road, Tottenham, N.17. Stand No. 217.**

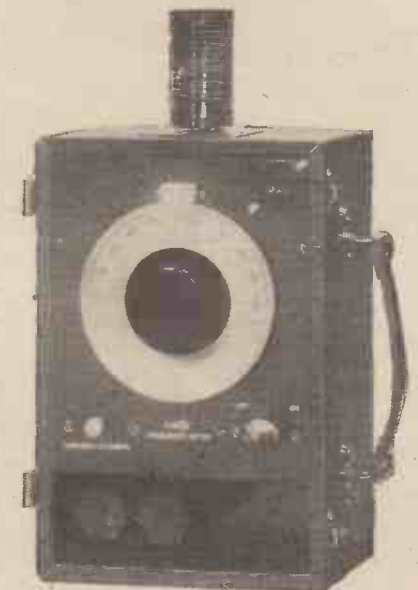
**I**N addition to many items already popular with amateur constructors, Messrs. Wright and Weaire will be showing some new apparatus designed for testing purposes by the radio trade. One of these is an oscillator unit, a portable shielded calibrated R.F. and A.F. signal generator, which is calibrated in microvolts at a frequency of 1,000 k/cs. There is also a meter unit, which is a portable precision multi-range meter directly calibrated to read in A.C. or D.C. and gives voltage, current, resistance, inductance and capacity ranges direct. There will be a complete testing unit for valves, a frequency meter and a small multimeter, whilst the many popular components, such as H.F. chokes, mains transformers, smoothing chokes, valveholders, L.F. couplers, etc., will find a place in the exhibit.



The R. and A. Alpha speaker. This is provided with a novel centring device and the three arms shown play an important part in the cone suspension.



A. H. F. metal-oxide rectifier—the Westector, or Cold Valve. This is a Westinghouse product and may be seen on Stand No. 101.



Another Weaire tester. This is a Frequency Meter and is useful for station location, gangings, etc.





**BROADCASTING IN SWEDEN**

WIRELESS in Sweden is divided into two sections, the technical side administered by the State through the mediation of the telegraph service, and the programme side looked after by a limited company (Radiotjänst) allowed by the State.

Organised wireless began in Sweden in January, 1925, and is financed by the licence fees paid by owners of sets. A licence costs 10 crowns a year. There is no other form of revenue, therefore there is no spare money for advertisement, and wireless materials are not subject to any tax. The number of licences, which is constantly growing, now stands at 720,000.

The licence revenue is divided thus: the programme side receives about 2.82 crowns per licence. Part of the remainder is used first on the technical side, which includes the construction of wireless stations, and a surplus of about 2,000,000 crowns is given back to the State. The most characteristic feature of Swedish programmes is that the same programme is given out all over the country as one national programme.

There are thirty-one wireless stations in Sweden, and of these twelve belong to the State and nineteen are privately owned. The State stations are from 10 to 75 kilowatt power, whereas the private stations, who only serve relay stations, have a power of 0.5 kW.

The private stations have no programme of their own, although sometimes they give a special programme of local interest. The private company which arranges the programmes is under State control. Thus the State has the right to nominate the vice-president of the company, also one of the announcers. Besides this, the State nominates a special council to examine the programmes. This consists of nine members who meet once a month to select matter to be broadcast.

**B.B.C. STAFF CHANGES**

THE B.B.C. announces that the following staff adjustments will take effect from October 1st, when Captain C. G. Graves takes up the appointment of Controller (Programmes).

The responsibility to the Director-General for Public Relations, together with the editorial control of the Corporation's publications, will be transferred from the Programme Division to a separate Controller (Public Relations). Sir Stephen Tallents, at present Public Relations officer to the Post Office, has been appointed to this post.

To enable the Controller (Programmes) to deal direct with the heads of programme departments on matters of policy, he will have a staff of two Assistant Controllers (Mr. R. H. Eckersley and Mr. Gladstone Murray) and a Director of Programme Planning (Mr. R. E. L. Wellington). Further, to promote and co-ordinate the development of the Corporation's Regional policy, a new post, that of Director of Regional Relations, will be created. Mr. C. A. Siepmann will take up this appointment.

As regards television, in view of the special functions of the Television Advisory Committee during the experimental years, this will be dealt with as a separate service within the present organisation.

**PETO-SCOTT EVERYTHING RADIO - CASH C.O.D. or EASY TERMS**

PILOT AUTHOR KITS for sets featured in "Practical Wireless" and all other Technical Journals are only obtainable direct from Peto-Scott. SEND FOR DETAILED PRICED LISTS OF PARTS.

PETO-SCOTT are again FIRST with EVERYTHING NEW, in Radio and Television, at OLYMPIA for Cash, C.O.D. or H.P. IMMEDIATE DELIVERY.

**EVERYTHING AT OLYMPIA on EASY TERMS!**

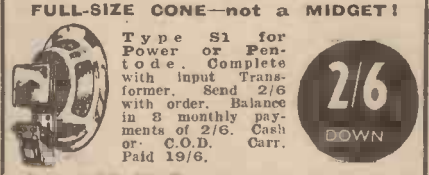
**1936 SPEAKERS 1936**

**CELESTION STANDARD 8 P.M. SPEAKER.** Suitable for all outputs and fitted with the new universal switch control. Cash or C.O.D. Carriage Paid, £2/5/0. Balance in 9 monthly payments of 5/- only

**BLUE SPOT SENIOR P.M. SPEAKER.** With matching transformer suitable for any output. Cash or C.O.D. Carriage Paid, £1/12/6. Balance in 11 monthly payments of 3/- only

**ROLA MODEL F514 PMT P.M. SPEAKER.** Complete with universal transformer suitable for all outputs. Cash or C.O.D. Carriage Paid, £1/3/6. Balance in 10 monthly payments of 2/6 only

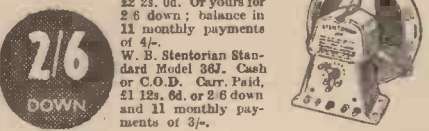
**Peto-Scott 1936 PERMANENT MAGNET MOVING COIL SPEAKER**  
FULL-SIZE CONE—not a MIDGET!



Type S1 for Power or Pentode. Complete with input Transformer. Send 2/6 with order. Balance in 3 monthly payments of 2/6. Cash or C.O.D. Carr. Paid 19/6.

**WESTENTORIAN SENIOR**

Model 36S P.M. Speaker. Suitable for any output and incorporating improved Micro-lode device. Cash or C.O.D. Carriage Paid, £2 2s. 0d. Or yours for 2/6 down; balance in 11 monthly payments of 4/-.  
W. B. Stentorian Standard Model 36L. Cash or C.O.D. Carr. Paid, £1 12s. 6d. or 2/6 down and 11 monthly payments of 3/-.



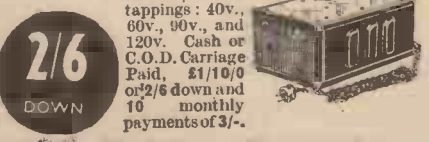
**1936 MANUFACTURERS' KIT SETS 1936**

**LISSEN SHORT-WAVER.** Complete Kit of components including valves. Cash or C.O.D. Carriage Paid, £3/9/6. Balance in 11 monthly payments of 6/6 only

**GRAHAM FARISH SENSITY SUPER.** Complete Kit of components, less valves. £2/10/0. Balance in 10 monthly payments of 5/- only

**1936 Peto-Scott ELIMINATORS 1936**

**MODEL A.C.12.** For A.C. mains, 200/250 volts, output 120 volts at 12 m/a. Four tappings: 40v., 60v., 90v., and 120v. Cash or C.O.D. Carriage Paid, £1/10/0 or 2/6 down and 10 monthly payments of 3/-.



**PILOT AUTHOR KITS**

Any item supplied separately. Orders over 10/- sent C.O.D.—carriage and post free.

**BATTERY 3/4 KIT "A" Cash or C.O.D. £4:13:6**

Author's Kit of first specified parts, less valves, cabinet and speaker. and 11 monthly payments of 8/6

**KIT "B."** As for Kit "A," but including set of 3 specified valves, less cabinet and speaker. Cash or C.O.D. Carriage Paid, £6/14/0, or 12 monthly payments of 12/3.

**KIT "C."** As for Kit "A," but including valves and Peto-Scott Console Cabinet. Cash or C.O.D. Carriage Paid, £7/13/6, or 12 monthly payments of 14/-.

**KIT-BITS** You pay the Postman. We pay post charges on orders value over 10/- GREAT BRITAIN ONLY.

1 Peto-Scott Ready-drilled Metaplex Chassis	..	20	3	0
1 Varley 3-gang Coil Unit	..	1	13	0
1 J.B. 3-gang Baby Condenser	..	0	15	0
1 Peto-Scott Battery 3-4 Console Cabinet	..	0	19	6

**ALL-WAVE MAINS 3**

**KIT "A" Cash or C.O.D. £9:13:6**

Author's Kit of first specified components, less valves, cabinet and speaker. and 11 monthly payments of 17/9

**KIT-BITS** You pay the Postman. We pay post charges on orders value over 10/- GREAT BRITAIN ONLY.

1 Peto-Scott Metaplex Chassis	..	0	4	6
1 Eddystone Multi Wave Coil Unit	..	21	15	0
1 B.T.S. .0002 mfd. reaction condenser	..	0	5	6
1 J.B. 00025 mfd. aerial condenser	..	0	5	6
1 Heayberd Mains Transformer	..	1	9	0
1 Westinghouse Rectifier	..	0	18	6

**1936 ELIMINATORS 1936**

**ATLAS MODEL A2 ELIMINATOR.** A.C. Send Mains, 200-250v., 40-120 cycles. 3 tappings. Output 12 m/a at 120 volts. Cash or C.O.D. Carriage Paid, £1/19/6. Balance in 10 monthly payments of 4/3 only

**EKOO MODEL AC10/20 Eliminator.** A.C. Send mains, 200-250 volts, 40-80 cycles. Adjustable output and variable screen grid tappings. Cash or C.O.D. Carriage Paid, £2/2/6. Balance in 11 monthly payments of 4/- only

**PETO-SCOTT CO., LTD.,** 77 Pr. W.S., City Road, London, E.C.1. Tel.: Clerkenwell 9406-7. West End Showrooms: 62 Pr. W.S., High Holborn, London, W.C.1. Tel.: Holborn 3248. Please send me your New Season's Catalogues. (Strike out those not required.)

Peto-Scott 1936 Radio.  
Peto-Scott Speaker and Accessories.  
Peto-Scott Short Wave.  
Peto-Scott "Easiway" General Radio.

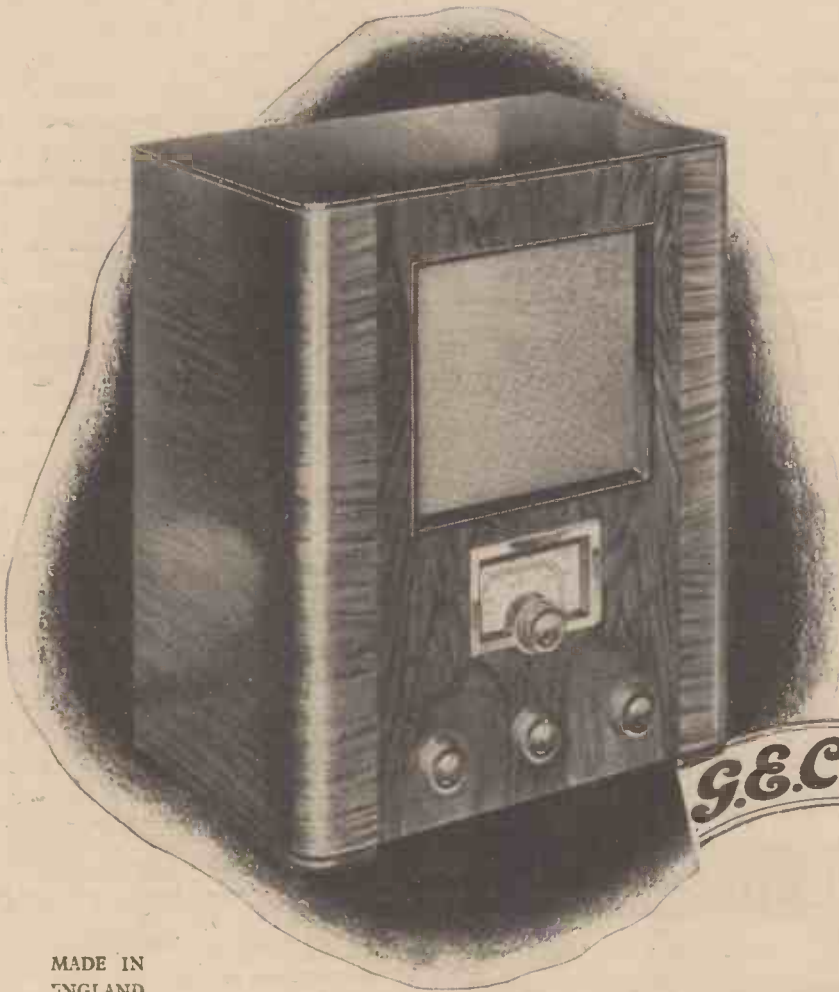
NAME .....

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Pr. W.S.

# G.E.C. Radio

Advanced designs and a complete range from a compact ultra-efficient battery set to the last word in automatic record-changing radiograms



MADE IN  
ENGLAND

## G.E.C. BATTERY S.G.3

A luxury class three-valve battery receiver employing super-selective low-loss tuning coils, with variable-mu screen-grid H.F. stage, H.F. pentode detector and economy pentode output. Powerful 8-in. moving coil speaker. Single knob full vision tuning. Automatic grid bias circuit. Sockets for external loudspeaker and gramophone pick-up. Accommodates all batteries. Walnut cabinet, with chromium-framed escutcheon.

Cat. No. 3636.

CASH PRICE complete with OSRAM Valves and G.E.C. Batteries.

**£7.19.6**

### HIRE PURCHASE TERMS:

Deposit 13/6  
and twelve monthly payments of 13/6

**G.E.C. BATTERY S.G.3**

IF YOU CANNOT VISIT THE EXHIBITION—YOUR RADIO DEALER WILL WILLINGLY DEMONSTRATE ANY G.E.C. RECEIVER TO YOU IN HIS SHOWROOM—OR IN YOUR HOME.

STANDS  
35 · 44 · 63

# *at Olympia*

*Come and see the  
new G.E.C. Radio  
Sensations!*

ILLUSTRATED ARE TWO TYPICAL  
EXAMPLES FROM THE NEW G.E.C.  
RADIO RANGE

Write for folder No. BC. 7332, which  
describes the complete range of G.E.C.  
Radio receivers and loudspeakers.  
Sent POST FREE on request.

**G.E.C. A.C. MAINS 4**

A four-valve (including rectifier) receiver of striking modern appearance. Highly efficient stranded wire tuning coils, coupled with a tetrode detector, provide unusually high selectivity, and the concert type energised moving-coil speaker gives amazingly good reproduction. Single knob tuning with wavelength-calibrated full vision dial. Provision for external speaker and pick-up. Bakelite cabinet, relieved with chromium fittings.

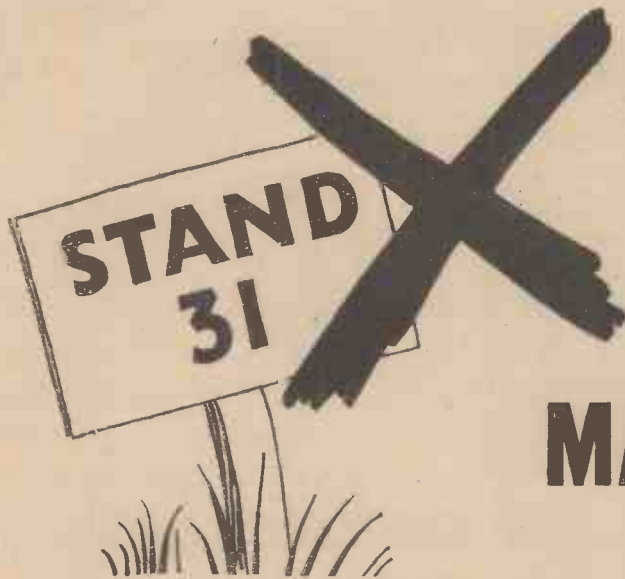
Cat. No. BC. 3630 for A.C. Mains.  
190/250 volts. 40/100 cycles.

CASH PRICE complete **9 gns.**  
with OSRAM valves.

HIRE PURCHASE TERMS :

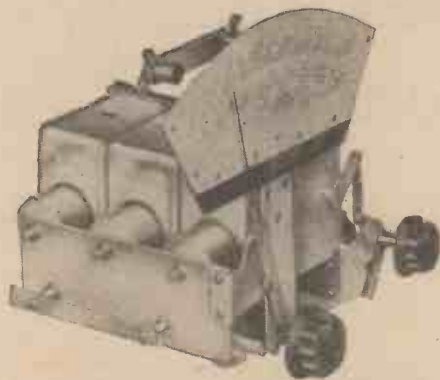
Deposit 16/-  
and twelve monthly payments of 16/-





## MARKS THE SPOT

to which you must go if you want "quality" radio components at a reasonable price. There you will find a courteous, efficient staff who will be pleased to answer any queries and settle your radio problems by the simple method of handing you the New Varley Catalogue.



### SUPERHET PERMEABILITY TUNERS.

Superhet tuning units with two pre-selector sections and one oscillator section, covering medium and long wave bands, all necessary padding coils are enclosed in the oscillator section. List No. BP105 .. .. 71/6

Another Model with an additional pre-selector circuit enabling a preliminary H.F. stage to be used. List No. BP106 .. .. 89/-



### VARIBAND I.F. UNIT.

Two I.F. Transformers with coupling controlled from the panel, thus enabling a wide frequency to be used for "high fidelity" reception, or a narrow frequency band for selectivity and reduction of interference. List No. BP89 .. .. 17/6



### MULTI-VOLT MAINS TRANSFORMER.

The feature of this transformer is the provision of two heavy duty L.T. Windings, sufficient to supply both the sound and vision channels of a Television receiver. Electrostatic screen between primary and secondary. Input 200/350 volts, 40/100 cycles. Output 300-0-300 volts, 100 m.s., 2-0-2 volts 2.5 amps; 2-0-2 volts, 6 amps; 2-0-2 volts, 3 amps. List No. BP39 .. .. 37/6



### AIR-TUNE I.F. TRANSFORMER.

An I.F. Transformer for 485 K.C. having Litz wound iron-cored coils tuned by air dielectric condensers with steatite insulation. Frequency drift is eliminated and high amplification, low adjacent channel interference and freedom from second channel whistles obtained. Particularly suitable for all-wave superhets. List No. BP05 .. .. 15/-

# Varley

(Proprietors: Oliver Pell Control, Ltd)

Oliver Pell Control Ltd., Bloomfield Rd., Woolwich, S.E.18, Telephone: Woolwich 2345

# Designing Your Own Wireless Set

This Week the Important Matter of Component Layout is Explained in Connection with the H.F. and Detector Stages. By FRANK PRESTON

UP to the present in this series we have discussed the general design of a single-valve high-frequency amplifier, and sufficient data has been given to enable the constructor to decide on the particular circuit arrangement which will best suit his own requirements. In the last article we concluded by giving very general rules concerning the best component layout, and we can now go more fully into this question and consider the alternative systems of placing the parts when using baseboard and chassis-form construction. It should be made clear at

therefore decide which are the most important parts, arrange these, and then do the best we can with the others.

### Take Care with the Tuning Circuits

The tuning circuits should receive attention first, for it is imperative that the leads from the coils to the corresponding condensers should be direct; if they are not, accurate trimming (when a gang condenser is used) may be impossible. It would be found that, although the condenser sections could be matched properly at one part of the tuning scale, they would be "out" at

another. Besides this, instability would probably be in evidence, due to the fact that interaction would occur between two or more wires. The significance of this may be realised by considering the leads as small inductances (coils), such as the tuning and reaction windings of the detector tuner; electro-magnetic fields are created round the coils and energy thus fed back from one into another. This effect is greatest when the leads are at widely different potentials—for example, when one is in the anode circuit and the other in the grid circuit of the valve. And it will be appreciated that the tuned-grid coil of the detector is actually a portion of the anode circuit of the first valve, whilst the aerial coil is in the grid circuit of that valve.

The relative positions of the two-gang tuning condenser and the two coils (probably ganged and provided with their own wave-change switches) depends to a certain extent upon the positions of the coil terminals. For example, if the terminals which are intended for connection to the fixed vanes of the tuning condenser are on the right of the coils, the condenser should be placed on that side, and vice versa. This rule is not invariable, however, because the leads from the other terminals have also to be taken into account, but a layout similar to that shown in Fig. 2 would be suitable in the majority of instances. Perhaps it should be explained that all the components shown here are of hypothetical make, and that the terminal positions do not necessarily agree exactly with any particular coils on the market.

### Symmetrical Frontal Appearance

It will be seen in Fig. 2 that the tuning condenser is placed centrally in front of the (Continued overleaf)

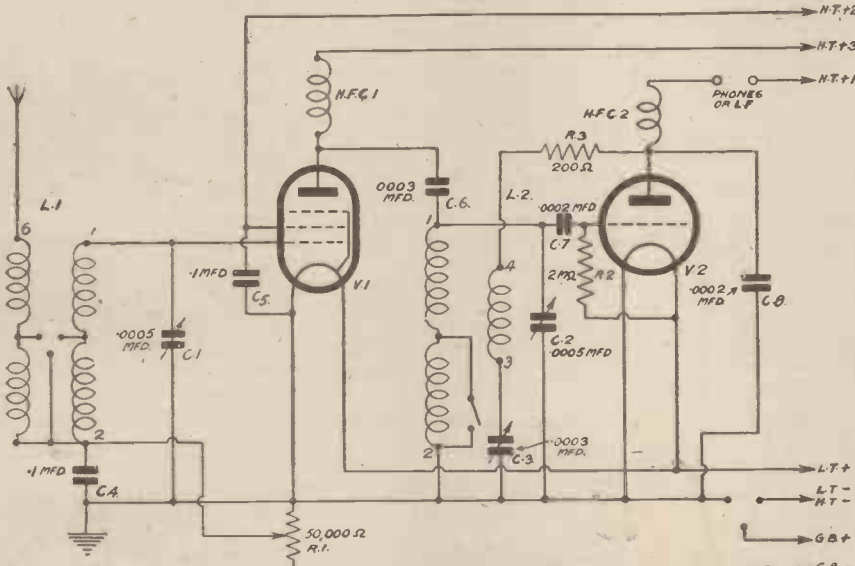


Fig. 1.—The circuit of a typical H.F. and detector circuit. The references given are the same as those in Fig. 2.

the outset, however, that a chassis is to be preferred in almost every case, if only because it permits of the closer spacing of components, thus reducing the lengths of the connecting leads. In addition to this, a chassis-built set has a far more business-like appearance, it is more compact and is easier to handle.

### Preliminary Trials

For our present purposes we need not consider the low-frequency portion of the set, since this is comparatively unimportant provided that the associated components are kept reasonably well away from those in the H.F. circuits, and that the L.F. connections are so short and direct that they do not cross over, or run parallel to, leads in the high-frequency circuits. For purposes of explanation we will first consider a simple H.F. valve and detector having a circuit such as that shown in Fig. 1, and which is to be made up on a baseboard. The correct procedure is to take a large sheet of card and, after collecting the necessary parts, to move these about on the card until they are eventually in those positions which ensure short connections, afterwards transferring the position to the chassis by pricking through the card. This sounds very easy, but in practice it will often be found that by placing two particular parts very close, one of them is brought a fairly considerable distance away from another one. We must

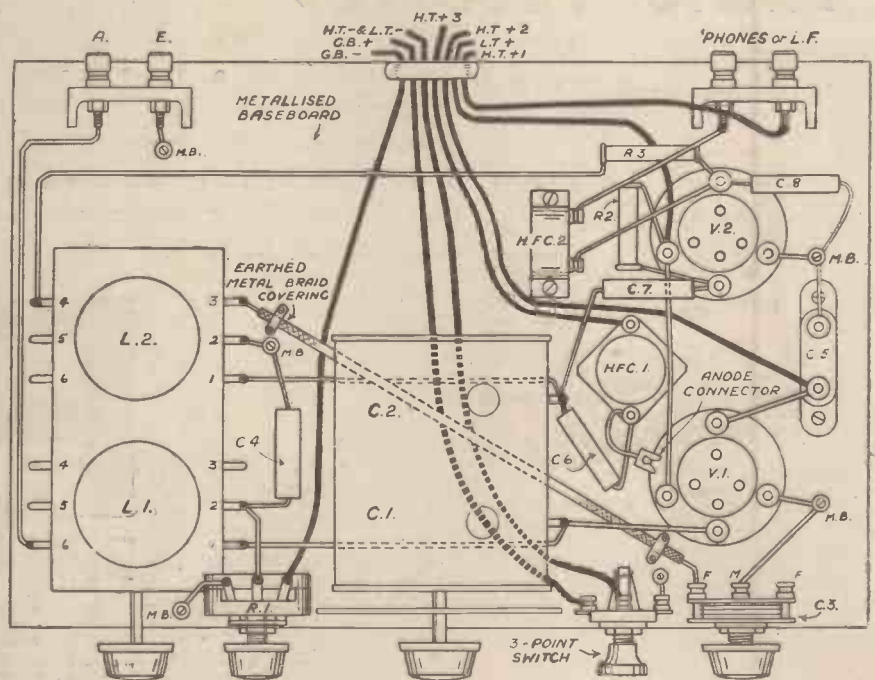


Fig. 2.—Showing the component layout for the circuit given in Fig. 1.

## DESIGNING YOUR OWN WIRELESS SET.

(Continued from previous page)

baseboard—purely with the object of making the layout symmetrical—and that the two valve-holders are placed to the right of this. By placing the valve-holders in this manner the leads from the grid ends of the coils, which is the same as saying the leads from the fixed vanes of the tuning condenser, are extremely short. In the case of the detector valve it is seen that the grid "lead" actually consists of the grid condenser itself, which is an excellent arrangement. It will also be noticed that the flexible lead from the anode terminal of the H.F. pentode goes straight to the S.G. high-frequency choke, which is situated between the two valve holders.

### A Reaction-condenser Point

The reaction condenser is so placed that its knob balances with that of the wave-change switch, and this necessitates the use of two fairly long leads. Any objection to this is removed, however, by including a 200-ohm non-inductive fixed resistance between the detector anode and the reaction winding, and by covering the lead from the reaction condenser to the second coil with screening braid. In this connection, it is important to observe that the resistance is placed as close as possible to the detector valve-holder and that the braid is earth-connected at two points—one near the condenser and the other near the coil.

When using a resistance in this position it is particularly desirable that an anode by-pass condenser of about .0002-mfd. should be used, and this is also placed close to the valve-holder and, being of the tubular type, it is connected entirely

by its own leads. If the condenser had been of any other type (and this applies also to the other two condensers previously mentioned) it could have been connected by means of very short lengths of connecting wire. The reason for using the condenser is that the so-called "reaction" choke used in conjunction with the detector prevents the passage of H.F. currents into the 'phones or L.F. circuit, so that they must have a "leakage path" to earth if stability is to be maintained. Normally, they pass through the reaction winding and coil, but the resistance restricts this passage, allowing only just enough current to pass to provide reaction.

The S.G. choke and the coils are screened, and it is thus possible to save a little expense by using an unscreened choke in the detector anode circuit, but this is placed well away from the leads in the anode circuit of the first valve, and also close to the detector valve-holder.

### The Variable-mu Control

We have now dealt with the most important components in the circuit, but there are still two more to be considered, the screening-grid by-pass condenser and the variable-mu potentiometer. It is important that the first of these should be placed as near as possible to the valve-holder terminal to which it is connected, and it is therefore shown alongside the S.G. H.F. choke. There is little difficulty in positioning the potentiometer when using a baseboard, although if a chassis were employed it could conveniently be mounted just beneath the coil assembly. In Fig. 2 it is shown between the condenser and wave-change-switch knobs, where it is close to the corresponding coil terminal,

and where it matches up with the on-off switch. If, for any reason, it could not conveniently be placed so near to the coil, with the result that a long lead was required between the centre terminal and the coil, it would be desirable to include a decoupling resistance between the coil terminal and the lead to the control, the resistance acting in a similar manner to that used in the reaction circuit, but having a value of 1,000 ohms upwards.

The filament wiring is made very simple by placing the valve-holders in line, and also by using a metallised baseboard, which serves to take the negative connections. Flexible battery leads are indicated because these are generally most convenient, but those who would prefer to fit terminal mounts to the rear of the baseboard could do so without affecting the lay-out in any particular.

### Using a Chassis

In the particular circuit we are considering the component disposition would not be greatly changed when using a chassis, but this could be slightly shorter than the baseboard, whilst the screening-grid by-pass condenser, detector H.F. choke, grid condenser and leak, and the detector anode-by-pass condenser could be placed on the under side, the leads from them passing through  $\frac{1}{16}$  in. holes. In the same way, the on-off switch and volume-control potentiometer could be attached to component brackets fixed to the under-side of the chassis. The various earth-return connections could then be made either by taking leads from the various components through the chassis to wood screws, with washers, and the upper surface, or by passing bolts through the chassis.

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**NOTES AND NEWS**

**New Marconiphone Public Address Installations**

WORK is proceeding 'immediately on three very important Marconiphone Public Address equipments. A huge installation, which is the biggest that has ever been put into a single hall in the North of England, is booked for Bridlington. This will serve the Royal Spa Hall, which is the largest municipal building in Bridlington. This hall is well known to radio listeners, as Herman Darewski's band is very often relayed from there by the British Broadcasting Corporation.

The Marconiphone DA.100 amplifier, which has an output of 80 watts, will form the basis of the equipment and will feed four short horn speakers which are mounted over the proscenium arch. Two special baffles are mounted on the stage itself, and on each baffle are mounted several independent loud-speaker units. Each of these baffles will handle 20 watts of output. Two Reisz microphones and one Transflux microphone are included in the equipment, and will be used for the broadcasting of speeches, etc.

**An Epic Story of Self-sacrifice**

ON September 27th, 1918, H.M.S. *Otranto*, an armed merchant cruiser, set out from New York to lead a convoy of American troopships across the Atlantic. The voyage was unlucky from the start, as the weather was appalling, and the ship badly overloaded; many of the troops and crew soon died of that dread disease, Spanish influenza, which broke out immediately on sailing. When the arduous voyage had been nearly completed, and the convoy and leader were in sight of the Hebrides, a collision occurred in tumultuous seas between the *Otranto* and one of the troopships. The crippled merchant cruiser, in accordance with Admiralty orders of that time, was left to her fate; and a grim battle for the lives of the survivors of the collision ensued. Some of them were eventually rescued by a destroyer, the circumstances of the rescue constituting an epic story of heroism and self-sacrifice. Those who were unable to leave the doomed ship were helpless to prevent her from being dashed to pieces on the rocky coast, and of the five hundred souls still on board only sixteen reached the shore alive. In the National programme on August 25th Commander A. B. Campbell, one of the fortunate few who were rescued from the *Otranto*, will tell listeners of the thrilling and terrible experiences he and his shipmates underwent in their fight against the forces of hurricane winds and the implacable sea.

**"In the Shadow of the Taj"**

ONE of the most charming and pathetic love stories of all time is that of Shah Jehan, who, when his wife, Mumtaz Mahal—"Glory of the Palace"—died, built for her that exquisite and world famous mausoleum, the Taj Mahal. A short radio travelogue entitled "In the Shadow of the Taj," by the Indian author, Dewan Sharar, dealing with the circumstances attendant on the building of the mausoleum, will be heard in the National programme on August 20th. Listeners will be able to join in fancy a party of tourists who are shown over the Taj by an Indian guide, who will describe its architectural and decorative glories, and a Khadim, or Guardian of the Sanctuary, who will relate the story of Shah Jehan and his tragic bride.

**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.*

**H. B. (Brighton).**—As the connection is made inside the valve by the makers you cannot modify the circuit arrangement. Various valves are wired in different ways. We note your remarks regarding transmission.

**G. A. H. (Grimston).** Bad tracking could cause the trouble and you should try the effect of a .001 or .002 mfd. fixed condenser joined across the pre-set padding condenser. This may enable you to line up the circuits more accurately.

**G. P. (Clapham).** We presume you kept a copy of the connections which you sent to us. You did not enclose a stamped-addressed envelope so that we cannot return your sketch. However, I is joined to G, and to this point also is joined terminal E on the volume control. H is then joined to C, whilst A is joined to D. Thus you will see that the volume control is joined across the pickup, and the grid of the valve is joined to the arm of the control.

**E. C. (Feltham).** We regret that we have no blue print of a modernised version of the receiver in question. The coils are, of course, rather out of date now and we would suggest that you dispose of the complete receiver and build one to a modern design from modern components.

**A. E. M. (Hartlebury).** The present lead joined from the first L.F. transformer (or the anode component of the detector circuit) should be removed and a separate flexible lead connected to that point. This will enable you to vary the H.T. to obtain smooth reaction control.

**A. H. (Chesham).** As the trouble occurs on all your receivers it would seem that the aerial is arranged in such a position that it offers a very bad pick-up to signals from that direction. Try and vary the position and you will perhaps find an arrangement which will enable you to receive the station clearly. We presume that the circuit is selective enough to hear the station which, of course, now tunes in about half-way between London Regional and National.

**B. D. (Leeds 12).** You do not state which model of the Fury Four you have. A modified version was published last year under the title of the Fury Super, and this will probably interest you. It incorporated iron core coils and is the subject of Blueprint No. PW34D.

**G. S. (Birmingham)** Your sketch of the charging board is quite in order. Arrangements should be made to vary the lamp resistances so as to accommodate different accumulators.

**L. M. (London, S.W.8).** Your connections are wrong so far as we can gather. Where did you obtain the numbers which you show on the coil? We do not think these are correct for the Lissen coil.

**R. C. O. S. (Northolt Park).** We cannot recommend a particular model, but would advise you to visit the Radio Exhibition and examine the various types so that you can judge for yourself.

**J. W. S. (Bury St. Edmunds).** Any modern dual-wave coil will do. An iron-core coil will give greater selectivity, but we do not think this point will concern you as you will require sensitivity, and therefore a good air-core coil designed on really low-loss lines should prove admirable.

**J. W. (Sydenham).** We have several circuits but require more details before we can make a recommendation. The Hall-Mark 4 is the most recent which will give the general results you mention, but if this is not suitable let us have more precise information and we will endeavour to help you.

**J. N. (Gorton).** We are sorry that we cannot help you. We do not think it is a Cossor receiver, but probably Messrs. Cossor could be of more assistance to you as they would have full details of the circuit if it is a receiver of their design and manufacture.

**F. W. P. (Dalston).** No, the blueprint would be of no use to you. What type of circuit do you require? We have no D.C. receiver with 3 S.G. H.F. stages.

**T. B. (Liverpool).** Which particular circuit of Mr. Camm's have you in mind? Please give date of issue and blueprint number, when we shall be glad to assist you further.

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By JACE

### New Electronic Organ at Radiolympia

AN interesting item in John Sharman's Variety Programmes at Radiolympia will be Harold Ramsay's performance on the new electronic organ invented and built by the John Compton Organ Com-



This illustration, and the one given below, show a Marconiphone Model 257 battery superhet in use somewhere in Sussex. With a 12 ft. aerial, consisting of flex, and no earth, reception was excellent, several foreigners, in addition to the London programmes, being received at good entertainment strength.

pany. It is stated that the new organ device is the most astonishing development in the field of sound production since the invention of the photo-electric cell. In effect, listeners will hear a carillon without bells and an organ without pipes. The whole apparatus, moreover, is contained in a metal box approximately 4ft. square.

The production of the new device has cost John Compton and his research workers eight years of intense experimental work and the sum of £10,000. Briefly, the research job was undertaken because certain musical tones eluded even the most ingenious arrangement of pipes or reeds.

Original sound waves were engraved on metal discs and it was found possible to produce (not reproduce, as in the case of gramophone records) the authentic sounds when a given

electrical impulse was passed through the appropriate wave. They found, in short, that they could make not only an imitation of the real sound, but the actual sound itself.

Experiments were then made in the production of sounds which had hitherto escaped the human ear entirely. Some of the results were particularly interesting, and they will be heard at Olympia. As the organist presses a key or operates a stop, so the necessary impulse will pass through the disc and the sound will be made.

It is pointed out that this new invention is not a substitute for but an adjunct to the existing organ.

### Illuminating Wireless Towers

ACCORDING to new international agreements, all wireless towers must carry a red light on the top, if they have no other signals, in order to warn aircraft.

At Hurlingham, near Buenos Aires, an original method of illuminating wireless towers has been found. A lamp is fixed in the ground and from this a perpendicular ray is thrown up to the sky. This, in turn, is reflected by a mirror at the top of the tower. The white rays given by this perpendicular system of illumination are very clearly seen at night, and are excellent for warning aviators.

### The Microphone Kiss

THE wireless kiss is usually created behind the scenes by somebody kissing his own hand. In America they have now hit on a more ingenious and natural-sounding method. This consists of rubbing a cork against a glass on which there is resin.

Order Next Week's Big Show Report Issue Now!



## NEW PETO - SCOTT RECEIVERS

SOME interesting new receivers are announced by Messrs. Peto-Scott, and in addition to modern circuit designs there are other novel features incorporated. Some new components are also announced, together with some kit sets and battery eliminators. The receiver illustrated below is a five-valve A.C. all-wave superhet, and it will be seen that a novel type of tuning dial has been fitted.



The new Peto-Scott receiver. Note the neat tuning dial.

This model costs £12 12s. and is available for D.C./A.C. working at the same price. There is also announced a battery straight three, an S.G. battery three, and some A.C. receivers and radiograms. An interesting two-colour catalogue of all these models, in which no less than twenty pages are devoted to a complete description of the various types, will shortly be available.

### An Extension Speaker

To cover the difficulties of radio in all parts of the house, Messrs. Peto-Scott have this season produced a special extension speaker which is adapted especially for their receivers. In addition, they are offering moving-coil loud-speakers from 19s. 6d.

### Interference Suppressors

With the introduction of these new units, Peto-Scott solve what heretofore has been a sore problem with many listeners—namely, the cutting out of interference from Droitwich and medium waveband transmissions. Model "A," designed expressly to present a high impedance to the Droitwich signals, is a highly efficient unit merely requiring connection in series with the aerial lead, plugs and sockets being provided for this purpose. Efficiently screened, mounted on ebonite base, and measuring only 3½ in. high, 3 in. deep, 3 in. wide, this component costs 6s. 6d. Model "B," incorporating a device making possible the tuning of different frequencies, and effective on any portion of the waveband between 200-550 metres, costs 7s. Dimensions: 3½ in. high, 3 in. wide, 3 in. deep.

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# THE CONSTRUCTOR IN 1934-35

ON the eve of yet another great wireless exhibition it is interesting to survey the past radio year, noting the changes which have taken place and the advantages which have accrued to the constructor.

Probably the first impression which strikes the constructor and experimenter is that very few entirely new components have been designed. But this does not mean that wireless construction has reached that "saturation point" to which the sceptics have so long been making reference; it simply indicates that the science has reached such a high degree of efficiency that it has become extremely difficult to improve upon existing apparatus. Despite this, however, improvements of a valuable kind, although not perhaps of a startling nature, have been effected and, to mention just one example, the amplification afforded by various types of valve has been increased to a worth-while extent. It is largely due to the improvement in this respect that there are now available to the constructor such highly-efficient receivers as the "£5 Superhet," which, although using only three valves, are far more satisfactory in every respect than their multi-valve counterparts.

## Fewer Valves

A few years ago, when the superheterodyne arrangements returned to popularity in this country, there seemed to be some probability that events would follow a similar course to those in America where receivers having up to twelve valves are quite common, and where even sixteen-valve superhets are not considered very unusual. Instead of merely adding to the number of valves we, in this country, have concentrated our attention upon obtaining the greatest possible output, and the highest degree of efficiency from the minimum number of stages. Valve manufacturers have certainly done their share, but it cannot be denied that the Technical Staff of PRACTICAL WIRELESS, and, later, PRACTICAL AND AMATEUR WIRELESS, have played at least an equally-important part in designing circuits which could do justice to the best components available.

## Midget Components

Another direction in which very important changes have taken place is in connection with midget components of extreme efficiency. Here again, it is only fair to give considerable credit to the Technical Staff of this paper, for it has been very largely due to their untiring efforts that many of the midget components have come into being. They have given prominence to all new midget apparatus which, on test, has proved to be outstandingly good, and have made numerous suggestions (about many of which the general public will probably never know) to several manufacturers. This is not all, however, for they have also designed in the efficient PRACTICAL AND AMATEUR WIRELESS laboratories many midget components, which manufacturers have been pleased to provide at most reasonable prices for readers.

While I am speaking of midget components I must make reference to the midget valves which have become available during recent months. These were not designed by PRACTICAL AND AMATEUR WIRELESS, but I do believe that this journal

A Non-technical Survey of a Few of the Important Events Since Olympia 1934.  
By THERMION.

was the first to design an efficient midget receiver in which they were incorporated, and the "Cameo" series of sets has proved immensely popular with all readers. Before making comparative tests it is very hard to believe that these tiny valves can possibly be half as efficient as they are, and after using them one feels that tribute is due to their sponsors.

## An Important Event

Leaving the question of components and receivers for a moment, it is interesting to recall the amalgamation of *Amateur Wireless* with PRACTICAL WIRELESS, for this step was probably one of the most important in the history of the year, at least so far as the experimenter and constructor is concerned. The amalgamation brought together what must surely be the widest band of enthusiastic amateurs in any part of the world. By "pooling" all of the popular features of the two journals and by acting



The new combined Marconi triode hexode valve, type X31.

upon the suggestions and opinions of the many thousands of readers, PRACTICAL AND AMATEUR WIRELESS can lay claim to be the most powerful representative of constructors' opinion in the British Empire. The enlarged short-wave section, quite apart from all the other regular features, has kept readers in close touch with all of the developments in this growing field of activity, and will continue to do so when ultra-short waves and television

reach the high degree of importance which they must do during the coming year.

The sister monthly magazine, *Practical Television and Short-wave Review*, the first number of which was on sale at Radiolympia 1934, has also met with a remarkable measure of success. This now-important magazine had its beginnings as a supplement to PRACTICAL WIRELESS, but it became of such importance that it very soon claimed individual distinction. The first issue was "sold out" two days after the 1934 exhibition opened, which was sufficient proof that later issues would have to be printed in larger numbers; consequently new readers have not been in the position of being unable to obtain a copy of Numbers 2 to 12.

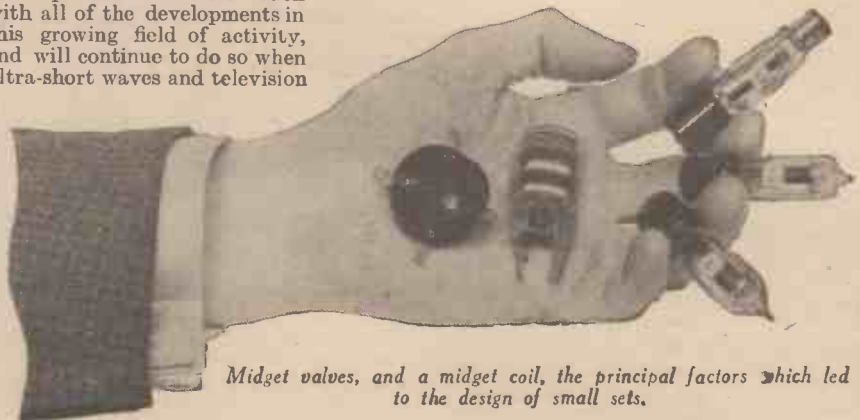
## All-wave Reception

I am not attempting to refer to the past year's events in anything like chronological order, but merely in the order in which they strike me in taking what I feel is an unbiased view of the situation. You will therefore excuse me if I now return to an important event which took place in the earlier part of this Jubilee year; I refer to the publication of the design in this journal of full constructional details of a remarkable all-wave receiver, the "Silver Souvenir." This was, I believe, the first all-wave receiver which could be made inexpensively from standard components by any constructor, regardless of his experience of receiver construction. I learn that this advanced design is still being made up in large numbers, and that a few readers have found that it can be used satisfactorily even on the ultra-short wavelengths, although it was originally intended to tune down to only 13 metres. I am speaking from experience when I say that the "Silver Souvenir" is the best all-wave set of simple design which I have ever had the pleasure of using; it is ideal not only for the short-wave "fan," but for the constructor who has not previously turned his attention to short-wave work, and who is desirous of gaining valuable experience which will serve him in good stead when the high-definition television transmissions definitely take their place in the ether.

## Television Progress

In these random notes on the year's progress we must not overlook the television developments which have, to a certain extent, rather overshadowed the other aspects of radio. A year ago we were anxiously awaiting the decision of the Television Committee regarding the future

(Continued on next page)



Midget valves, and a midget coil, the principal factors which led to the design of small sets.

THE CONSTRUCTOR IN 1934-35

(Continued from opposite page)

of vision transmissions; we had to wait until February 1st, when the agreement to adopt high-definition systems was definitely announced. The fact that these transmissions would take place on wavelengths below 10 metres led many scaremongers to suggest that all existing receiving equipment would soon become obsolete, that the whole science of broadcasting would be altered, and so on. Unfortunately, such views were freely expressed in certain sections of the lay Press, with a result that many would-be constructors of new receivers postponed their plans, even though it was made perfectly clear in this journal that the effects would be nothing like those which ill-informed sceptics would have us believe.

It is a fact that the constructor is only now recovering from the shock of the ill-founded reports referred to, realising that normal sound broadcasting will continue as before, although listeners will find their entertainment valuably augmented by the vision transmissions, so that he can see as well as hear his favourite broadcasters, and be enabled to watch sporting and other events in addition to having a commentary and verbal description of them.

Future Outlook—Bright!

If I am privileged a year hence to give my views on "The Constructor in 1935-36" I am confident that I shall be able to report on an even more successful year for the home constructor than I have done for the past year. Television and ultra-short-wave reception will give the constructor a new and even keener interest than he has had for ten years past, for I can foresee a wonderful future for the practical man who delights in making his own apparatus, and who can always derive considerably more pleasure from his hobby than the listener who buys "ready-made." I said "listener," but next year it will probably be necessary to change this name to "listener-looker," or something similar. Meanwhile, I am full of hope and enthusiasm.

HIGH POWER FOR RUSSIA

WORK has already been commenced on the organisation in Leningrad of a factory-laboratory for powerful radio stations. The new combine will be known as the Comintern, and is being erected on the base of the existing Comintern radio-factory.

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## Pick-up Peculiarities

THE methods of connecting a pick-up to various types of receiver have frequently been described in these pages and are by now well known to almost every constructor. But despite the simplicity of the connections entailed difficulties sometimes occur, whilst it is often found that reproduction of gramophone records leaves much to be desired, although the "quality" on radio is excellent. One of the most usual troubles is a certain form of instability which results in a high-pitched whistle that accompanies all record reproduction, and which is entirely absent when the pick-up is not in use. This can generally be traced to the reduced "load" on the grid of the valve when a change-over from radio to gramophone is made. The point is that the impedance of the pick-up is much greater than that of the coil or transformer secondary which it replaces.

This trouble can generally be overcome by the very simple addition to the grid circuit of a potentiometer volume control between the pick-up and the valve, but the potentiometer should have a value not in excess of about 25,000 ohms; in many cases it is necessary to use a value as low as 10,000 ohms if the background whistle is to be eliminated entirely. When the use of a volume control of this kind does not cure the trouble it will generally be found that either the leads from the pick-up to the grid of the valve are too long, or that they require to be screened. In this respect, it must be remembered that not only the flexible leads attached to the pick-up itself, but also the leads from the valve to the radiogram switch, are concerned. The leads can easily be screened by using the braided tubing which is available for the purpose, but it must be made certain that the braid is properly earthed.

Even when screening is correctly used it is desirable that the lead from the grid of the valve to the radiogram switch or pick-up terminals (when a switch is not used) is reasonably short, and that it does not run close to components such as a mains transformer or L.F. transformer, or to loud-speaker or low-frequency wires. In the case of a mains-operated receiver care should also be taken to ensure that the pick-up leads do not run close or parallel to the supply wires—including those which carry the L.T. current to the valve heaters.

Another point to be noticed is that the gramophone motor should be earthed, especially if it is built into the same cabinet as the receiver. Also, if the motor is of the synchronous type it should be switched off when not in use; if this is not done a very pronounced mains hum will probably be heard on radio, and the source of this might be difficult to locate.—F. P.

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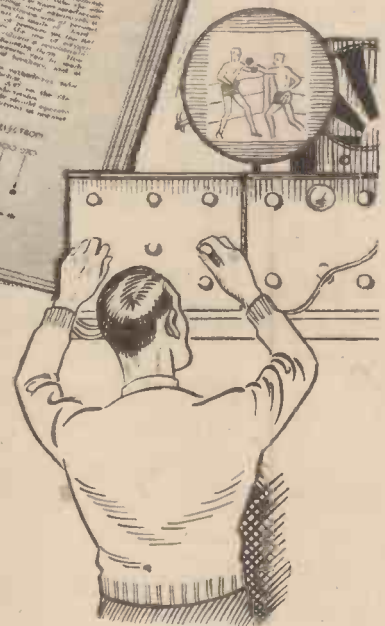
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ONCE again extracts from the Alder-shot Tattoo have been recorded by "His Master's Voice," but never before have the Massed Bands provided such vivid "pictures in sound" of all the pageantry and beauty of the Jubilee year performances.

The two records, *H.M.V. C2768 and C2769*, contain such fine marches as "The British Grenadiers," "The Boys of the Old Brigade," "Here's a Health unto His Majesty," and many others.

**Lily Pons Sings Mozart**

LILY PONS, who has figured so much lately in Opera in this country, has now made a beautiful recording of "Ah! Je le sais" from Act II of "La Flute Enchantée," by Mozart, on *H.M.V. DB2502*. Since her overwhelming success at Covent Garden she has attained immense popularity. Deservedly so, for her fine technique and amazing personality, the perfect clarity with which she sings her top notes make her one of the greatest sopranos in the world.

No one who has heard her sing "Una Voce Poco Fa" can easily forget her lovely rich voice.

The other side of her new record for "His Master's Voice," is "Lo! here the gentle Lark"; charming as it is, her recording enhances it still more.

**A Fantasia in Memory of Schubert**

MEMBERS of the La Scala Orchestra of Milan have again excelled themselves with their latest recording for "His Master's Voice"—A Fantasia in Memory of Franz Schubert—on *H.M.V. B8340*. Admirably played by a world-famous orchestra, and a fine tribute to

**IMPRESSIONS ON THE WAX**

By T. ONEARM

Schubert's genius, this fine record embraces many of his compositions of which everyone knows the tunes, but rarely realize that they are by Schubert.

"My Lovely Celia" and "Pastorale" are the titles of two beautifully sung recordings for "His Master's Voice," by Elisabeth Schumann on *H.M.V. DA1416*. The easy grace and expression which have long been characteristics of her singing are in evidence more than ever in this record. The cadences in "Pastorale" add enormously to its charm and the general effect is excellent.

**Mark Hambourg Recordings**

TWO records not to be missed this month are Mark Hambourg's recording of Liszt's Hungarian Rhapsodies Nos. 5 and 7 on *H.M.V. C2758*, and Peter Dawson's "Old Man Noah" and "Here's to the Good Old Days" on *H.M.V. B8334*.

Mark Hambourg, of course, needs no introduction—his brilliant playing has given him world fame. His latest record is played with that "easily-flowing" style and vivacity that is beyond criticism. Peter Dawson's new "His Master's Voice" record reveals him in one of his best moods; his deep baritone voice leaving nothing to be desired.

**Descriptive Music on a Banjo**

FOR light and original entertainment, Ken Harvey's descriptive recording for "His Master's Voice" of "A Musical Journey from New York to California" is of particular interest (*H.M.V. B8351*). As Ken Harvey's "train" passes from one State to another he plays a well-known tune associated with it. On this record also is "The World is Waiting for the Sunrise." This tune also he plays with rhythm and alacrity that is almost breath-taking.

The well-known London Palladium Orchestra provides some excellent entertainment with their new record for "His Master's Voice"—"Charm of the Valse" on *H.M.V. C2760*. It contains a selection of popular waltzes—"Blue Danube," "Amoretteentanze," and a number of others all played with that delightful lilt with which this orchestra has built up its reputation as one of the leading theatre orchestras in the country.

**Dance Tunes**

THE dance records this month are better than ever. Ray Noble has recorded two more hits for "His Master's Voice"—"Paris in the Spring" and "Bon Jour Mam'selle"—on *H.M.V. BD192*, both from the film, "Paris Love Song."

Jack Jackson's records are "The Oregon Trail" and "Louisiana Fairy Tale," on *H.M.V. BD195*, and two hits from shows—"If your Father only knew" from the film "Heat Wave," and "Here's to you and Love," from Renée Houston's success at the London Hippodrome, on *H.M.V. BD196*.

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# RADIO CLUBS AND SOCIETIES

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

## ANGLO-AMERICAN RADIO AND TELEVISION SOCIETY

ON July 27th, members of the above society heard for the first time the Al Williams' Anglo-American Radio and Television Society Dance Orchestra at a private dance held in Uxbridge. Many officials of the society were present, including Mr. Leslie W. Orton, honorary president, and Mr. Malcolm Barr, an executive secretary of the society.

A very enjoyable time was spent by all present. Members will be interested to know that arrangements are being completed for monthly socials and dances to be held in Buckinghamshire and Middlesex, during which the above-mentioned dance orchestra will be heard.—Leslie W. Orton, "Kingsthorpe," Willowbank, Uxbridge.

## THE RADIO, PHYSICAL AND TELEVISION SOCIETY

THIS society has recently been experimenting with 5- and 10-metre apparatus, and an interesting and enlightening 10-m. field day was held on Sunday, July 28th, at Wimbledon Common, which is particularly useful for high-frequency experiment owing to its very variable contours, portions of which are thickly wooded. The operator of the transmitting station (G5NR), was Mr. E. G. Nurse, who had obtained the P.M.G.'s sanction to operate on a portable licence. A self-excited oscillator was used, and this was modulated alternately with speech and buzzer, the power input being only 1/2 watt.

Four receiving groups, comprising six receivers in all, were despatched to the four cardinal points, and each group had the same type of receiver, viz., a one-valve self-quenching super-regenerative set which used a quarter wave aerial. The first antenna used by the transmitter was a di-pole pointing due north and south, and some very interesting results were obtained.

It was noted that trees, hills, and valleys had practically no effect on reception, and also that the position of the receiving aerial, whether trailing on the ground or otherwise, did not cause the signals to vary. The experiment proved that reliable 10-metre "pocket" telephony can be maintained in all types of country over several miles with extremely low-powered and simple apparatus.—M. E. Arnold, 12, Nassau Road, Barnes, S.W.13.

## INTERNATIONAL SHORT-WAVE CLUB, D.X. CONTEST (1935)

THE D.X. contest which has been arranged by this organisation is open to all short-wave listeners, irrespective of whether they are members of the I.S.W.C., or not. Many valuable prizes will be awarded to the contestants presenting the greatest number of verifications received during the period of the contest. Contestants have to receive as many short-wave broadcasting stations as possible, report their reception to the station, and ask for a verification of their reception, not forgetting to enclose an International Reply Coupon.

The contest opens on September 1st and closes November 30th, 1935. Only verifications from short-wave broadcasting stations can be considered. No amateur or commercial station will be eligible unless the verification states that the transmission was of a broadcast nature. Where a station uses one or more call-signs, or wavelengths, each will count as a separate station.

The first prize will be a Midwest 7-valve All-wave Receiver with five wavebands, A.C., D.C., or battery-operated, given by Midwest Radio.

The second prize will be a 12in. World Globe mounted on a walnut floor stand.

The third prize will be a 12in. World Globe mounted on a walnut table stand.

Fifty certificates of merit suitably inscribed will be presented to the runners-up.

The Judges will be the Officers of the London Chapter, I.S.W.C., no officers being allowed to compete. Two months will be allowed after the close of the contest for contestants to receive verifications from the more distant stations. Further details, together with entrance form, can be obtained by sending 1d. stamp to I.S.W.C., D.X. Contest, 82, High Street, Clapham, London, S.W.4.

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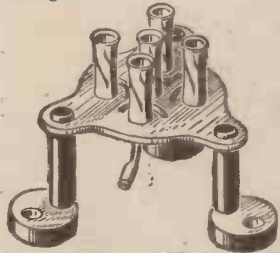
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## LETTERS FROM OUR READERS

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

### An All-wave Set for Overseas!

SIR,—I am a reader of your most instructive and interesting paper, and have noticed that readers, like myself, living in the colonies, have often written asking for an all-wave set to suit their conditions. I would like to suggest the kind of set that I would like to build if I had the circuit for it, and I think many others would welcome a set on the same lines. The set I have in mind is similar to your A.C. Hall-Mark Four battery receiver, but covering approximately 12 metres to 600 or 2,000 metres.

Your Silver Souvenir appears to be excellent, but I think the set I have suggested would be received with greater favour.

I have a 3-valve set, S.G. Det. and pentode, which brings in the South African stations quite strongly, and I also have a straight three short-wave set which I built to get the overseas stations, and although this works very well, it hasn't sufficient power. It has, however, proved to me that what we require in this part of the world is a set with Q.P.P. output, and provided with an S.G. H.F. valve, ordinary detector, and two power valves in Q.P.P.

I think, for a battery set, this one should bring in the overseas stations, worth listening to, with quite good strength, and at the same time be fairly economical on batteries, which are rather expensive here.—R. G. LUSH (Bloemfontein, S. Africa).

### Transmitting Data

SIR,—In answer to your requests re transmitting apparatus, I have experimented with low-power valves (150 volts) without aerial, and have found the constant current choke modulation system the only one to give good quality and stability. I would appreciate a few articles about crystal frequency control, and how to measure the depth of modulation.—H. WALLERS (St. Helens, Lancs).

### S.W. Correspondent Wanted

SIR,—I should be greatly obliged if you would put me in touch with a reader, aged about eighteen, who is interested in the short-waves.

I have been a regular reader for the last year, and the only improvement I can suggest is an increase in the number of articles on short waves.—R. B. MURCH (Bootle).

[Any reader desirous of getting in touch with Mr. Murch can address a letter to him, care of the Editor.—Ed.]

### Valve Development

SIR,—Having read in your journal a letter from T. A. J. Jaques (Lewisham), in regards to the superiority of the American valves, perhaps he does not know that, with modification in construction, the principles embodied in American valves are also obtainable in the essentially European valves.

In fact, the pentode power valve was developed in Europe, and extensively used, before it was developed in America.

(Continued on page 641)

## ELECTRADIX BARGAINS

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DOUBLE CURRENT GENERATORS, D.C. 600 volts, 100 m.a., and 6 volts 3 amps, 40/.

CIRCUIT BREAKERS replace fuses now. Magnetic Trip Overload Switches, A.C. or D.C. mains, 2 to 4 Amps., 7/6; 6 amps., 10/-; 10 amps., 12/-; 15 amps., 14/-; 20 amps., 18/-. Trips may be remote controlled.

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WAVEMETERS. C. Lyons 4 1/2 to 85 metres, 35/-. McLachlan, S.G. Valve, 20 to 5,000 metres and charts, Gambrell, type D, 220 to 500 metres. Long Range Gambrell, 75 to 12,000 metres. Sullivan Het. in metal case, 300 to 16,000.

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(Continued from page 640)

In regard to the 6AF, is this not a mistake and meant to be 6A7, which is a Pentagrid?

The first numeral specifies the heater voltage and the last numeral is one less than the total number of socket and grid pins.—CHAS. E. HARDING

[We assume that Mr. Jacques referred to the 6A7, as pointed out by Mr. Harding.—Ed.]

**A Good Log of Amateurs**

SIR,—I have noticed in your journal the interest taken in amateur stations by readers, and I have spent most of my time listening on the short waves, especially on the 40-metre band. I have logged the following stations during the past few weeks, most of them heard on Sunday mornings and they are all British amateurs on 40 metres: G6PP, G5LC, G5GC, G6PK, G5PT, G2LV, G2LU, G2LZ, G2SC, G6SR, G6SW, G6YU, G5LC, G2ZT, G5YY, G5DL, G5CY, G6WS, G6TV, G6NC, G2NN, G5OV, G2IL, G6RZ, G5CG, G5KJ, G6LH, G5PP, G6UL, G2IK, G5ZJ, G2AZC, G5VM, G6UD, G2DL, G5GR, G5XG, G5SC, G6QZ, G2DL, G2TM, G5ZJ, G2QY, G2IP, G5GC, G6WS, G5VD. Most are heard on loud-speaker. As regards commercials, W2XAF on 31.48 m. is as strong at its peak strength (R 8-9) as any other station on 31 metres, and on Wednesday, 24th July, I listened to a programme from this station featuring a radio competition relayed from Wyoming. This was at 10.20 p.m., and received from R7-R8 on the loud-speaker. My set is a 3-valver, det., L.F., and pentode.—R. HARVEY (Holyhead).

**An Amateur Log on 40 Metres**

SIR,—I have been a reader of your publication, PRACTICAL WIRELESS, since the fourth issue, and have taken advantage of all your book offers. Please accept my best thanks for them. I have seen in recent issues lists of amateur stations logged in different parts of the British Isles, and append my log of amateur stations received on the 40-metre band. G5QZ, G2DF, G6ZJ, G6WU, G6AU, G3PB, G5MR, G5GS, G2RF, G5VD, G5PW, G5OV, G5KG, G2AV, G6GO, G5RF, G5GL, G5RX, G5GF, G6SR, G5ML, G6VD, G5XV, G5ZJ, G5LC, G6QZ, G5MU, G5VD, G5BF, G2NN, G2FX, G6GO, G5BS, G2DL, G6ML, G2OO, G2AV, G2AX, G2PX, G5BK, G6MF, G6GF, G5NV, G6XX, G6IL, G5HB, G2IP, G5CU, FATIG, ON4WSS, F8QX, ON4NC, ORK3, PAEOE, PAOWJ.

In the above log no stations have been included which have been below R6 or QSA4. My set is the short-wave converter described in PRACTICAL WIRELESS for December 24th, 1932, with hand spread added. It is used before a S.G., Det., L.F. and power output. I agree with all that J. C. Johnson (Rubery) says in your issue of July 20th, 1935.—R. S. HOUGHTON (Wigan).

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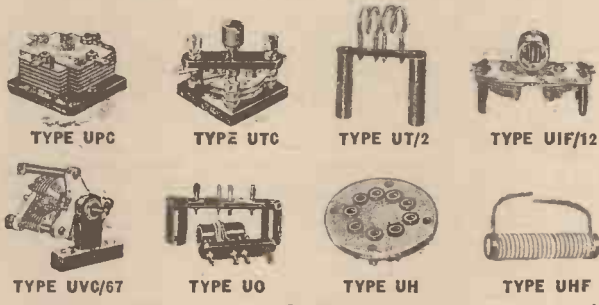
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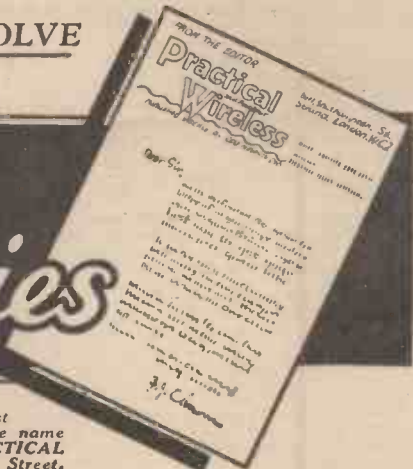
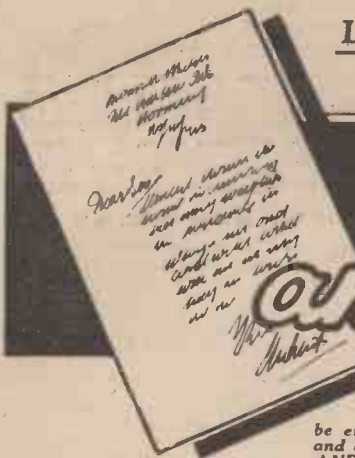
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"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	Aug. '34	WM368
"W.M." Long-wave Converter	Jan. '35	WM380
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SPECIAL NOTE

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. Please note also, that queries must be limited to two per reader, and all sketches and drawings which are sent to us should bear the name and address of the sender.

H.F. Choke Windings

"Can you explain whether there is any advantage to be gained by making the H.F. choke in several parts? I notice that the commercial article has a sort of slotted former and yet it is not tapped at the various sections. What is the point of this?"—G. L. (Ashted).

THE object of an H.F. choke is, as its name implies, to choke back the high frequencies, and for this purpose inductance only is required. The smallest capacity will by-pass the high frequencies, and, therefore, an efficient choke would consist of an inductance only. Commercially, it is not practicable to wind a choke of this nature, but the distributed capacity can be kept at a very low value by adopting the sectional winding.

Dry Battery for Filament Supply

"I am going to build a one-valver for local station listening, and I do not wish to use an accumulator. With a 3-volt dry battery for lighting the filament what value resistance should I use and how should this be wired up?"—S. W. C. (Carlow, I.F.S.).

IT is assumed that the valve will be of the 2-volt general-purpose type, having a .1 filament. The voltage to be dropped is therefore 3-2, which equals 1 volt. The current is limited by the filament to .1 amp, and therefore, the series resistance required to deliver 2 volts will be 1 volt divided by .1 amp, or 10 ohms. If you

intend to use a variable rheostat to control the filament brilliancy, you could use a 15-ohm component and this would enable you to reduce the initial voltage when the battery is first installed.

Radiogram Switching

"When using a single-pole double-throw switch in the grid circuit of my first L.F. valve, I find that serious break-through of the radio is experienced when using the gramophone. I am using I.H. A.C. valves. Is the best remedy to use a double-pole double-throw switch and when using the gramophone to interrupt the heater circuit of the detector valve? I find this has the desired effect, but am not sure whether the valve will be damaged in this way."—L. A. G. (New Malden).

THERE should be no break-through with a single-pole switch if the grid is isolated from the radio section. A high capacity across the switch or switch wiring could cause the trouble, but with a good switch there should be no difficulty. We do not favour the breaking of the detector heater circuit in view of the possibility of an undue rise on the remaining heaters—but this will, of course, depend upon the regulation of the transformer. You would probably find it more reliable from that point of view to interrupt the H.T. circuit to the screening grid of the H.F. stages, as the extra current is so small and therefore would not cause any noticeable increase in the H.T. on the remaining valves. You do not give the complete circuit, and we cannot therefore suggest any better arrangement, but would prefer to switch the H.F. circuits in some way rather than break a heater circuit.

Loudspeaker Movement

"How much is a diaphragm pulled out of alignment when a signal is received? Also, where can I obtain a carbondum-steel crystal?"—A. S. (Salisbury).

THE movement of a diaphragm depends upon the type of speaker and the volume of the received signal, as well as upon the frequency of the note being reproduced. In a flat diaphragm type of speaker of the old pattern the maximum movement is extremely small, and that

accounts for the weak low-note response. In a modern, well-designed moving-coil speaker, however, the maximum movement may be as much as a quarter of an inch. This, of course, will only be on the low notes, such as the pedal notes of the organ or bass drum beats. The detector may be obtained from Electradix Radios, Upper Thames Street, London, E.C.

Output Pentode

"I am looking for a suitable output valve. The ideal would be a pentode between 20-40 watts with up to 500 volts H.T. Could you please give me any help?"—R. K. (Castleford).

WE presume you refer to anode dissipation and not undistorted output, as there is no pentode at present available with an output of 20 watts undistorted. Other pentodes suitable for your purpose would be the Cossor PT.41.B (400 volt, 12 watts), giving an undistorted output of 3.6 watts; the Marconi or Osram PT.25 (400 volts, 24 watts), giving an undistorted output of 10 watts; or the Mullard PM.24.D (500 volts, 25 watts), giving an undistorted output of 10 watts. The first-mentioned valve costs 22s. 6d. and the others 45s. each.

Adding a Pentode to the Leader Three

"A few weeks ago I wrote you about fitting a pentode to the Hall-Mark Three. I have now decided to build the Leader Three, as the circuit should be more powerful. Are the connections for a pentode the same as for the Hall-Mark Three?"—H. S. W. (Thornton Heath).

YES, the same connections must be adopted. That is, fit a five-pin valveholder and connect the four pins which are arranged in the stand manner as shown on the wiring diagram, and connect the extra terminal to H.T. positive maximum. You may find it desirable to connect a 10,000-ohm resistance in series with a .01 mfd. condenser across the loudspeaker terminals to reduce the high-note reproduction.

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

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PREMIER SUPPLY STORES

ANNOUNCE a City Branch at 165 and 165a. Fleet Street, E.C.4 (next door to Anderton's Hotel), for the convenience of callers; post orders and callers to High Street, Clapham.

OFFER the following Manufacturers' Unused Surplus goods at a Fraction of the Original Cost; all goods guaranteed perfect; carriage paid over 5/-, under 5/- postage 6d. extra; I.F.S. and abroad, carriage extra; orders under 5/- cannot be sent C.O.D.; please send 1d. stamp for large new illustrated catalogue, also August bargain supplement.

SPECIAL Bargains for callers at our Clapham Branch where Summer Sale is now taking place. WORLD Famous Continental Valve Manufacturer; mains types, 4/6 each, H.L., L., power; high and low magnification, screen grid; variable Mu screen grid; 1, 3, and 4 watt A.C. output, directly heated pentodes; V.H.P., D.D.T. Diode Tetrodes, 250 volt 60 m.a. full wave rectifiers; A.C. D.C. types, 20 volts, 0.18 amp. filaments; screen grid; variable Mu screen grid; H., H.L., power and pentodes.

THE following Types, 5/6 each; 350 v. 120 m.a. full wave rectifiers, 500v. 120 m.a. full wave rectifiers, 2 1/2 watt indirectly heated pentodes. 2-VOLT H.F., L.F., 2/3; power, low consumption power, super power, 2/9; screened grid, variable mu screened grid, 5- or 4-pin pentodes. Variable-mu H.F. Pentodes, 5/-.

THE following American Types, 4/6: 250, 210, 245, 47, 40, 24, 35, 51, 57, 58, 55, 37, 80, 0A7, 2A7, 27, 77, 78, 2A5, 281. All other types, 6/6.

AMERICAN types 260 Valves 4.5 watts undistorted, 450 volts plate 4/6. Matched pairs 9/-.

B.T.H. Moving Coil Speakers, matched pairs, 8in. 1,500 ohms. 7,500 ohms. (1,500 speaker as choke 7,500 speaker in parallel with H.T. supply), with output transformer for pentode, 15/6 per pair; A.C. kit for pair, 12/6.

M.C. Multi-ratio output transformers, 2/6; 2-1 or 1-1 output transformers, 2/6; microphone transformers, 50 and 100-1, 2/6; 3 henry chokes, 2/6; 100 henry chokes, 2/6.

LARGE Selection of Pedestal, table and radio-gram cabinets at a fraction of original cost.

BLUE-SPOT 29P.M. P.M. Moving Coil multi-ratio transformers, 15/-; handles 4 watts. Sono-chorde ditto. Ideal for Battery Sets.

ELIMINATOR kits, condensers, resistances and diagrams, 120v. 20 m.a., 20/-; Trickle charger, 8/- extra, 150v. 30 m.a. with 4v. 2-4 amp. C.T., L.T., 25/-; trickle charger, 6/6 extra; 250v. 60 milliamps, with 4v. 3-5 amps., C.T., L.T., 30/-; 300 v. 60 m.a. with 4 volts 3-5 amps., 37/6; 200v. 50 m.a., with 4v. 3-5 amps. L.T., 27/6.

PREMIER L.T. Charger kits. Westinghouse rectifier, input 200-250v. A.C., output 8v. 1/2 amp., 14/6; 8v. 1 amp., 17/6; 6v. 2 amp., 27/6; 30 v. 1 amp., 37/6; 2v. 1/2 amp., 11/-.

B.T.H. Truamped Induction Type A.C. only, Gramophone Motors, 100-250v. 30/- complete; ditto, D.C., 42/6.

COLLARO Gramophone Unit, consisting of A.C. motor 200-250v. high quality pick-up and volume control, 45/-; Motor only, 35/-.

EDISON BELL Double Spring Gramophone Motors, complete with turntable and all fittings, 15/-.

WIRE Wound Resistances, 4 watts, any value up to 50,000 ohms, 1/-; 8 watts, any value up to 100,000 ohms, 1/6; 15 watts, any value up to 50,000 ohms, 2/-; 25 watts, any value up to 50,000 ohms, 2/6.

MAGNAVOX 144, 15/-, 144 Magna, 25/-, 152, 17/6, 152 Magna, 37/6, 154, 12/6, Dual-Matched Pairs D.C. 144/152, 32/6. Ditto Magna 02/6. A.C. Energising Kit to suit any above 10/-, all 2,500 ohms. P.M. 7 inch, 16/8, P.M. 9 inch, 22/8. State transformer required.

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1,000 OHM 150 milliamp, Semi-variable resistance, 2/-; 1,000 ohm 250 milliamper, tapped, for any number .18 valves, 3/6; 800 ohms, 350 m.a., tapped, 2/-.

COSMOCORD pick-ups with Arm and Volume Control, wonderful value, 10/6.

(Continued at top of column three)

Easy Terms

N.T.S. offers you, on the EASIEST EASY TERMS in the Country, IMMEDIATE DELIVERY of all the

1936 MODELS as shown at

OLYMPIA

STENTORIAN BABY

Model 36B. Incorporating improved Mansfield Magnet, which gives previously unobtainable flux density. Can be matched to any output. Cash or C.O.D. Carriage Paid £1 3s. 6d. or 2/6 down and balance in 10 monthly payments of 2/6.



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BLUE SPOT POPULAR P.M. speaker. Improved design and fitted with universal transformer suitable for any output. Cash or C.O.D. Carriage Paid 19/6, or 2/6 deposit and 8 monthly payments of 2/6.



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THE PERFECT GRAMOPHONE MOTOR AT LAST! Low consumption, CONSTANT SPEED, 1-HOLE FIXING. Darwin's Magnets. A.C. Mains only. 100/150 or 200/250 volts, 50 cycles, 12-in. turntable. Send only 2/6, balance in 11 monthly payments of 4/-. Cash or C.O.D. Carriage Paid, £2/2/0.



CELESTION MODEL P.2. PICK-UP

MODEL P.2. Pick-up complete with volume control. Cash or C.O.D. Carriage Paid, £1 9s. 6d. or 2/6 deposit, and 10 monthly payments of 3/-.



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Simplifies testing valves in chassis built receivers. Complete with 7-pin Avo Coupler. Suitable for testing 4, 5, and 7-pin valves. Cash or C.O.D. Carriage Paid, £1 5s. 0d. or 2/6 down and 10 monthly payments of 2/6.



New Times Sales Co

56, (Pr. W. 9), LUDGATE HILL, LONDON, E.C.4.

Please send me (a) Free Art Catalogue of N.T.S. 1936 Radio. (b).....for which I enclose first payment of £.....s.....d..... Name..... Address..... Pr. W.9

(Continued from foot of column one)

THE following Lines 6d. Each or 5/- per dozen: 4- or 5-pin baseboard or 4-, 5-, 6-, or 7-pin chassis mounting valve holders, American valve holders, 1 watt resistances, wire end, every value; tubular wire end condensers, 1,500 volt, every value up to 0.5, 0.3 amp., 2- or 3-point switches, Cydon double trimmers, 6yds. Systoflex, 1, 1.5, 2 or 2.5 mm., 1 yd. 7-way cable, 9ft. rescored solder, 6yds. push-back connecting wire.

L.P. transformers, AFS, 6/6; R.I.DUX, 4/-; Benjamin Transfeeda, 4/6; Telsen Radiogram, 2/9; Voltra, 2/-.

RELIABLE Soldering Irons 200, 250 volts, 2 amps., 2/6 each.

ELECTROLYTIC Condensers T.C.C. Smf. 440v., 3/-; 550v., 4/-; 15 mf. 50v., 1/-; 15 mf. 100v., 1/-; 15 mf. 12v., 1/-; Dubilier 4, or 8mf. 500v., 3/-; 8 plus 4 500v., 4/-; 50v. 50mf., 1/9; 12mf., 20v., 6d. U.S.A. 4, 8 or 12mf. 550v., 1/9; 100 mf. 12v., 1/3; 2,000mf. 12v., 6/-.

PAPER Condensers. Dubilier 4mf. 500v. working 4/-; ditto 700v., 5/-; ditto 800v., 6/-; Western Electric, 250v. working 1mf., 6d.; 2mf. 1/-; 4 mf., 2/-; 1mf. 2000v. working, 3/-.

CONDENSER Blocks 250v. working, various taps 6mf., 2/-; 10mf., 3/-; 8.5 mf., 2/6.

MAINS Transformers. Premier all have tapped primaries, C.T., L.T.'s and Engraved terminal Board. H.T.8 plus H.T.9, 2 L.T.'s, 10/-; Rectifier, 8/6 extra; H.T.10 2 L.T.'s, 10/-; Rectifier, 9/6 extra; 250 plus 250 60 m.a. 3 L.T.'s, 10/-; 350 plus 350 150 m.a. 3 L.T.'s, 12/6.

WESTERN ELECTRIC Manufacturers type 300 plus 300, 60 m.a. 2 L.T.'s, 6/6; 350 plus 350 120 m.a. 3 L.T.'s, 9/6; 500 plus 500 150 m.a. 5 L.T.'s, 19/6.

VARIABLE condensers. Premier, all brass, short wave, .00015 slow motion, 3/9; British Radiophone, all brass, 2-gang, .00015 each section, 5/6; Ormond, .00025, 1/6; Polar, all brass, .0005 slow motion 3/11; Lissen 2-gang, .0005, front trimmer, disc drive, 5/11; Utility 3-gang fully screened trimmers and disc drive, 7/6.

BAKELITE reaction condensers, .00015, .00035, .0005, .00075, 9d.

LISSEN 3-gang, superhet coils, 6/-; Lotus 3-gang band-pass coils, 12/6; Iron core coils with circuit, 2/11 each; Varley band-pass aerial coils, B.P.5 type, 2/9; ditto band-pass transformer, B.P.8, 2/6.

H.F. Chokes Premier screened, 1/6; Premier short-wave, 9d.; pre-sets, any value, 6d.

PREMIER smoothing chokes, 25ma., 20 henries, 4/9; 40 ma. 30 henries, 4/-; 60 ma. 40 henries, 5/6; 150 ma. 40 henries, 10/6; 60 ma. 80 henries, 2,500 speaker replacement, 5/6.

PREMIER auto transformer 100/200-250 and vice versa, 100 watt, 10/-.

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20-22, High Street, Clapham, S.W.4. 'Phone: Macaulay 2188. Nearest Station Clapham North (Underground).

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"THE OUTLINE OF WIRELESS," by Ralph Stranger. Fifth edition, 8s. 6d. net.—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.—George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

A DICTIONARY OF WIRELESS TERMS, by Ralph Stranger. A Wireless Work of Reference that should be on the bookshelf of every keen amateur. Compiled by a master of lucidity, it gives the meanings of all Technical terms in general use. Price 2s. 6d. from all Booksellers and Newsagents.—George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

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MOVIES AT HOME. How to make your own Cinema Projector. Particulars free.—Movie-scope (Z), Pear Tree Green, Dodinghurst, Essex.

BURGOYNE Class B-3. Limited stocks of this very fine Class B 3-valve receiver. All guaranteed new complete with Mullard Valves, Exide Accumulators and Batteries, Moving-coil Speaker, Cabinet, Black and Chromium. In sealed cartons, unopened, listed £6/18, our price £3 carriage paid. Cash refunded if not satisfied within seven days.—G. W. Radio, 7, Chapel Street, Lamb's Conduit Street, London, W.C.1. 'Phone Holborn 4434.

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**HULBERT.**  
**HULBERT** for Quality Surplus Speakers at Amazing Prices.  
**HULBERT**, 6, Conduit St., W.1. Read below.

If You Are Requiring Realistic Reproduction at Remarkably Low Cost, send for one of the following high grade speakers. Repeat orders are coming in daily.

**10/6** Only.—Are you on D.C. mains? If so, read below.  
**10/6** Only.—Brand new manufacturers' surplus moving coil speakers made by one of the best known British makers; energised 6,500 ohms field for direct use on 200/240 volts D.C. mains, 8in. cone; power, pentode or universal transformer as required.

**14/-** Only.—As above, but with 10in. cone; a very powerful quality speaker, capable of handling large outputs, fitted with rigid die cast cone housing.

**10/6** Only.—Are you on A.C. mains? If so, read below.

**10/6** Only.—Brand new manufacturers' surplus moving coil speakers made by one of the best known British makers; energised 1,800, 2,200 or 2,500 ohms field, 8in. cone; power, pentode or universal transformer as required; for use as smoothing choke in A.C. mains circuits; can be used direct on A.C. mains with suitable rectifying equipment as described below.

**14/-** Only.—As above, but with 10in. cone; a very powerful quality speaker, capable of handling large outputs, fitted with rigid die cast cone housing.

**12/6** Only.—Westinghouse rectifier and 4 mfd. smoothing condenser for above.

**15/6** Only.—Are you requiring a high class permanent magnet speaker at low cost; if so, read below.

**15/6** Only.—Brand new manufacturers' surplus moving coil speakers, made by one of the best known British makers; permanent magnet model of high efficiency, with power, pentode or universal transformer as required, 8in. cone.

**18/6** Only.—As above, but with 10in. cone; a very powerful quality speaker, giving a large output with a given input, fitted with rigid die cast cone housing.

**19/6** Only.—Are you requiring one of the new Alni permanent magnet speakers at low cost; if so, read below.

**19/6** Only.—Permanent magnet speakers, with new high efficiency Alni magnets, high flux density and wide frequency response, 8in. cone; power, pentode or universal transformer.

**24/-** Only.—As above, but with 10in. cone and special voice coil, giving exceptionally realistic reproduction; ideal for use with quality receivers.

**2/9** Only.—Brand new cabinets suitable for above; 2/9 each only.

**59/6** Only.—Brand new Auditorium speakers, suitable for Public address work or special quality receivers and amplifiers, for use on D.C. mains or A.C. mains; rectifying equipment for latter, 17/6; usual price for these speakers £9; limited number available: exceptional bargain.

**SECURE** One of these Amazing Speaker Bargains Now; repeat orders are coming in daily; cash with order or c.o.d.—Hulbert, 6, Conduit St., W.1.

**HULBERT** for Surplus Speaker Bargains.

**SOUTHERN RADIO'S WIRELESS BARGAINS.** Every Article Guaranteed New, Perfect and sent Carriage Paid.

**FOX INDUSTRIAL 4-Valve Amplifiers** for A.C. Mains. 3½ Watts Output, with two tuning coils, suitable for Television, Radio, Gramophone and Microphone. Chassis complete, less valves, 30/-. With 4 specified Mullard Valves, £3/12/6. Specified Speaker for same, 15/-.

**BARGAIN PARCELS.** We are offering the following parcels of mixed Components at a fraction of their value. The items comprise up-to-date Radio parts, new and perfect, which are too varied to be advertised individually:

**5/- PARCEL.** Containing modern Components to the value of at least 20/-, including resistances, condensers coils, wire, etc. Circuits of up-to-date Receivers included in each parcel.

**10/- PARCEL.** Containing components to the value of at least 45/-; Including Transformers, variable condensers, etc., etc., also circuits.

**20/- PARCEL.** THIS IS THE "SMALL TRADERS" parcel and contains a marvellous selection of components valued at 85/-. We have supplied this parcel to Hundreds of Dealers for re-sale at a profit.

**EVERY Article** in these Parcels is of Present Day Use and is New and Boxed.

**SOUTHERN RADIO.** Branches at 271-275, High Road, Willesden Green, N.W.10; 46, Lisle Street, W.C.2. All Mail Orders to 323, Euston Road, London, N.W.1.

**SOUTHERN RADIO**, 323, Euston Road, London, N.W.1. (Near Warren Street Tube.) 'Phone, Musenm 6324.

**CLARION VALVES.**—All brand new; battery types, 2-volt, H.2, H.L.2, L.P.2, 1/9; Super power, P.2, 2/6; screens and pentodes, 3/9, A.C. Mains, 4-volt, 1 amp., general purpose, 3/3; power, 4/-; screens and pentodes, 4/6; full wave rectifiers, 3/6; postage paid, cash with order, or C.O.D. over 10/-. Clarion Valves, Dept. 2, 885, Tyburn Road, Edgington, Birmingham.

**FOYLES**  
**Booksellers to the World**  
 Over two million new and second-hand books in stock. Catalogues free on mentioning interests.  
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**IRISH FREE STATE**  
 We can give promptest delivery of components specified in PRACTICAL WIRELESS. Full range of Eddystone and Graham Farish components always in stock. Post orders given careful attention.  
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**STAND 212 GALLERY**  
 Come along and SEE HOW TO SAVE MONEY. Let us tell you all about THE BEST VALVES MONEY CAN BUY FOR LESS MONEY, and the famous 363 six months replacement guarantee which ensures 100% satisfaction.  
**THE 362 RADIO VALVE COMPANY, LTD.,**  
 Stoneham Works, London, E.5.  
 Tel. CLISSold 1294 & 6607.

**CABINETS.** Write for free list  
**GILBERT, Cabinet Maker, SWINDON**

**WANTED,** good modern wireless parts, sets, eliminators, meters, valves, speakers, etc. Spot cash waiting. Exchanges. Send or bring. We pay more than any other dealer. Open 9-8.—University Radio, Ltd., 142, Drummond St., Euston, N.W.1. 'Phone: Museum 3810.

**FREE ADVICE BUREAU**  
**COUPON**  
 This coupon is available until August 24, 1935, and must be attached to all letters containing queries.  
**PRACTICAL AND AMATEUR WIRELESS,**  
 17/8/35.

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**WOBURN RADIO OFFER FOLLOWING LINES:**  
**SHORT-WAVE CONDENSERS:** .0001, .00015, .00016, .0002, .00025, .0003, .0005, 2/- each; two piece slow motion dials (Ormond) for same, 1/- each.

**ELECTRIC Soldering irons,** 200/250v., copper bit, flex and adaptor, guaranteed 1/11, post 6d. Mike transformers ratio 100/1, 2/3. L.F. Transformers, 5/1 and 3/1, 2/6. Chokes, 30h 30 m.a., 40h 40 m.a., 3/3. Binocular chokes, 1/3; snap type H.F. Chokes, 10d. Popular air cored canned coils, 2/3; iron cored canned coils, 2/6, with circuits. Differentials, .0001, .00015, .0003, 1/4. Tubular condensers, .1, .01, .02, 6d. Eric or Dubilier Resistances, all values, 6d.

**W.R.C. Eliminators,** 150v. 30 m.a. Three positive H.T. tappings. Guaranteed 12 months. A.C. Model, 21/-; A.C. with 2v., 4v., 6v. ½ amp. trickle charger, 32/6. Postage 1/-.  
**ALL goods** as advertised last week.

**TRADE List Ready.** Send business heading and stamp. Please note we do not send this list to private individuals.  
**WOBURN RADIO CO.,** 9, Sandland Street, Holborn, W.C.1.

**THE following unused set manufacturers' Surplus:** all goods guaranteed perfect; immediate delivery.  
**MAGNAVOX** speakers, complete with hum-bucking coil, output transformers, etc. DC152 (9in. cone), 22/6. DC154 (7in. cone), 16/-. All with 2,500 or 6,500 ohms fields.

**WESTINGHOUSE** rectifiers, HT8, 9/6. HT9, 10/-. HT10, LT5, LT4, 10/9. Regentone transformers for HT8 or HT9, with 4v. 4 amp. LT winding, 7/-. Eliminators, first-class make. Outputs 150v. 25ma., SG and Detector. AC type with Westinghouse rectifier 25/-. AC type with 5 amp. trickle-charger, 30/- DC type, 12/6.

**DUBLIER** or TCC dry electrolytic condensers 8mfd. or 4mfd., 500v. working, 50mfd., 50v., 200mfd., 10v., 3/3. 50mfd., 15v., and 15mfd., 100v., 2/3. 50mfd., 12v., 2/-. TCC type "M" condensers, any value up to .001 mfd. 6d. Eric resistances, 1 watt type, 7d., 2 watt, 1/2, 3 watt, 1/9. Send for comprehensive list.

**WARD, 40, Farringdon Street, London, E.C.1.** Telephone: Holborn 9703.

**BANKRUPT BARGAINS.** List free. Continuous advertiser in wireless press for nearly six years. You can rely on a square deal at the right price. I get all the clearance lines in receivers and components and handle all the value-for-money regular lines. Always in stock. Mains and battery receivers, valves Triotron, Tungram, and mains AC and DC types from 3/6. Eliminators, MC speakers. Whatever you require, ask for a quotation. Part exchange. Some items at present in stock. Burgoyne 3v sets, Mazdas speaker and batteries listed 4gns. 1935, 42/- One only to clear Vidor Universal, 8gns. 1935, £5/10/0. Sunbeam 1935 Spherhet, £5. Universal. One only Lissen 2v DC complete, £2. Lampex 4v AC MC 1935 8gns. sets, 90/-. DC Superhets AVC, etc., £7. DC bandpass, £5/10/0. Two, three, and four-gang air-spaced condensers with trimmers, 3/9. Large stock smaller components.—Butlin, 143B, Preston Road, Brighton. Preston 4030.

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**1935 Northumbria AC Sets.** Few to clear, 4-valve, £32/6, 5-valve, 97/6.—Novo Radio (2), Union Works, St. John Street, Newcastle-on-Tyne, 1.

**VAUXHALL.**—All Goods PREVIOUSLY advertised still available. Guaranteed lines only.  
**VAUXHALL.**—Have just issued new lists, including short-wave lines, and 3,000 other bargains. Send post-card for free lists.  
**VAUXHALL UTILITIES,** 163a, Strand, London, W.C.2. 'Phone Temple Bar 9338. Over Denny's.

**PEARL & PEARL** Summer Bargain List; free. 190, Bishopsgate, London, E.C.2.

**GALPINS** Government Surplus Stores for Dynamos, Motors, Resistances, Cutouts, Telephones, Microphones, Transformers, Spark Coils, X-Ray Tubes, Meters, A.C. Check Meters, Short-wave receivers, Spark Transmitters, Receivers, Deaf Aids. Send for list.—GALPIN, 75, High Road, Lee, London, S.E.13.

**OUR CATALOGUE SAVES POUNDS**  
**BUT COSTS ONLY STAMP.**  
**THE SQUARE DEALERS**  
**RADIOMART,**  
**19, JOHN BRIGHT STREET,**  
**BIRMINGHAM.**

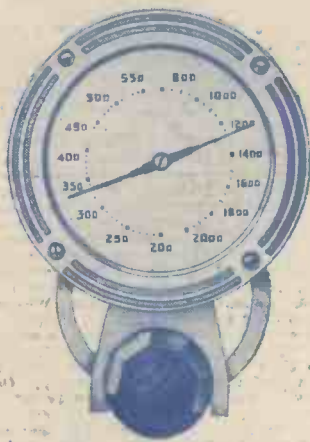
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# UNDER THE ROOF AT RADIOLYMPIA



## AIR-PLANE DIAL



*Bold Wavelength calibration, dual lampholder and escutcheon fitted with glass. Three finishes: chrome, oxidised silver and bronze. Catalogue No. 2130 Price 5/9.*

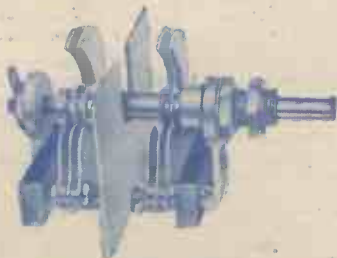
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What's new in Radio? If you want to know, go to Radiolympia and look at the J. B. Stand. An amazing range of **Condensers** for all purposes, including television and the ultra-short waves. You will not regret the visit.

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# Practical <sup>3<sup>D</sup></sup> and Amateur Wireless

Edited by F.J. CAMM

AND AMATEUR TELEVISION



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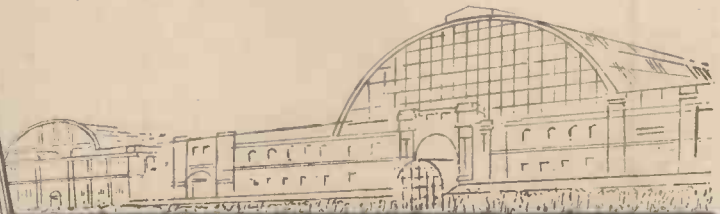
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# BRITAIN'S LEADING WIRELESS WEEKLY!



## Practical and Amateur Wireless

Edited by F. J. CAMM

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

VOL. VI. No. 153. August 24th, 1935.

## ROUND *the* WORLD *of* WIRELESS

### Norway's New Radio Network

THE Fredriksstad relay transmitter has now been officially taken over for its daily duties, and the recently reconstructed Porsgrund station is carrying out tests on 352.9 m. (850 kc/s). Work has already started on the Stavanger transmitter which will be brought into operation in about six months time. Bodø and Tromsø are also to be endowed with new broadcasting plant.

### The Modern Streamlined Microphone

THE greatest advance in microphone construction would appear to have been made in the new streamlined instrument constructed in the Bell Telephone Laboratories. As mounted in the U.S.A. studios it has the appearance of a billiard ball stuck on the top of a metal rod. It is non-directional, is of low electrical impedance and capable of faithfully reproducing frequencies ranging between 40 and 10,000 cycles. It may be used at several hundred feet from the amplifier.

### Buenos Aires High-power Station

RADIO *El Mundo* (LR1), Buenos Aires (Argentine Republic), a new 50-kilowatt, has started testing on 280.4 m. (1,070 kc/s) daily between B.S.T. 05.00-08.00, or at the conclusion of the days programme put out by the present transmitter.

### 100-Kilowatt for Bulgaria

THE Bulgarian Government has taken over the broadcasting monopoly and has decided to install a 100-kilowatt station at Vakarel, near Sofia. As soon as it is practicable the Radio Rodno private transmitter will be closed down.

### World's Radiotelephone Centre

AT the present time thirty-four of the thirty-six million telephone subscribers in the world are able to speak direct to London, which is now the headquarters of a vast radiotelephone system. Experiments are being carried out to establish a service with Kenya Colony and China. In Europe, Albania alone is outside the international telephone network as are Arabia and Transjordan.

### Loud-speaker Veto in Paris

WIRELESS fans in France have been classed with such "noise-makers" as dustmen, motor-drivers, street singers, hawkers, and so on! As motorists are forbidden to sound their horns in lighted streets between 9.0 p.m. and 8.0 a.m., so radio enthusiasts have been told that during these hours they must also damp down their loud-speakers or close the

### TELEVISION: AN OFFICIAL ANNOUNCEMENT.

As we go to press an announcement has been made by the Postmaster-General to the effect that test transmissions from the new high-definition station at the Alexandra Palace will commence in about six months' time. These will be followed by a regular public service as soon as practicable. The P.M.G. also stated that technical information to assist manufacturers in designing receivers would be published at an early date. This announcement comes at a very propitious moment, as the absence of television equipment at Olympia has caused many people to form the opinion that after all television was not ready and that all that has been said was mere talk. There were, of course, many difficulties to be overcome before a complete service could even be planned, and it is gratifying to note that the majority of these have now been overcome and that the B.B.C. have now been authorised to make arrangements with the Baird and the Marconi-E.M.I. Television Companies for the supply of complete transmitting equipment at the Alexandra Palace.

windows of their apartments. A special force of anti-noise police has been organised to deal with the noise-mongers.

### Italian Concession to Tourists

THE Italian Government has decreed that foreign tourists may bring portable wireless sets with them into the country providing that a licence approximating five shillings is paid on entry.

### Telephony with Cross-channel Steamers

ON 109.9 m. (2,730 kc/s) listeners may sometimes pick up transmissions from North Foreland Radio working with steamers plying between Dover-Calais and vice-versa.

### Finland Protests!

SINCE Moscow (1) altered its wavelength to 1,744 m. (172 kc/s) the 500-kilowatt Soviet transmitter at times swamps the Lahti broadcasts. The Finnish authorities have lodged a strong protest with the U.I.R., pointing out that a separation of 6 kilocycles only now exists between the two stations, and that this is contrary to the Lucerne Plan.

### Czech Transmitter Testing

THE new 30-kilowatt Banska-Bystrica broadcasting station is reported to be carrying out tests on 765 m. (392 kc/s).

### New Station for Radio Lyons

IN October next the present transmitter working on 700 watts will close down and will be replaced by a new 25-kilowatt station which is being erected in the neighbourhood of the Tour de Salvagny. The same wavelength, namely, 215.6 m. (1,392 kc/s) will be used for the daily broadcasts.

### Varied Fare for Midland Listeners

THE Round Table Singers, who give a programme of part songs from the Midland transmitter on the evening of August 21st, owe their origin to a roadside incident. Julian Were, formerly for ten years solo bass at Birmingham Cathedral, went to the rescue of a motorist who was in difficulties. He was helping to locate the trouble when he heard the car's owner humming a Bach chorale. This led to talk about music and, finding his chance acquaintance was a music critic, Mr. Were sought his help in getting together a mixed quartet.

### Coventry Hippodrome Relay

IN light entertainment for Midland listeners the principal attractions of the week are a variety bill from the Hippodrome Theatre, Coventry, on August 21st; and the Kit-Kat-Kits, from the Jephson Gardens, Leamington Spa, on August 23rd.

# ROUND the WORLD of WIRELESS (Continued)

## Two Broadcast Dramas

TWO outstanding productions from the B.B.C. Drama Department will be "Armada," which will be given on August 27th (Regional) and 28th (National), and "Black Vengeance," which is due for presentation on September 4th in the

## INTERESTING and TOPICAL PARAGRAPHS

Jephson Gardens, Leamington Spa. The two regiments, which were amalgamated in

## SHORT-WAVE AMATEURS' ENTHUSIASM



A group of Manx radio amateurs, in their keenness for their hobby, have carried their short-wave wireless set to the summit of Greeba Mountain (Isle of Man). The aerial consists of a wire hanging from a kite, and the earth a buried tin.

National Programme, and will be repeated for Regional listeners on the following evening.

## Concert from Cheltenham

AN all-Gloucestershire concert will be relayed from Cheltenham Town Hall to Midland listeners on August 26th. The artists are the Cheltenham Municipal Military Band, conducted by Arthur Cole; Reginald Morgan (tenor); and Chick Fowler, who entertains with original sketches about an imaginary rustic, "Gloucestershire George from the Forest of Dean."

## Variety from Morecambe

MORECAMBE provides another composite outside broadcast for Northern listeners on August 28th. Lionel Millard and his Band will be heard broadcasting from the Winter Gardens Ballroom; after this there will be an excerpt from the Variety bill at the Winter Gardens. Finally, there will be a performance by the "1935 Frolics," under the direction of George Pawsey, from the Palace Theatre.

## "Beside the Seaside"

ON August 31st, the principal programme for Midland listeners is from North Wales. This is one of the "Beside the Seaside" series. There are relays from Llandudno, Colwyn Bay, and Rhyl—all favourite places with Midland holiday-makers.

## Dragoon Guards Band

THE Band of the 4/7th Dragoon Guards, conducted by Mr. F. Marks, will be heard on August 29th in a relay from the

1922, were both raised in the seventeenth century.

## "An Aberystwyth Night"

WESTERN listeners will be taken on a tour of Aberystwyth on August 29th, in a programme entitled "An Aberystwyth Night." This particular "Night" is designed for the holiday period, and the programme will include a dance band, a silver band, and a concert party.

## Tattoo Broadcast

THE 1st Cadet Battalion, the Durham Light Infantry, is holding a Tattoo towards the end of August, and on August 25th Northern listeners will hear part of a rehearsal for this Tattoo relayed from the Greyhound Stadium, South Shields. The units to be broadcast will consist of Regulars—the massed bands of the 1st Battalion the King's Own Borderers and the 2nd Battalion the Royal Scots Fusiliers, with Pipes and Drums. These units, which are stationed at Catterick Camp, are taking part in the Tattoo by the courtesy of their commanding officers.

## Instrumental Music from Glasgow

GLASGOW Corporation Gas Department Band, conducted by Herbert Bennett, will play "Slavonic Rhapsody," No. 2, by Friedemann, arranged Wright; pot-pourri, "On with the Show, 1935," by Nicholls; excerpts from "The Geisha," by Jones, arranged Bennett; foxtrot, "Oregon Trail," by Peter de Rose, arranged Bennett; a selection from "The Mikado," by Sullivan; and march, "On the Quarterdeck," by Alford, on August 26th.

## "In the Shadow"

THIS is the title of a tense and exciting drama of the Navy, written by a naval officer, Horton Giddy, and will be revived in the National programme on August 21st and in the Regional programme on August 22nd. The play successfully portrays the colossal tension existing between two ships lying parallel to each other in a naval harbour. The ships belong to different countries between which war is on the point of breaking out. Each crew watches the other like a bird watching a stoat, as at any moment the declaration of war may come and both ships would spring to life and become bitter enemies. The author experienced this tense atmosphere in a certain harbour a few days before the declaration of war between England and Germany, and the details are meticulously accurate and add to the drama of the situation.

## Massed Guards Bands

SHREWSBURY claims to be the only place outside London where three massed Guards Bands can be heard. The occasion is the famous Flower Show in August, where the Bands of the Coldstream Guards, Scot Guards, and Welsh Guards have been a popular attraction for many years. They will be heard by Midland listeners in a popular programme on August 22nd. Major Andrew Harris, who is the Senior Director of Music of the Brigade of Guards, will share the conducting with Lieut. H. E. Dowell, of the Scots Guards, and Lieut. J. Causley Windram, of the Coldstreams.

## Variety from Exmouth

"CRAZY FARE," a "cocktail of comedy and colour," presented by Chris Weede, will be relayed from the Pavilion, Exmouth, on August 27th, for Western listeners.

## SOLVE THIS!

### PROBLEM NO. 153

Rodgers had a small microphone which had afforded many hours of amusement, but he was anxious to improve the output volume. He searched through his spare wireless parts and found an old 5 to 1 L.F. transformer, which he thought would be of value in increasing the output, and he accordingly connected the microphone and battery in series with the secondary winding, and joined the primary winding to a pair of headphones. He found, however, that the results were not so good as when the transformer was left out. Why was this? Three books will be awarded for the first three correct solutions opened. Envelopes must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 153 in the bottom left-hand corner, and must be posted to reach this office not later than the first post Monday, August 26th, 1935.

### Solution of Problem No. 152

As all the voltages were correct in Robinson's set and yet signals could not be heard, the indication was that there was no transference of energy in one stage. The sound in the speaker indicates that the output stage is in order and that the circuit is not broken, and thus the final indication of the fault is that an anode lead is short-circuited. In this particular case the two terminals on the transformer primary were shorted by the soldering tags fitted to them as Robinson had not adopted soldered connections, but had twisted the ends of the connecting wires round the terminals and in tightening them the soldering tags had turned and touched each other.

The following three readers correctly solved Problem No. 152 and books are accordingly being forwarded to them:—H. A. Lond, 20 Heywood Road, Diss, Norfolk; A. S. Turtle, A.I. Medical Ward, R. V. Hospital, Netley, Hants; J. Shepherd, 15 Fairbrother Street, Hyde, Cheshire.

# Designing Your Own Wireless Set

THE advantages of a two-H.F.-stage receiver have already been explained in a previous article, and it will be interesting now to consider the design of the two-stage amplifier. The degree of amplification which can be obtained from such an amplifier is tremendous, and the difficulties which are experienced in its design do not concern the matter of efficiency nearly so much as of stability: the step-up provided by two modern H.F.-pentode valves is so great that the least amount of carelessness in design is certain to lead to uncontrollable

**The Design of a Two-stage H.F. Amplifier is Explained, Different Forms of Inter-valve Coupling, and Methods of Variable-bias Control Being Described**  
By FRANK PRESTON

### Using Band Pass

The one objection to this form of circuit is that the degree of selectivity is so high that there is a danger of introducing distortion due to the sharp response of the three circuits in cascade. Nor would the use of a band-pass filter in the aerial circuit confer any great advantages because this would still be followed by two sharply-tuned stages. This difficulty can most easily be overcome by placing the band-pass filter between the first and second valves as shown in Fig. 2. The advantages of this are that the band-pass circuit is not damped by the aerial, that the two "sharp-peak" circuits are isolated, and that the arrangement becomes completely asymmetrical since

is in respect of the method of feeding the screening grids of the two high-frequency pentodes. In the A.C. circuit a single fixed potentiometer is used to provide the correct potential, and the screening grids are decoupled by means of 1,000-ohm non-inductive resistances, but in the battery circuit a separate H.T. tapping supplies the screening grids through decoupling resistances. With all variable- $\mu$  valves it is important that the S.G. potential should remain constant regardless of the setting of the volume control, and it is this fact which makes it necessary to use an apparently rather complicated resistance system in the case of the A.C. circuit.

When the matter is first considered, it would appear that the required condition could be satisfied simply by connecting a fixed potentiometer between H.T.+ and H.T.-, and taking leads from the tapping of this to the S.G. terminals. But it must be remembered that the current passed by the screening grids when the volume control is set to increase the bias on the grids of the valves (to reduce volume) is automatically reduced; and as the current becomes less the voltage increases. The resistance network shown is typical of that required for most valves, but the values of the resistances vary according to the exact characteristics of the valves chosen, and, therefore, with their make. For this reason it is best to refer to the makers' instruction leaflet with regard to this point.

It will suffice to mention that the combined effect of the resistances is to maintain the S.G. voltage constant. This is because a movement of the slider of the volume control towards the negative end reduces the screening-grid current, and at the same time tends to reduce the voltage provided by the potentiometer by increasing the resistance of the lower "arm." These two effects, combined with those of the decoupling resistances of providing a lower voltage drop when the current is reduced, balance out and maintain the S.G. voltage at a reasonably constant figure.

(Continued overleaf.)

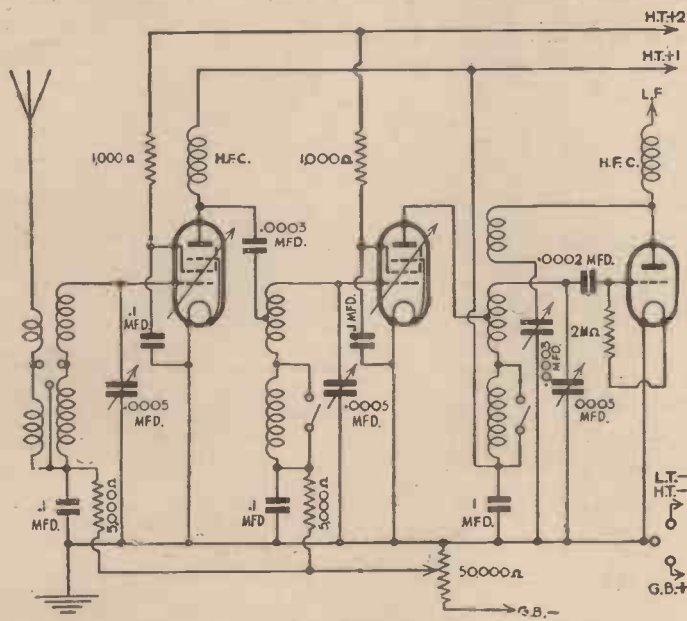


Fig. 1.—Skeleton circuit of a two-H.F. amplifier in which the tuning circuits are purposely made asymmetrical.

reaction, and unwanted oscillation of all sorts. It is mainly for this reason that it is nearly always best purposely to arrange that the valves shall not be operated at their full efficiency. This may sound wasteful, but the true range of a moderately-efficient stable receiver is greater than that of a highly-efficient set which cannot be operated except by the expert.

### "Asymmetrical" Tuning Circuit

We discussed the principal types of inter-valve coupling circuits a few weeks ago, so that we can now make reference to them without repeating the details. It was explained that, generally-speaking, the tuned-anode circuit is most efficient and the tuned-grid circuit least efficient: from this it would appear that the latter would be most suitable in the case under consideration. In practice, however, it does not work out quite like that, and it is nearly always found to be easier to make the two inter-valve circuits "asymmetrical," because by so doing there is less fear of feed-back between the two stages. Thus, it is found an excellent plan to use tuned-grid coupling between the first and second valves, and tuned-anode between the second and third, the general circuit being rather as shown in Fig. 1. Here the circuits are arranged so that a three-gang condenser can be used to give single-knob tuning, it being understood that the characteristics of all three coils are similar.

all three tuning circuits are of different form. This is probably the best method of using two H.F. stages when ease of control and high-quality reproduction are required. Where high fidelity is not considered essential, or if prime cost is an important consideration the circuit first described will fill the bill. Even when good reproduction is desired, a fair compromise can be effected by the use of tone control in the low-frequency portion of the set: this matter must be left for consideration until later.

### S.G. Voltage Supply

The circuit shown in Fig. 1 is for battery operation, but the alterations required in designing an A.C. receiver are quite simple, as can be seen from Fig. 3. The chief point to observe in the mains version

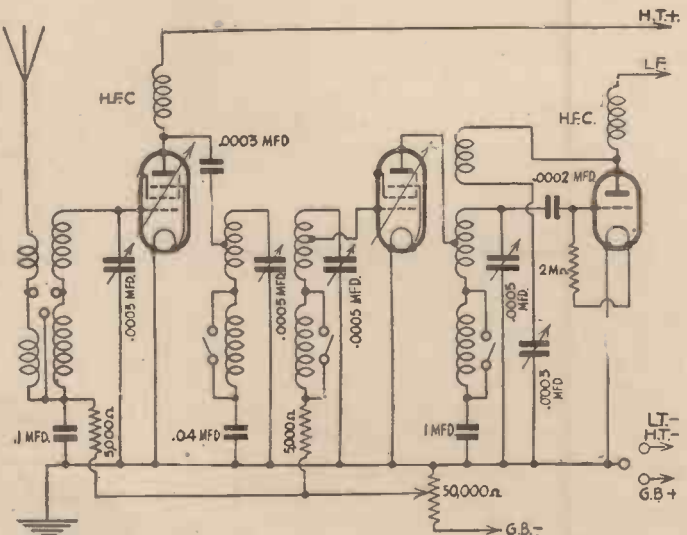


Fig. 2.—In this skeleton circuit a band-pass filter is used between the first two valves.





# The "Allwave" Three

Further Notes on Operating this Modern Receiver, and Some Details Regarding the Battery Model which is to be Described Next Week

THE aerial series condenser is, of course, well known as a selectivity device, but it has a much more important function than merely controlling the degree of selectivity, and although in many receivers a small pre-set is used, it will be seen that a complete panel-controlled component has been fitted in the "All-wave" Three. On the normal broadcast bands this condenser should be set at the "full-in" position if maximum volume is required. Generally speaking, in most parts of the country the selectivity which is then obtained is ample for all normal requirements, and station separation should be easily carried out. When situated near to a powerful station, however, some reduction in capacity may be found necessary in order to restrict the spread of the local station, and thus the condenser should be adjusted to provide the required compromise between signal strength and selectivity. On the short waves, however, its function is much more vital.

## Reducing Aerial Damping

The damping effect of the average aerial and earth system is generally so great that it is impossible to obtain adequate reaction effects on the wavelengths below 100 metres or so. One way of overcoming this difficulty is to employ a small and highly-efficient aerial, but then this would not prove so efficient for broadcast reception. The series-aerial condenser will, however, be found to provide a perfect control for this purpose, and it will be found that there is a definite position, where it will be possible to obtain smooth reaction control over the entire tuning range on studs 1, 2, and 3. Some little experiment may be carried out with a view to finding this position, although when once it has been ascertained a further adjustment will only be required in the

event of a modification in the aerial-earth system, and, therefore, an indicating mark may be made on the panel to facilitate a rapid adjustment of the condenser.

## Wave Range

The actual ranges covered by the coil which is specified are stud 1—13 to 26 metres; stud 2—21 to 40 metres; stud 3—32 to 60 metres; stud 4—255 to 520

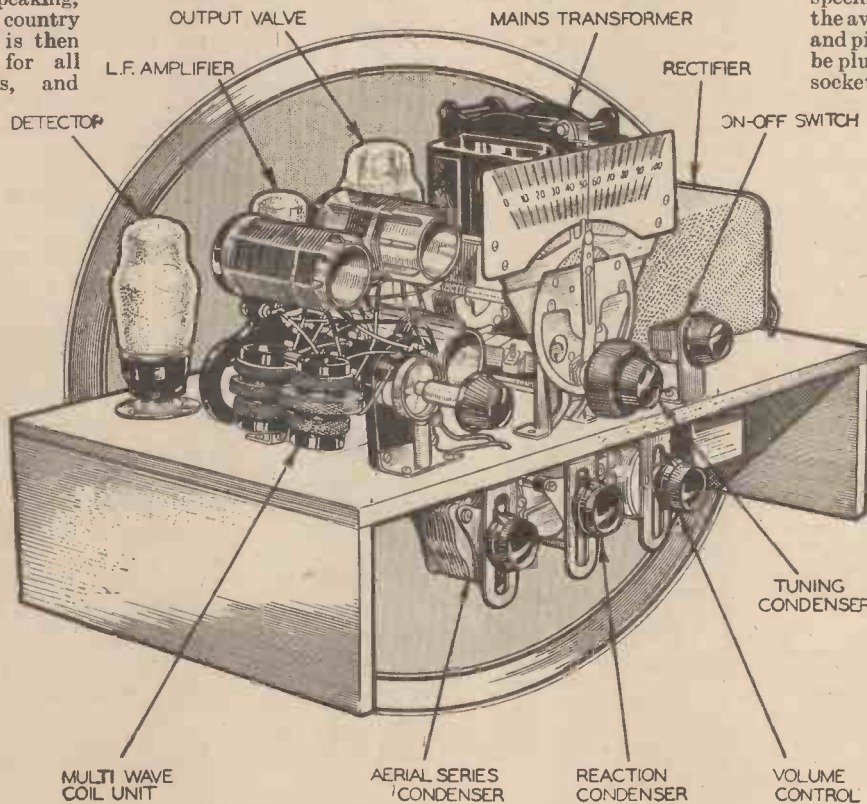
it will be very noticeable when using the first and second studs.

## Using the Pick-up

For gramophone-record reproduction a good make of pick-up should be employed, and it should be of the high-resistance type. There is no necessity to obtain a component fitted with a volume control, as an L.F. control is already fitted to the circuit, and the detector valve which is specified will not overload with the average gramophone record and pick-up. The latter should be plugged into the appropriate sockets on the rear strip, and the change-over switch operated. No radio break-through should occur, and the volume should be fully controllable from a whisper up to the maximum output of the last valve.

## Battery Version

There are, no doubt, many readers who would like to build this receiver, but who have no mains facilities. Therefore, we shall describe in next weeks issue how to build a battery version of this receiver, and full constructional details of the Battery "Allwave" Three will then be given. The same tuning unit will be employed, and the circuit is practically identical—except so far as changes due to the different nature of the voltage supplies are concerned, and the valves which will be used are the Hivac D.210, L.210, and the PP.220. The same method of phone connection is adopted, and the circuit performs in every respect as efficiently as the mains version, allowing for the slightly lower amplification provided by battery valves. The battery set is even more compact than the mains version illustrated on this page, and is ideal for those whose homes are not wired for electric lighting. It is also very useful for overseas listeners who require a semi-portable outfit.



Our artist's impression of the "Allwave" A.C. Three.

metres; and stud 5—1,000 to 2,000 metres. It must be emphasized that the minimum wavelength on each range will only be attained if the specified tuning condenser is employed and the exact wiring is adhered to as shown on page 605 of last weeks issue. Any increase in the minimum capacity, which might be introduced by bad wiring or by wiring carried out in a different manner from that indicated, will result in a raising of the minimum wavelength, and although this may not be of much importance on the broadcast band,

will be used are the Hivac D.210, L.210, and the PP.220. The same method of phone connection is adopted, and the circuit performs in every respect as efficiently as the mains version, allowing for the slightly lower amplification provided by battery valves. The battery set is even more compact than the mains version illustrated on this page, and is ideal for those whose homes are not wired for electric lighting. It is also very useful for overseas listeners who require a semi-portable outfit.

## LIST OF COMPONENTS.

Multi-wave coil unit, No. 960 (Eddystone).  
 One .00016 mfd. condenser, Type E, with micro drive horizontal (Polar).  
 One .0002 mfd. reaction condenser (B.T.S.).  
 One .0003 mfd. aerial condenser (B.T.S.).  
 Eleven fixed resistances: 2 meg., 100,000 ohms, 75,000 ohms, 50,000 ohms, 30,000 ohms, 20,000 ohms, 10,000 ohms, 10,000 ohms, 750 ohms, 750 ohms, 1 watt type; 600 ohms, 2 watt type (Dubilier).  
 Twelve fixed condensers: .05 mfd., .01 mfd., .005 mfd., .0001 mfd., Tubular. Two 2 mfd., three 4 mfd., Type 40 (T.M.C.).

Two 25 mfd. 25v., one 10 mfd., 50v. electrolytics (T.C.C.).  
 One Allwave H.F. choke, Type H.F.O. (Wearite).  
 One 500,000 ohms potentiometer (B.T.S.).  
 One change-over jack with plug (B.T.S.).  
 One L.F. choke, Type H.T.13 (Wearite).  
 One mains transformer, Type W.31 (Heayberd).  
 One rectifier, type H.T.8 (Westinghouse).  
 One fuse with holder, 500 m.a. (Microfuse).  
 One radiogram switch, Type S92 (Bulgin).

One on-off switch, Type S91 (Bulgin).  
 Three terminal strips, A.E., P.U., L.S. (Clix).  
 Four component brackets (Peto-Scott).  
 One metaplex chassis, 16in. by 10in. by 3 1/2in. (Peto-Scott).  
 Three valves: two A.C.-H.L. (Hivac), one 4XP. (Cossor).  
 Three valveholders, two 5-pin, one 4-pin (Clix).  
 One permanent magnet speaker, Type F720, P.M.00 (Rola).  
 18in. screened lead.



# MODERN RADIO MANUFACTURE

FIRST ARTICLE OF  
A SHORT SERIES

## A Tour of A. C. Cossor's Five Highbury Factories

firm cover the manufacture of valves, components, sets, radiograms, cathode-ray tubes, transmitting valves, and, in fact, almost every article used in the science of radio. Some of the most modern machinery in the world is employed in the making of these multitudinous radio parts. The processes and methods can really be called "Marvels of modern industry," and we hope in this short series, to give the impressions of a layman during a tour of the Highbury factories.

vision system, experiments which may be the means of bringing commercial television to our homes. All these widely differing spheres of activity are of real interest to the radio amateur, and the series of articles which have this as their forerunner will cover completely all the marvels of modern ingenuity which are employed in the manufacture of radio in 1935.

### The Hydrogen Ovens

These ovens, which measure about 20ft. in length, are employed to clean and purify all the nickel electrodes used in the manufacture of Cossor valves.

The anodes, grids, etc., are placed in the specially constructed semi-circular wire containers,

**M**ANY extraordinary things are to be seen in a tour of the factories of so modern and progressive a radio firm as A. C. Cossor, Ltd., at Highbury Grove, London, which cover an area equal to many a country village. The five huge factories in which many thousands of workers are employed combine to make this company the British Empire's largest self-contained radio manufacturing concern.

It is difficult to visualise the wide scope of this firm without having actually seen all the departments and intricate machinery which supply thousands of sets and valves each year. The phenomenal growth of this firm is, of course, synonymous with the expansion of the radio industry. It seems almost incredible that just a few short years ago the Cossor Works, though even then the biggest British factory solely devoted to radio, employed but a few hundred workers making the first wireless valves. Such famous "old-timers" as the "Wuncell," "Stentor" and the first bright emitters, the P.1 and P.2 types. Since those days many famous valve types like the first screen-grid-pentode, the Class "B" valve, etc., have been pioneered by the research engineers at Highbury.

Now, of course, the ramifications of the



Three views of A.C. Cossor's extensive factory buildings at Highbury.



Cleansing valve electrodes in a hydrogen oven of the Cossor factory.

### Research Department

One of the busiest sections of the Cossor valve works is the Research Department, where engineers are continuously engaged in developing new types of valves. In another section experiments are being made with the Cossor Tele-

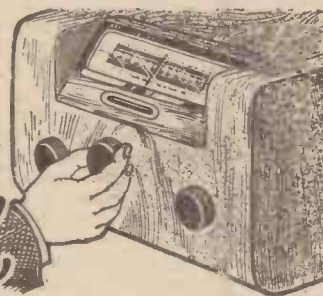
and are slid into the central tunnel of the oven. There they are heated in pure hydrogen to a temperature of about 1,600 degrees Fahrenheit. They then automatically pass through a cooling chamber and are delivered, absolutely cleansed of all dust and other impurities, at the far end of the oven.

When the oven is loaded a foot-long yellow flame issues from a hole in the feeding end—this shows that the hydrogen is flowing consistently.

Practical Television Short-wave  
Review—6d. monthly!



# On Your Wavelength



By Jhermion

## Schoolboy Designers

I HAVE heard from Smith Minor, Brown Nonus, and Robinson Junior about the abilities of schoolboy designers. They are all positive that they could do far better than such eminent designers as Mr. F. J. Camm, and have stated so in the usual schoolboy patois—by jingo, it's a ploy! Is there an association of schoolboy designers? I am told, with a great degree of verve, vim, self-assurance, sang-froid and nonchalance, that each of them has produced sets "which worked jolly well." Maybe, my masters. I only tactfully suggested that a designer was a creator of a new circuit, not a user of old ones. In my ignorance I thought that the older one got, the more experience one gained, but I am wrong, dead wrong. Of course, we start the other way about, and what I had thought to be mere bumptiousness, precocity, the sign of the juvenile prodigy, is merely the experience inborn like the sins of the fathers unto the third and fourth generation, particularly of those who hate me. So I will arise and say unto the Editor: "Sir, I have sinned, and I know not where to lay my head. Pardon *mes faux pas*, and excuse my deviation from the paths of rectitude into which I have strayed through my technical juvenescence." Thermion is in the stage of second childhood, and will soon reach the stage of mere oblivion, *sans* teeth, *sans* crystal set, *sans* sense, *sa ne fait rien*, and *sans* job—at least my schoolboy friends hope so. Are not schoolboy designers in the same category as schoolboy editors—all quite certain, as a result of being misled by the misplaced flattery and adulation of their schoolmasters and partial friends, they could edit daily papers far better than their betters?

## Strolling Down the Aisles

IT is my privilege to visit Olympia before it opens its portals to the public. I like to indulge in this proem because it gives me some idea beforehand of the exhibits and enables me to study them without being jostled by the crowds. The day before Olympia opens witnesses scenes of indescribable activity. Stand fitters, painters, sign-writers, manufacturers' workmen dashing about, and the stands in a

hopeless state of desuetude. It never seems possible that the following day will witness the glaring show of cleanliness and cosmos. No tawdry bunting about Radiolympia. Miracles must be worked overnight. The clutter, the debris, the ladders, the planks, and dust vanish as if by fairy hands. When Olympia closes, a similar miracle occurs, for within twenty-four hours the place resumes its former

can get more enthusiastic attention from manufacturers' representatives. Most people, I suppose, pick early-closing days and Saturday afternoons for their annual trek. Not for me.

## Quality and Selectivity

I AM very pleased to notice that so many manufacturers have this year produced components by means of which the selectivity, and hence the quality, provided by a receiver can be varied over fairly wide limits. I am all the more interested because a short article recently appeared in PRACTICAL AND AMATEUR WIRELESS in which the author suggested that variable selectivity was badly needed. As was pointed out, when the tuning circuits are so adjusted that they will eliminate unwanted stations in present-day conditions their response to a "band" of frequencies is very narrow. In other words, if the circuits give a response of, say, 4 kilocycles, it is impossible to obtain that high-fidelity reproduction for which every listener seems to be striving. On the other hand, if the tuning circuits give approximately uniform response to a frequency band of about 10 kilocycles there is little chance of getting interference-free reception of more than two or three transmissions. Of course, it is a practical impossibility to receive all transmissions in such a manner that the reproduction provided closely resembles the original broadcast, but with variable selectivity it is at least an easy matter to ensure really life-like loud-speaker signals from three or four comparatively local stations.

Yes, I welcome variable selectivity, and I am sure that it will solve numerous problems; after all, it is only logical—and long overdue.

## Intermediate Frequency

IS it not high time that intermediate frequencies were standardised? Perhaps we must be prepared to accept two or three different frequencies, since these are desirable in different types of receiver, but surely it would be sufficient to have 110, 150, and 465 kc/s. Instead we also have 126, 450, 463, 472, etc. In many cases, the difference between the frequency and one of the three first mentioned is not great, but if a superhet type gang condenser is to be used with complete success it must be designed to operate at one frequency difference only—not to "make do" at two or three frequencies. I hope that by next year's Radiolympia the manufacturers will have settled this matter and arranged to produce all their components for two, or at the most three, intermediate frequencies.

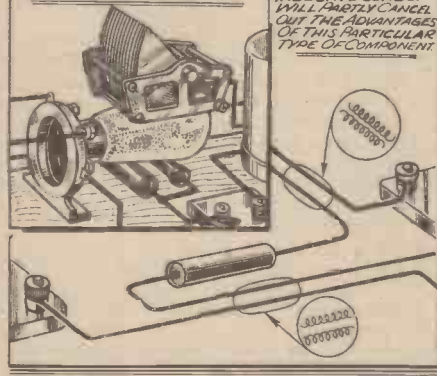
(Continued overleaf)



WHERE H.F. CURRENTS ARE CONCERNED, SCREENED SYSTOFLEX IS PREFERABLE TO SHIELDED RUBBER COVERED WIRE. THE RUBBER COVERING INCREASES THE CAPACITY BETWEEN THE WIRE AND THE SHIELDING.



HORIZONTAL TYPE VALVE HOLDERS ARE OFTEN PREFERABLE WHERE COMPACTNESS IS AN IMPORTANT DETAIL.



desolation. The captains and the kings depart. The first day of the Show, of course, sees some hectic finishing touches, and last year it was my privilege to buy your Editor a bottle of—er—well, a bottle, approaching midnight. In my opinion, the first day of Radiolympia is the best for the interested technician. It has not quite got into its stride, and you



# 1936 STENTORIAN

NEW PRECISION "FORMER" FOR WHITELEY SPEECH COIL

(Continued from previous page)

### Radio Musical Instruments

There is an interesting field for experiment to those who are musically inclined and own wireless receivers. We have had the electronic organ and similar instruments employing oscillating valves, but by means of an ordinary gramophone pick-up or a converted headphone receiver you can construct quite a novel instrument. The wires or strings must be arranged so that the bridge over which they pass at the lower end forms part of the armature of the pick-up and thus any sounds produced from the strings will be converted into electrical energy. By feeding these to any form of amplifier a loud-speaker may be used to reproduce the sound and thus the usual sounding board of the instrument is dispensed with. The idea may be applied to a violinist who is learning, as he may use a skeleton violin built in the above manner and the sounds produced will be so weak (acoustically) that no outsider could hear them. A pair of headphones could be worn and thus the player alone would hear the music. No doubt many flat-dwellers will be glad of this hint! By combining various tone controlling devices and volume controls, a very interesting musical instrument may be constructed to give various peculiar effects not obtainable with ordinary musical instruments as we know them.

### Mixing Universals and A.C. Valves

One of the problems of designing a really powerful "quality" A.C. set has been that, if more than 3 watts output is required (or rather less if really good quality is wanted), the output stage must either be designed on the push-pull system, using two valves, or else a large output valve requiring about 400 volts H.T. must be employed. The first alternative means a fairly big expenditure of H.T. current. While this is not serious from the point of view of running costs, it presents two difficulties. First, the usual 120 milliamp. rectifier will only just give sufficient output for a couple of H.F. valves, a powerful grid detector, and two output valves in push-pull. Second, the initial cost of two output valves, special push-pull transformers, and the power transformer is somewhat high.

On the other hand, if a 400-volt valve is used in the output stage, a comprehensive network of voltage-dropping resistances and decoupling condensers is necessary in order to provide the various screen and anode voltages to the different early-stage valves. Moreover, if variable- $\mu$  valves are used in the high-frequency stages, it is theoretically advisable to use a separate rectifier to provide H.T. for the early-stage valves, since the anode-current variations due to the adjustment of the variable bias react on the voltage available at the anodes and screens, making them too high at low settings of the volume control.

### A Neat Solution

An experimenter of my acquaintance solves the problem in a very neat manner. Although operating on an A.C. supply, he always uses "universal" valves for all stages except the output valve, these stages being complete with their own "universal" rectifier. This is quite economical because no power transformer is required for this part of the receiver. For the output stage he uses a unit comprising a 400-volt output valve giving 5 watts output, with its own rectifier valve and power transformer.



### Interference on Short Waves

The use of an H.F. stage in a short-wave receiver does not materially increase sensitivity and volume, but it serves the useful purpose of stabilising the reaction control by eliminating aerial capacity effect. Owing to the low sensitivity of the normal S.G. valve on the higher frequencies it is customary to use an untuned aerial stage, as this simplifies tuning, but it is found in practice that this method of connection has one disadvantage. Unless precautions are taken, interference is often experienced from the local broadcast band transmitter. In the majority of receivers of this type the aerial lead is connected direct to the grid of the first valve, and a high resistance is joined between the grid and earth, or between the grid and G.B. Battery.

If interference is caused by a station on the broadcast band it is suggested that the high resistance referred to above be replaced by an efficient short-wave choke, and a small series condenser having a capacity of approximately .00005 mfd. be connected between the aerial lead and the grid of the first valve. For short-wave listening a short length of aerial of approximately 20ft. will be found quite satisfactory; if a longer aerial is used the above-mentioned .00005 mfd. fixed condenser should be replaced by a .0001 mfd. air-spaced variable condenser.

### Mains Supply for Battery Valves

There are probably many of our readers who have a mains supply in the house but cannot afford to scrap their battery receiver and purchase a modern mains set. It is possible, however, to supply battery valves from the mains through an eliminator, and apart from the fact that this is cheaper than using H.T. batteries, better quality can in most cases be obtained. This is particularly so when a super-power or power pentode valve is employed in the output stage, as the average low-capacity battery cannot satisfactorily supply this type of valve. In some of the cheaper battery models, however, the anode circuits are not effectively decoupled, and therefore when an eliminator is used slight low-frequency instability may be experienced. This can, however, be remedied by connecting a 20,000 resistance between the detector H.T. lead and the detector terminal of the eliminator, and 2 mfd. condenser between the receiver end of this resistance and earth.

### Band-pass Coupling

The selectivity of a straight receiver can be greatly improved by fitting a band-pass filter before the first valve. In some band-pass assemblies the two tuned circuits are joined together by means of a condenser. This method of connection is very effective on the medium waveband, but as the capacity of the condenser has to be very low the sensitivity on the long waveband is affected, and therefore when this type of coupling is incorporated it is suggested that inductive coupling be added by winding a few turns of wire around each of the coils and joining the ends together.

He tells me that there is a net saving in cost with this arrangement because, although he uses two rectifier valves and two smoothing systems, there is only one power transformer, only one output valve (which is less expensive than two smaller valves), and no costly push-pull transformers. He also saves a little in voltage-dropping resistances.

### The Drift Towards High Fidelity

I have been listening recently to one or two modern commercially-built superhets of the more expensive kind, and I must admit to being pleasantly surprised at the really good quality reproduction they can give. As you may have guessed from my previous writings, I have never been a great lover of the superhet myself—this is, of course, merely a matter of personal taste and you must not take it too seriously. I admire the ingenuity of the superhet principle, and admit its high sensitivity and great selectivity, but, in general, I do not like its reproduction. For distant reception I agree that the superhet is unrivalled as a station-getter, but then, I am not an enthusiastic DX. fan, and my particular partiality is high fidelity.

Manufacturers have, however, now shown us that it is possible to combine world-wide range with a very fair simulation of natural reproduction in a superhet, and they have done it in the best of the 1935 models. They would, however, be the first to admit that this very agreeable reproduction is what is so often called "faked fidelity"—in other words, it is the result of introducing a number of tone-correction devices into the circuit. This is, of course, a perfectly legitimate device because it really does deliver the goods. Moreover, there are very few listeners—even among musical experts—who can distinguish between synthetic quality and natural quality.

### Satisfying Moderate Requirements

My point is, however, that fidelity faking is only necessary in these sets because, in order to obtain a sufficient degree of selectivity to make foreign listening possible, quality has to be killed in the first stage of the receiver. Moreover, all these correction devices cost money, and a first-class high-fidelity superhet is therefore far from being a cheap proposition.

Personally, I hold a very firm belief that a very large number of listeners are quite content with their local stations and, say, half a dozen foreign alternatives, and it is often found that even the owners of the more comprehensive sets, after the first novelty has worn off, settle down to a similar limited range of listening. It has been established beyond all doubt that in most parts of the country these more moderate requirements can be satisfied by a simple "straight" set, and that such a receiver can be designed to give reproduction quite equal to that of the best "faked fidelity" sets, and often superior to some, without any complicated or expensive correcting devices.

The construction of receivers of this nature is quite within the capabilities of the average constructor, and the cost is no greater than that of a bought set giving rather inferior reproduction. Suitable designs have already appeared in PRACTICAL AND AMATEUR WIRELESS and there will be more to follow.

**A NEW HANDBOOK!**  
**POWER-DRIVEN MODEL AIRCRAFT**  
 1/-, or 1/2 by post from George Neumes, Ltd.,  
 8/11, Southampton Street, Strand, W.C.2.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

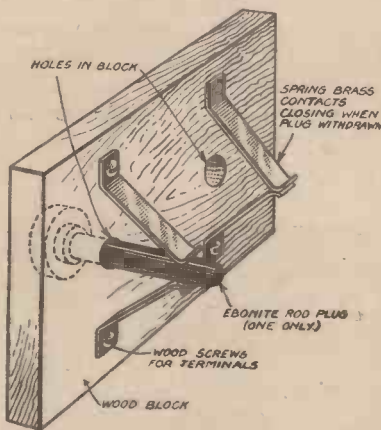
READERS WRINKLES

THE HALF-GUINEA PAGE

Extension Loud-speaker Switch

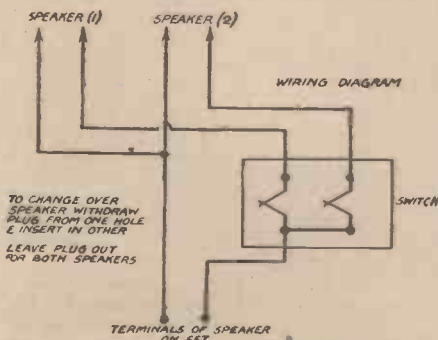
WHEN fitting a switch control for extension speakers care has to be taken to see that the set cannot be left, even momentarily, without any speaker connected, as such a condition is most harmful to the output valve. Three-position switches suitable for the job being something of a rarity, the following scheme was devised.

Four pieces of spring brass are bent to



A handy switching arrangement for an extension loud-speaker.

form contacts similar to those of "push-pull" switches, and are mounted in pairs on a wood block, as shown in the sketch, each pair being shaped to make contact together. When wired according to the diagram a circuit is made to both speakers, and to cut out the speaker not required a small plug to separate the contacts is inserted through a hole in the wood block. The plug consists of a short length of



Circuit diagram for extension loud-speaker switch.

ebonite or hardwood rod slightly pointed at the end, and fitted with a knob. This scheme has not the disadvantage of single switches or plugs in that both speakers cannot be disconnected at once, while allowing either speaker to be selected at will.

The device can be mounted unobtrusively on the side of the set cabinet, or other

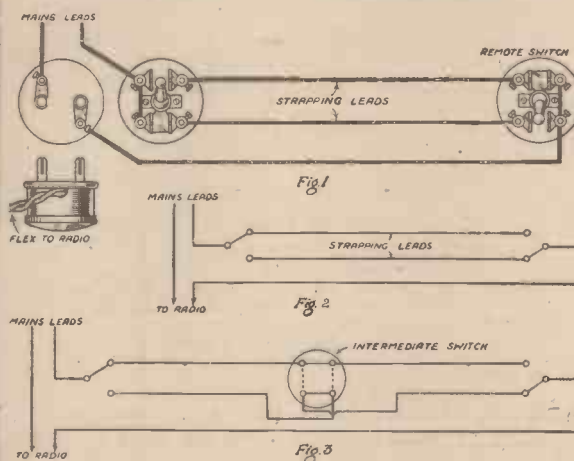
THAT DODGE OF YOURS!

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., 8-11, 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 Wrinkle.

suitable position, and can be made, if saving work is an object, from old push-pull switches or other discarded parts usually found in the junk box.—W. M. LITTLE (Edinburgh).

All-mains Remote Control A.C. or D.C.

THE accompanying diagrams show a remote control arrangement suitable for the mains-user, who needs no mechanical



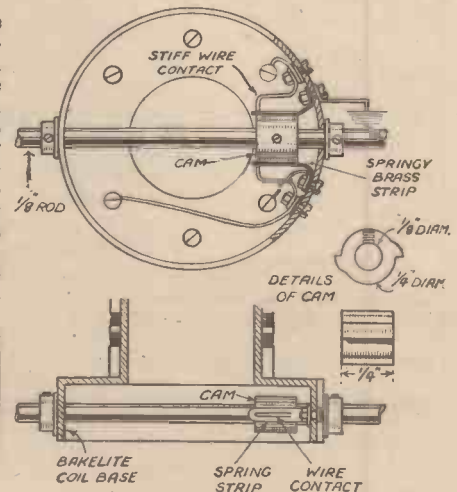
A remote control arrangement for use with A.C. or D.C.

devices other than the common electric lighting switch which is practically trouble-free. Two-way switches are employed in the following manner: First remove the wall socket into which the radio is plugged, disconnect the + lead, and reconnect this lead to the centre contact of a two-way switch. The return lead from the remote switch centre contact is then connected to the vacant socket, the whole then being replaced. When the twin strapping leads are connected, the two switches can be screwed up in their positions, one by the socket and the other in whichever room it

is desired to control the set (see Figs. 1 and 2). It is best to use triple lead-covered cable, size 1.044, and to make sure that the lead is earthed; this can be done by connecting a wire via a clip to the casing of the present wiring. This system can be enlarged upon and any number of control points installed by using intermediate switches in the strapping leads, as shown in Fig. 3.—E. C. PACKHAM (Hayes).

Curing Instability

THE following description of a dodge which completely cured instability in my set may prove useful to other readers. As most constructors know, long switch leads on coils fitted with high-gain H.F. stages very often cause instability, and for this reason many coils are fitted with self-contained switches. Some coils, however, are not fitted with switches and external switching has to be used. Such coils can easily be fitted with switches, as shown in the accompanying sketches. The small cam can easily be made of ebonite, or bakelite, and can be fixed with six or eight B.A. screws. The contacts are springy brass, or copper, strip and copper wire. They should nearly touch when the switch is off. Connections can be made to them straight from the windings. These switches have been in use for some time and have worked very satisfactorily. The arrangement may no doubt be adapted for various types of coil, and the actual construction modified to suit the particular coil used.—F. HAWKINS (Edgware).



A method of shortening coil leads for curing instability.

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# COSSOR



Illustration shows Models 368 & 436B. Models 360, 363 and 369A are generally similar.

## BATTERY MODELS

### Model 360 (Power Output)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. and Triode Power Output. Sensitive Moving Iron Speaker. Cabinet accommodates Batteries. **£5.15.0**

(Exclusive of Batteries)

Hire Purchase Terms : 12/6 deposit and 12 monthly payments of 10/-.

### Model 363 (Pentode Output)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. and Economy Pentode Output. Sensitive 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries. **£6.15.0**

(Exclusive of Batteries)

Hire Purchase Terms : 13/- deposit and 11 monthly payments of 13/-.

### Model 436B

(Class B Amplification)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., High Slope Power Driver and Class 'B' Output. Special 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries. **£8.8.0**

(Exclusive of Batteries)

Hire Purchase Terms : 16/- deposit and 11 monthly payments of 16/-.

## ALL-ELECTRIC MODELS

### Model 368 (A.C. Mains)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Triode Power Output. Heavy Duty Rect. 8" Energised Moving Coil Speaker. For A.C. Mains only 200/250 v. (adjust.) 40/100 cycles. **£8.18.6**

Hire Purchase Terms : 15/6 deposit and 12 monthly payments of 15/6.

### Model 369A (D.C./A.C. Mains)

Universal Receiver similar to illustration above. Specification as model 368 but with 8" Energised Moving Coil Speaker. For D.C. 200/250 v. (adjust.) and A.C. 200/250 v. (adjust.) 50/100 cycles. **£8.8.0**

Hire Purchase Terms : 14/6 deposit and 12 monthly payments of 14/6.

### De Luxe Model 367 (A.C. Mains)

(illustrated on right)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Directly Heated Power Pentode Output. Heavy Duty Rect. "Thermometer Tuning" with illuminated wavelength scale. 8" Energised Moving Coil Speaker. For A.C. Mains only 200/250v. (adjust.) 40/100 cycles. **£9.19.6**

Hire Purchase Terms : 17/- deposit and 12 monthly payments of 17/-.

IN these splendid new models Cossor offers the greatest value obtainable in up-to-date radio. Behind their production is one of the finest research laboratories in the country—a big staff of highly qualified engineers and a vast organisation (the largest of its kind in the country) operating in no less than six factories, each planned on the most modern lines. Little wonder that Cossor Radio is so efficient—so reliable!

**COSSOR**  
*SUPER-FERRODYNE*  
REGD  
**RADIO**

*The De Luxe Model 367*



# 1935-36 Quality Radio



### A.C. MAINS MODEL 364

(Similar to illustration above)

With Pentagrid Frequency Changer, H.F. Pentode I.F. Amplifier, Double Diode Detector, High Slope Pentode Output, Full Wave Rect., Thermometer Twin illuminated and detachable Scales. Combined On/Off, Wavechange and Pick-up Switch, Volume Control. 8" Mains Energised M.C. Speaker. Complete with plug and sockets for extension Speaker and for pick-up. A.C. Mains only 200/250 volts (adjust.) 40/100 cycles.

Hire Purchase Terms: 20/- deposit and 12 monthly payments of 20/-.

## 11 GNS.

Prices do not apply in I.F.S.

### BATTERY MODEL 366A

(illustrated above)

A Battery operated Superhet with Pentagrid Frequency Changer, H.F. Screened Pentode I.F. Amplifier, Double Diode Detector and Economy Pentode Output. 8" Moving Coil Speaker. Cabinet with accommodation for suitable Accumulator and Batteries.

Hire Purchase Terms: 17/6 deposit and 11 monthly payments of 17/6.

## 9 GNS.

(Exclusive of Batteries.)

### DE LUXE A.C. MAINS MODEL 365

(illustrated on right)

With a performance unsurpassed by any receiver regardless of price, this model incorporates every possible refinement that gives greater efficiency, simplicity and dependability. With Pentagrid Frequency Changer, H.F. Pentode I.F. Amplifier, Double Diode Triode Detector/Amplifier, Super Power Triode Output, Full-Wave Rect. Improved Superhet compensated Anti-Fading circuit with NEON Visual Tuning. Illuminated and detachable Scales. Combined On/Off Wavechange and Pick-up Switch. Volume Control. 10" Concert Grand Mains energised M.C. Speaker. Variable Tone control. Special switch plug for extension speaker. Connections for pick-up. A.C. Mains only 200/250 volts (adjust.) 40/100 cycles.

Hire Purchase Terms: 25/- deposit and 12 monthly payments of 25/-.

## 14 GNS.

## COSSOR SUPERHET RADIO

The De Luxe Model 365



THIS COUPON BRINGS FULL DETAILS

To A. C. Cossor Ltd.,  
Melody Dept., Highbury Grove, London, N.5.

Please send me free of charge, literature giving full particulars of the \*Model.....

Name.....

Address.....

\*Please state Model required.

PRAC. 34/8/35

7305



Full List of Exhibitors arranged in Alphabetical Order, with Addresses and Stand Numbers.

# GUIDE TO THE EXHIBITORS

NAME	ADDRESS	STAND No.	NAME	ADDRESS	STAND No.	NAME	ADDRESS	STAND No.
Ace Radio, 2-5, Dingley Place, E.C.1.		97	Dubiller Condenser Co. (1925), Ltd., Ducon Works, Victoria Road, North Acton, W.3		67	National Radio Service, Ltd., 15, Alfred Place, W.C.1		12
Adey Portable Radio, 99, Mortimer Street, W.1		1	Dulcetto-Polyphon, Ltd., 2-3, Newman Street, W.1		T16	New London Electron Wks., Ltd., East Ham, E.6		29
Aerialite, Ltd., Junction Mills, Whittington Street, Ashton-under-Lyne		8	Dyson & Co., Ltd., J., 5, Godwin Street, Bradford		T17	Newnes, Ltd., George, 8-11, Southampton Street, W.C.2		9
Aerodyne Radio, Ltd., Aerodyne Works, Tottenham, N.17		72	East London Rubber Co., Ltd., 29, Great Eastern Street, E.C.		T18	Nuvollon, Ltd., Meredith Works, Park Crescent, Clapham Park Road, S.W.4		220
All Power Transformers, Ltd., 8a, Gladstone Road, Wimbledon, S.W.		211	Eastick & Sons, J. J., 118, Bunhill Row, E.C.		T9	Oldham & Son, Ltd., Denton, Manchester		66
Allwave International Radio & Television, Ltd., 242, High Street, Bromley, Kent		109	Econasign Co., Ltd., 92, Victoria Street, S.W.1		208	Ormond Engineering Co., Ltd., Ormond House, Rosebery Avenue, E.C.		33
Anson & Hopwood, Ltd., 11, Berkeley Square, W.1		87	Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2		79	Orr Radio, Ltd., 79a, Parkhurst Road, N.7		96
Automatic Coil Winder & Elec. Equipment Co., Ltd., Winder House, Douglas Street, S.W.		103	Efficiency Magazine, 87, Regent Street, W.1		209	Ossicaide, Ltd., 447, Oxford Street, W.1		121
Balcombe, Ltd., A. J., 52, Tabernacle Street, E.C.		65	Electric (Croydon), Ltd., 97, George Street, Croydon		114	Partridge Wilson & Co., Ltd., Evington Valley Road, Leicester		104
Beethoven Radio, Ltd., Chase Road, North Acton, N.W.10		60	Electro Dynamic Construction Co., Ltd., Devonshire Grove, S.E.		112	Peta & Radford, 107a, Pimlico Road, S.W.1		94
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Bird and Sons, Ltd., Sydney S. (Cyldon Radio), Cambridge Arterial Road, Enfield, Middlesex		118	Epoch Reproducers, Ltd., Aldwych House, Aldwych, W.C.2		47	Plessey Co., Ltd., Vicarage Lane, Ilford, Essex		20
Britanna Batteries, Ltd., Union Street, Redditch, Worcs.		40	Erie Resistor, Ltd., Carlisle Road, Hendon		15	Portadyne Radio, Gorst Road, North Acton, N.W.		80
British Blue Spot Co., Ltd., Sterling Estate, Dagenham, Essex		28	Ever Ready Co. (G.B.), Ltd., Hercules Place, Holloway, N.7		71	Primus Mfg. Co., Primus House, Willow Street, E.C.2		19
British N.S.F. Co., Ltd., Waddon Factory Estate, Croydon, Surrey		48	Everett Edgecombe, Ltd., Colindale Works, Hendon, N.W.		229	Prism Mfg. Co., California Works, Brighton Road, Belmont, Surrey		117
British Permal Enamelled Wire, Ltd., Charlton, S.E.7		50	Ferranti, Ltd., Radio Works, Moston, Manchester, 10		74	Pye Radio, Ltd., Radio Works, Cambridge; Africa House, Kingsway, W.C.2		84
British Pix Co. 118, Southwark Street, S.E.		201	Film Industries, Ltd., 60, Paddington Street, W.1		4	R.A.P., Ltd., Ferry Works, Thames Ditton		106
British Rola Co., Minerva Road, Park Royal, N.W		43	Filnders (Wholesale), Ltd., 14-20, St. Peters Street, Ipswich		T0	Radio Gramophone Dev., Co., Ltd., Frederick Street, Birmingham		88 & 89
British Television Supplies, Ltd., Bush House, Aldwych, W.C.2		14	Fuller Accumulator Co. (1926), Ltd., Woodland Works, Chadwell Heath, Essex		119	Radio Instruments, Ltd., Purley Way, Croydon		102
British "Wireless for the Blind" Fund, 226, Great Portland Street, W.1		92	Garrard Eng. & Mfg. Co., Ltd., Newcastle Street, Swindon, Wilts.		57	Radio Society of Gt. Britain, 53, Victoria Street, S.W.		202
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Brown Radio Co., Wm. F., Ossillo Works, High Street, Brierley Hill, Staffs.		210	Gilbert & Co., Ltd., C., 73, Arundel Street, Sheffield		T23	Regentone Products, Ltd., Worton Road, Isleworth, Middx.		93
Browning Wireless Mfrs., 18, Shellgrove Road, N.16		228	Goodmans (Clerkenwell), Ltd., Broad Yard Works, Turmill Street, E.C.		51	Reproducers & Amplifiers, Ltd., Frederick Street, Wolverhampton		56
Bulgin & Co., Ltd., A. F., Abbey Road, Barking		117	Graham Farish, Ltd., 153, Masons Hill, Bromley		64	Rists Wires & Cables, Ltd., Freemantle Road, Lowestoft		213
Burgoyne Wireless (1930), Ltd., Great West Road, Brentford		2	Gramophone Co., Ltd., 108, Clerkenwell Road, E.C.		77, 82	Selecta Gramophones, Ltd., 81, Southwark Street, S.E.1		T24
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Burton, C. & H., Bernard Street, Walsall		105	Hacker & Sons, H., Perfecta Works, Ray Lea Road, Maidenhead		32	Sonochorde Reproducers, Ltd., Rothermel House, Canterbury Road, N.W.		54
Bush Radio, Ltd., Woodger Road, Shepherd's Bush, W.12		85	Haleyon Radio, Ltd., Sterling Works, Dagenham		30	Sound Sales, Ltd., Tremlett Grove Works, Junction Road, Highgate, N.19		108
Cadisch & Sons, R., 5-6, Red Lion Square, W.C.		T20	Hartley Turner Radio, Ltd., Thornbury Road, Isleworth, Middlesex		23	Stratton & Co., Ltd., Eddystone Works, Bromsgrove Street, Birmingham		30
Celestion, Ltd., London Road, Kingston-on-Thames		26	Haynes Radio, Queensway, Enfield, Middlesex		25	Suffex, Ltd., Aintree Road, Perivale, Greenford, Middx.		205
Central Equipment, Ltd., 188, London Road, Liverpool		3	Heyberd & Co., F. C., 10, Finsbury Street, E.C.		10	Sun Electrical Co., Ltd., 118, Charing Cross Road, W.C.2		T15
Chloride Electrical Storage Co., Ltd., 205-231, Shaftesbury Avenue, W.C.2		59	Hellesens, Ltd., Morden Road, Wimbledon, S.W.		21	Tannoy Products, Canterbury Grove, S.E.27		90
Churchmans, Ltd., 79, Maldenburgh Street, Colchester		T30	Hendersons, Wholesale Electric & Radio, Ltd., Electric House, Queens Road, Brighton		T28	Telegraph Condenser Co., Ltd., Wales Farm Road, Acton, W.3		37
City Accumulator Co., Ltd., 18, Normans Buildings, Central Street, E.C.		38	Henleys Telegraph Works, Ltd., Holborn Viaduct, E.C.		53	Telephone Mfg. Co., Ltd., Hollingsworth Works, Martell Road, S.E.		20
Clarke & Co. H. (M/C), Ltd., Atlas Works, George Street, Patricroft, Manchester		83	High Vacuum Valve Co., Ltd., 113, Farringdon Road, E.C.		27	Thompson Diamond & Butcher, 34, Farringdon Road, E.C.		T19
Climax Radio Electric, Ltd., Haverstock Works, Parkhill Road, N.W.3		22	Hillman Brothers, 123, Albion Street, Leeds		T8	Tucker Eyelet Co., Ltd., George, Jameson Road, Aston, Birmingham, 6		122
Cole, E. K., Ltd., Ekco Works, Southend-on-Sea		76	Hobby Bros., Ltd., 21, Great Eastern Street, E.C.		T22	The 362 Radio Valve Co., Ltd., Stoncham Road, Upper Clapton, E.5		212
Colvern, Ltd., Mawneys Road, Romford, Essex		55	Itonia, Ltd., 58, City Road, E.C.		T14	Ultra Electric, Ltd., Western Avenue, Acton, W.3		73
Concordia Electric Wire Co., New Sawley, Nr. Nottingham		218	Jackson Bros. (London), Ltd., 72, St. Thomas Street, S.E.		110	Union Radio Co., U.R. Works, Campbell Road, Croydon		18
Cosmoccord, Ltd., Cambridge Arterial Road, Enfield		221	Johnson Talking Machine Co., 96, Clerkenwell Road, E.C.		T11	Vandervell, Ltd., C. A., 319, Regent Street, W.1		214
Cossor, Ltd., A. C., Cossor House, Highbury Grove, N.5		70	Kingsway Radio, Ltd., 3-9, Dane Street, W.C.1		17	Varley, 103, Kingsway, W.C.2		31
Crypto Equipment Co., Acton Lane, Willesden, N.W.10		215	Kolster-Brandes, Ltd., Cray Works, Sidcup		78	Vidor, Ltd., West Street, Erith, Kent		98
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Darwins, Ltd., Fitzwilliam Works, Sheffield		107	Lectro Linx, Ltd., 79a, Rochester Row, S.W.1		115	Webber & Co., Ltd., J.M., 39, Great Eastern Street, E.C.2		T2
Davies Woodwork, D. M., Trading Estate, Slough		45	L. E. S. Distributors, Ltd., 15-16, Alfred Place, W.C.		T25	Westinghouse Brake & Signal Co., Ltd., 82, York Road, King's Cross, N.1		101
Dayzite, Ltd., 17, Lisle Street, W.C.2		T5	Levick & Sons, Ltd., Swift, Clarence Steel Works, Sheffield		113	Weston Electrical Instrument Co., Ltd., Kingston by Pass, Surbiton, Surrey		216
Decca Gramophone Co., 1-3, Brixton Road, S.W.9		34	Lissen, Ltd., Worpole Road, Isleworth, Middx.		86	Wharfedale Wireless Works, 62, Leeds Road, Bradford		203
De La Rue & Co., Ltd., Thos., 90, Shernhall Street, E.17		5	Lugton & Co., Ltd., 203, Old Street, E.C.		T10	Whiteley Electrical Radio Co., Victoria Street, Mansfield, Notts		95
Dent, B. H. (Ardente), 309, Oxford Street, W.1		46	McMichael Radio, Ltd., Danes Inn House, 265, Strand, W.C.2		68	Wingrove & Regers, Ltd., 188-9, Strand, W.C.2		49
Dew & Co., Ltd., A. J., 33, Rathbone Place, W.1		T21	Manufacturers Accessories Co. (1925), Ltd., 85, Great Eastern Street, E.C.		T7	Wireless Retailers Association, 316, First Avenue House, High Holborn, W.C.		T4
Dibben, Ltd., Horace, 34, Carlton Crescent, Southampton		T1	Marconiphone Co., Ltd., 210, Tottenham Road, W.1		11 & 69	Wright & Weaire, Ltd., 740, High Road, Tottenham, N.17		217
Diggle & Co., Ltd., A., Jane Street, Rochdale		16	Milnes Radio Co., Ltd., Church Street, Bingley, Yorks		204			
			Mullard Radio Valve Co., Ltd., Mullard House, Charing Cross Road, W.C.		5			

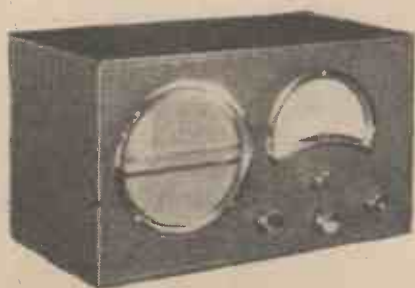




**Items of Outstanding Interest on Each Stand**  
By THE TECHNICAL STAFF.

**STAND No. 1**  
**ADEY PORTABLE RADIO, 99, Mortimer Street, W.1.**  
THE interesting portable receivers on this stand strike quite a novel note and interest everyone. There are many novel features in the receivers, and although of such small dimensions they have quite an appreciable range and the volume also is quite considerable in spite of the smallness of the voltage supplies. The Oriental finish renders these small receivers ideal for the modern small flat, where they may be permanently fitted as the home set.

**STAND No. 2**  
**BURGOYNE WIRELESS (1930), LTD., Great West Road, Brentford.**  
A FEATURE of the receivers exhibited on this stand is that special attention has been paid to the removal of interference from the high-powered station at Droitwich, and certain receivers have been designed for special use in the Midland area, where



The new Marconiphone Model "235" The large tuning dial is an interesting feature on this receiver and it can be seen on the right.

this trouble is quite considerable. Some receivers are fitted with a Droitwich filter, and the receivers cover A.C., Universal and Battery working, and range from simple circuits to radiograms.

**STAND No. 3**  
**CENTRAL EQUIPMENT, LTD., 183, London Road, Liverpool.**

ALL the novel aerial devices shown on this stand will appeal to every type of listener, and many present unsightly and inefficient aerials will no doubt be scrapped and replaced by one of the small and efficient devices exhibited. The "No-Mast" may already be seen on many houses, but the new version shown on this stand has certain advantages, and when used in conjunction with the Fletch Lightning Arrester, also shown, forms a fully-protected and efficient collector of energy. The Slit earth device is also an attraction and has novel merits,

**STAND No. 4**  
**FILM INDUSTRIES, LTD., 60, Paddington Street, London, W.1.**

THIS exhibit includes some novel amplifiers and speakers, whilst a new microphone, type M3, attracts many. This has been designed for high-fidelity work, such as music relays, etc., and gives a full bass response and a high output. It costs 10 guineas and may be obtained in various types suitable for table use or for use with stands or suspension schemes.

**STAND No. 5**  
**DE LA RUE & CO., LTD., THOS., 90, Shernhall Street, E.17.**

THE extensive range of mouldings which are shown on this stand gives to the visitor some indication of the extensive branches which are covered in the manufacture of radio accessories and components.

**STAND No. 6**  
**ILIFFE & SONS, LTD., Dorset House, Stamford Street, S.E.**

**STAND No. 7**  
**BERNARD JONES PUBLICATIONS, LTD., Chancery House, Chancery Lane, W.C.**

**STAND No. 8**  
**AERIALITE LTD., Junction Mills, Whittington Street, Ashton-U-Lyne.**

AMONGST the large exhibit of wires, flexible leads and H.T. batteries, the various compact forms of indoor aerial form a remarkable display. These devices will assist in improving reception where it is not possible to erect an outside aerial, and are greatly to be preferred to the simple flex laid around the walls. There are various types to suit different needs, and, in addition, there is some interesting wire for outdoor use, and the necessary brackets and fittings to make a really sound job.

**STAND No. 9**  
**NEWNES, GEO., LTD., 8-11, Southampton Street, Strand, London, W.C.2.**

IN addition to the comprehensive display of books on wireless and kindred subjects, our stand was besieged from the moment of opening by readers anxious to meet the Editor and Staff and to bring with them interesting problems which had arisen in their hobby and which they felt could not be adequately solved by correspondence. In addition, many readers came to thank us for the benefits which they had obtained from our Free Advice Bureau, and several stated that they could not thank us enough for the time and worry we had saved them in putting their receivers into working condition. They said that we had no idea what a relief it was, after spending several nights fruitlessly trying to get the set to work, to find on submitting it to us that some component was defective—and which they could never have traced without suitable instruments—and then to get the set back in sound working order. Many interesting suggestions have also been given to us concerning

articles which readers would like to see in future issues, and a careful record is being kept of all complaints, suggestions, and recommendations concerning receiver designs. We thank all those readers who we were not able to see personally.

**STAND No. 10**  
**HAYNES RADIO, Queensway, Enfield, Middlesex.**

THE receiver with a meter on the tuning dial seemed to cause quite a stir during the early days at the exhibition. Listeners seem to have become accustomed to the novelties in tuning devices, and the use of a simple meter—which, of course, is quite as efficient—seemed to attract a lot of attention. In addition, the elaborate chassis design and the interesting test apparatus are worthy of inspection. Some interesting details concerning circuit design are to be obtained on this stand.

**STAND No. 11**  
**MARCONIPHONE CO., LTD., 210, Tottenham Court Road, W.1.**

THE Marconiphone exhibits on this stand and on No. 69 comprise some interesting types of receiver, and the Marconimen rendered these stands easily identifiable. The Model "235" table receiver



The Haynes receiver. Note the tuning indicator, which, in this receiver takes the form of a milliammeter in the circuit of the controlled H.F. valves.

strikes a novel note, and the large tuning dial is a new departure for the Marconi receivers, which have hitherto relied upon the small type of tuning indicator. This new type of dial is also to be seen on the model "240." When switched on a circle of light is projected on to the back of the scale and a hairline on the light spot indicates the exact tuning point. Other interesting exhibits on these stands include the car-radio unit and the range of Marconi valves.

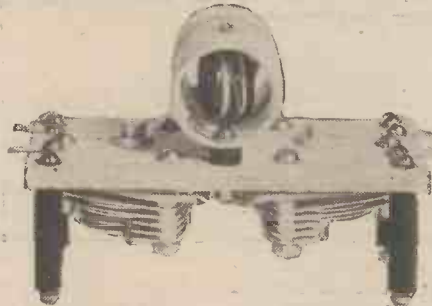
**STAND No. 12**  
**NATIONAL RADIO SERVICE, LTD., 15, Alfred Place, W.C.1.**

An interesting range of products may be seen on this stand, ranging from complete receivers for "tropical" use, to small accessories such as headphones, car-radio aerials, microphones, etc. The tropical sets are of the all-wave superhet type and are complete with batteries.

**STAND No. 13**  
**AMALGAMATED PRESS, LTD., Fleetway House, Farringdon Street, E.C.**

**STAND No. 14**  
**BRITISH TELEVISION SUPPLIES, LTD., Bush House, Aldwych, W.C.2.**

UNDOUBTEDLY the amateur will find this stand one of the most interesting in the hall, in view of the large range of accessories which are displayed.



One of the new B.T.S. short-wave components. This is a special I.F. transformer for ultra-short-wave superhet receivers. It has air-dielectric trimmers and variable coupling.

In addition to the ordinary broadcast apparatus, there is a most interesting range of short-wave components, none of which has before been on sale. The B.T.S. components have not, of course, previously been seen at Olympia, and all of the short-wave parts which are now to be seen have been developed and introduced for the first time at Olympia. There are also a number of parts specially designed for use in conjunction with television receivers, and a complete range of television equipment is obtainable.

**STAND No. 15**  
**ERIE RESISTOR, LTD., Carlisle Road, Hendon, N.W.9.**  
THE display of resistors is quite a fascinating one, and the newly-introduced 1/4-watt components offer an attraction to the set-builder, as in many cases such a rating is ample, and hitherto it has not been



A new Celestion loud-speaker of interesting design. The magnet system may be seen to have considerably increased in size over the usual type of speaker.

possible to obtain the Eric wire-end resistor in any but the 1-watt type. The smaller space which is occupied, coupled with the lower cost, will therefore be an important consideration in the construction of the modern receiver. In addition to these resistors, the volume controls, with and without a combined switch, are to be seen. The special resistors designed for use with car-radio apparatus to prevent interference are worthy of inspection.



An ultra-short-wave choke of novel design. This is the new Kingsway product, and the glass tube is filled with a special liquid.

**STAND No. 16**  
**DIGGLE & CO., LTD., A., Jane Street, Rochdale, Lancs.**

THE small trader and the serviceman will find the Reliance charging apparatus of particular interest on this stand. Their range of apparatus is quite considerable, and some of the larger plant possesses novel features which will appeal to the dealer who is anxious to add battery-charging to his other activities.

**STAND No. 17**  
**KINGSWAY RADIO, LTD., 3-9, Dane Street, W.C.1.**

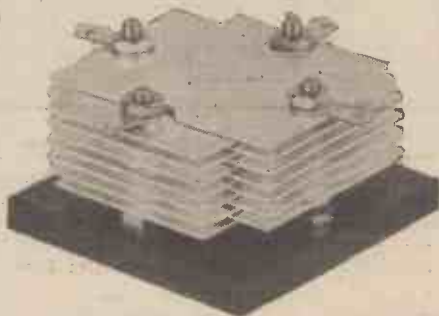
THE popular Simpson's Electric Turntable is no doubt the principal item on this stand, although the recently introduced component parts will also attract the amateur set-builder. We have already commented on the novel H.F. choke for ultra-short-wave use, and the large range of L.F. transformers, mains transformers, and chokes will also repay inspection.

**STAND No. 18**  
**UNION RADIO CO., U.R. Works Campbell Road, Croydon.**

THE range of Unirad receivers possess novel circuit features, and the various designs and models comprise an extensive range.

**STAND No. 19**  
**PRIMUS MFG. CO., Primus House, Willow Street, E.C.2.**

An interesting range of H.T. batteries may be seen on this stand which will appeal to the battery user. An extensive range is covered and various capacities are obtainable suitable for a simple receiver or a multi-valve receiver employing large types of valve.



An air-dielectric condenser for use in short-wave receivers. This is another B.T.S. component which is being shown at the exhibition.

**STAND No. 20**  
**PLESSEY CO., LTD., Vicarage Lane, Ilford, Essex.**

THE exhibits on this stand consist mainly of accessories and assemblies for the commercial set-builder, and some novel chassis and related parts are to be seen. These parts are not, unfortunately, obtainable by the home-constructor, but they furnish interesting information concerning the method adopted in commercial apparatus for assembly and simplicity of wiring, etc.

**STAND No. 21**  
**HELLESENS, LTD., Morden Road, Wimbledon, S.W.**

IN addition to the very small batteries seen on this stand there are some super single-capacity batteries and some power batteries which will appeal to the set-user who finds the replacement problem a matter of some importance. The capacity of the battery is a vital factor, and the wide range of Hellesep batteries will no doubt prove of interest to the visitor.

**STAND No. 22**  
**CLIMAX RADIO ELECTRIC, LTD., Haverstock Works, Parkhill Road, N.W.3.**

THE "Sports" Model is probably the most interesting exhibit on this stand, as it represents in the receiver range what the sports car represents in the motor-car range. It is a straight circuit, and is obtainable for A.C. or Universal mains use. There are many other interesting models on the stand, ranging from battery circuits to the all-wave superhet for mains use. All the modern circuit features are incorporated in this large model.

**STAND No. 23**  
**HARTLEY TURNER RADIO, LTD., Thornbury Road, Isleworth, Middlesex.**

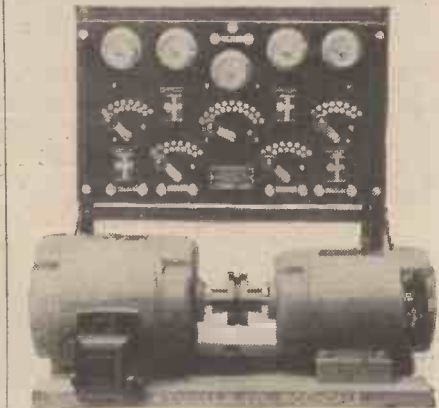
THE home-constructor's amplifiers and receivers probably prove the greatest attraction, although the loud-speakers are also an important feature of this exhibit. There are, in addition, some interesting complete receivers and de luxe radiograms.

**STAND No. 24**  
**LAMPEX RADIO & ELECTRIC CO., 62, Brewery Road, N.7.**

THE Phantom battery receiver is an important feature on this stand, and the oval tuning dial is of rather novel design. Other models on the stand include a band-pass four-valver for battery use, and the cabinets are of pleasing design. In both of these receivers a pentode valve is used in the output stage.

**STAND No. 25**  
**HEAYBERD & CO., F. C., 10, Finsbury Street, E.C.**

ALTHOUGH the new mains receiver is a prominent feature on this stand, the extensive range of mains equipment no doubt forms a very attractive part of the complete exhibit. The mains transformers,

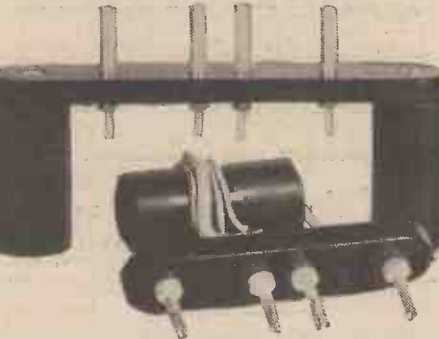


A Reliance charging plant, one of the products of Messrs. A. Diggle & Co. There is an extensive range of this equipment and it may be inspected on Stand No. 16.

chokes, condensers, and other accessories for the construction of complete mains units or receivers cover a most exhaustive range, and, in addition, there are interesting parts for the construction of charging and other L.T. equipment.

**STAND No. 26**  
**CELESTION, LTD., London Road, Kingston-on-Thames.**

THE newly-designed Celestion speakers are the subject of this exhibit, and they possess many features not to be found in the older models. The use of the high-note tweeter is increasing, and it is to be noted that all the new speakers are claimed to have a wider range, which includes better high-note response. Sensitivity, too, is increased, and the speakers are obtainable in various models covering every need.



Another B.T.S. short-wave component in which the coil is of exceedingly small dimensions. There is now a most comprehensive range of short-wave components to be found on the B.T.S. stand—No. 14.

**STAND No. 27**  
**HIGH VACUUM VALVE CO., LTD., 113, Farringdon Road, E.C.**

VALVES of every type may be seen here, and in addition to a complete range of battery and mains valves of already-popular types there are the new A.V.E. and Harries output valves. The peculiar spacing of the electrodes in the latter valve will no doubt excite comment; whilst the advantages to be



The new Heayberd mains receiver. This is the 4-point A.C. receiver and retails at £14 14s. It will be noticed that all controls are hidden from view beneath the lid.

# AN HISTORIC ATTAINMENT



This startling new design, bristling with important improvements on orthodox practice, marks a new peak of high achievement in Speaker technique. It enables the "quality" enthusiast to obtain, at reasonable cost, a "laboratory" standard of reproduction previously only obtainable at almost prohibitive expense.

Amongst the "1936 Stentorian's" innumerable technical advantages the following are outstanding. Each in itself is a marked advance. Each takes an important part in bringing a new high fidelity and volume.

- ⊙ New and larger "Mansfield" magnet, giving a flux density previously unequalled in a commercial instrument.
- ⊙ New micro-accurate construction, providing better sensitivity and cleaner reproduction.
- ⊙ Improved "Microlode" matching device, section-wound and paper interleaved.
- ⊙ Hand-made cone, for improved attack and freedom from frequency-doubling and focusing.

Read Mr. Camm's message, and then hear a "1936 Stentorian" for yourself. You will be amazed at the new quality it gives!



"Every constructor owes your engineers a debt of gratitude for your 1936 Stentorian." Once again they have beaten their best—excellent precision workmanship, even wider frequency response, higher degree of magnetic flux, entrancing tone at which the most critical could not cavil—and, above all, outstanding sensitivity.

"Can there be a better speaker?"

*J. H. Camm*

Hear for yourself—on your own set if possible—the reason for Mr. Camm's enthusiasm. You will be struck by the magnificent volume and the new cleanness of reproduction. You will notice clear top notes and a strikingly colourful realism of which you never thought your set capable.

Ask your Dealer to-day or write for the leaflet.

# 1936

## 1936 STENTORIAN PRICES:

Senior Chassis	—	42/-
Junior	,"	32/6
Baby	,"	23/6
Midget	,"	17/6
Stentorian Duplex		84/-

RADIOLYMPIA

SEE THEM ON

STAND No. 95

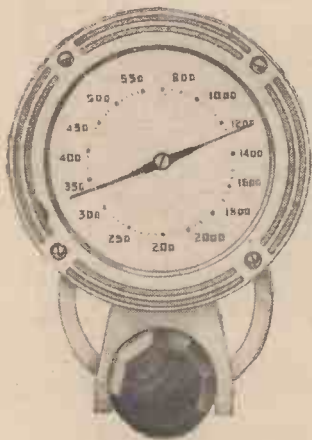
# STENTORIAN

Whiteley Electrical Radio Co., Ltd., Radio Works, Mansfield, Notts.

Sole Agents in I.F.S.: Kelly and Shiel, Ltd., 47, Fleet Street, Dublin.

# RADIO

## MUST BE TUNED!



**AIR-PLANE DIAL**

Bold wavelength calibration, dual lampholder and escutcheon fitted with glass. Three finishes: chrome, oxidized silver, and bronze.

Catalogue No. 2130. Price 5'9

Obviously! But if you want the best go to Stand No. 110 at Radiolympia. We are specialists in tuning for every phase of radio, and shall be pleased to advise you on your tuning problems. If you are unable to visit our Stand, please send for our latest illustrated list, which contains a remarkable range of tuning components.



**NEW BABY GANG**

New Baby Gang Double Spaced Two Gang. Catalogue No. 2142.

Price 10'6

Three Gang Catalogue No. 2192.

Price 15'-

## STAND NUMBER 110



**JACKSON BROS. (LONDON) LTD.**  
72, St. Thomas Street, S.E.1 Telephone Hop 1837

## 'SPARTA' IN NAME AND A SPARTAN in quality



Sparta Batteries are not merely of high quality but they are consistent in quality. There is nothing to touch them at 7/6 for 120 volt.

For Super Power try a Fuller SUPER battery 10/6 only 120 volt.

*Dealers everywhere stock them*

And Fuller features the ideal combination — A L.T. Accumulator Type LDGH at 10/-.

SERVICE AGENTS THROUGHOUT THE COUNTRY

## SEE OUR STAND No. 119 AT OLYMPIA

THE FULLER ACCUMULATOR CO. (1926) LTD., CHADWELL HEATH, ESSEX. 'Phone: Seven Kings 1200. 'Grams: Fuller, Chadwell Heath.

## Price and Preference

For many of us, price marks a boundary; but no limit need be set to the enjoyment from one's pipe. Price and preference can be reconciled. Hosts of smokers who first considered cost, now "fill up" with "Airman" for choice.



MIXTURE  
FLAKE  
NAVY CUT

**10d.**  
PER OZ.

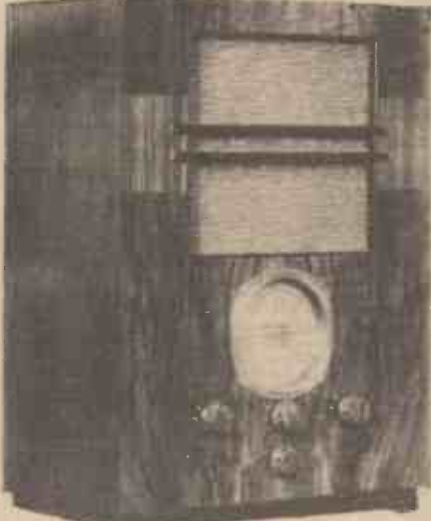
NAVY CUT  
DE-LUXE 11'

# PLAYER'S AIRMAN TOBACCO

gained both from this valve and the double-triodes designed for automatic volume expansion will no doubt be shown during the coming season in new receiver designs. There are also shown some commercial and some amateur-built Midget receivers in which the new valves are employed. They include a 1-valve set in a cigarette box and a Midget Police Pocket Receiver.

**Stand No. 28**  
**BRITISH BLUE SPOT CO., LTD.,** Sterling Estate, Dagenham, Essex.

**T**HE new radiogram with totally enclosed controls is probably the principal exhibit on this stand, and there is much to be said for this type of design. When not in use nothing can be seen of either the



The Torador—a product of Messrs. Hacker & Sons. The large airplane tuning dial is an important feature of this receiver, and it greatly facilitates the tuning operations.

radio or the gramophone apparatus and the only indication that the apparatus is used for wireless purposes is the loud-speaker opening at the bottom.

**Stand No. 29**  
**TELEPHONE MFG. CO., LTD.,** Hollingsworth Works, Martell Road, S.E.

**T**HE range of T.M.C.-Hydra condensers may be seen on this stand, and they cover all ordinary radio requirements. From the simple tubular models of very small capacity to the multi-unit blocks in metal cases, there are all types and capacities. Novel features are incorporated in these condensers which ensure safety and protection against breakdown, and the tubular models are non-inductive. A special method of sealing is adopted, which prevents the entry of moisture, and the metal-cased types are all clearly marked with their capacity and working voltage.

**Stand No. 30**  
**STRATTON AND CO., LTD.,** Eddystone Works, Bromsgrove Street, Birmingham.

**T**HE short-wave enthusiast will find much to interest him on this stand, and the various



This new Varley I.F. transformer enables the degree of coupling to be adjusted from the panel. There are many advantages to be gained by this arrangement, and it should be inspected on Stand No. 31.

components need no introduction to the old hand. In addition to the multi-range coil unit, which is employed in our All-wave Three receivers described in this issue, there are condensers, chokes, valve and coil-holders, insulators, coil formers, I.F. transformers, H.F. chokes, and many small items for use in the construction of short-wave apparatus. A particularly interesting new item is the telescopic aerial for use on the 5-metre waveband.

**Stand No. 31**  
**VARLEY, LTD.,** 103, Kingsway, W.C.2.

**T**HE newly-introduced air-tuned I.F. transformers are probably the most interesting item in this exhibit, as they are a distinct departure from the transformers which have already been available. In place of the usual solid-dielectric trimming condensers these components are fitted with air-dielectric trimmers and many advantages are claimed for this improvement. The permeability tuner is now seen in two distinct types, one for superhet and the other for straight circuits, and it may be obtained in three- or four-gang units.

**Stand No. 32**  
**HACKER AND SONS, H. Perfecta Works,** Ray Road, Maidenhead.

**T**HE large circular tuning dial on the Dynatron receivers seen on this stand immediately attracts attention. This part of the receiver is, of course, the most important from the operating point of view, and tuning is greatly simplified with this full type of dial which is incorporated a visual tuning indicator. This is known as Searchlight tuning, and a ray of light travels round the dial as the receiver is adjusted and the ray varies in width according to signal strength and thus enables very accurate tuning to be carried out. Other novelties are to be seen, including an all-wave receiver with a separate short-wave section.



In this new Blue Spot radiogram, the control panel, as well as the gramophone turntable, is completely enclosed when not in use by the two hinged doors. There is thus only the speaker opening left to indicate that the piece of furniture is actually a wireless set, and no doubt in time even this will disappear.

**Stand No. 33**  
**ORMOND ENGINEERING CO., LTD.,** Ormond House, Resebury Avenue, E.C.

**M**ANY interesting sundries, amongst which may be mentioned condensers, transformers, dials, switches, knobs and so on, are to be seen on this stand in addition to some loud-speakers. These include a new permanent-magnet model available in two different designs. Three complete receivers are also to be seen, and one of these is designed for use on any type of mains supply.

**Stand No. 34**  
**DECCA GRAMOPHONE CO.,** 1-3, Brixton Road, S.W.9.

**U**NDoubtedly the Portable Radiogram is the centre-piece of attraction on this stand. A complete superhet receiver incorporating also a turntable, pick-up and loud-speaker, and all embodied in a case no larger than the old-time portable gramophone, this is indeed a remarkable piece of equipment. It may be obtained for either battery or mains operation.



A new Halcyon receiver.

**Stand No. 35**  
**GENERAL ELECTRIC CO., LTD.,** Magnet House, Kingsway, W.C.2.

**T**HIS stand is shared with Nos. 44 and 63 by the G.E.C. and the three are devoted to an exhibition of complete receivers, loud-speakers and other accessories, batteries and valves. The full range of valves is, of course, already popular and the triode-pentode is the latest addition to these. Amongst the H.T. batteries there are types for all purposes, and a new development in the design of these batteries has facilitated the production of a new H.T. and G.B. battery which is claimed to have a longer life than any previously produced type. In the receiver range, there are only two new models.

**Stand No. 36**  
**HALCYON RADIO, LTD.,** Sterling Works, Dagenham, Essex.

**A**N all-wave receiver is to be seen on this stand, together with other interesting radio and radiogram apparatus. The A.C.T.G. is probably the outstanding model exhibited and this has all the controls but one hidden and thus presents a very pleasing and neat appearance. The cabinet-work, as well as all the technical details, is of a high standard.



A complete Decca portable radiogram, combining a superhet receiver, loud-speaker and the necessary gramophone section. This interesting piece of apparatus may also be obtained for use direct from the mains if desired.



1936 STENTORIAN

NEW ACOUSTICALLY BALANCED  
NON-RESONANT CABINET

**STAND No. 37.**  
**TELEGRAPH CONDENSER CO., LTD.,** Wales Farm Road, Acton, W.3.

THE display of fixed condensers is most impressive, and from the smallest "postage-stamp" model to the large power-station model there is a condenser for practically every purpose. Mica dielectric, paper dielectric, tubulars, electrolytics, block condensers and various other types are represented, and in addition to the patterns familiar to home constructors there are also models designed especially for commercial-set manufacturers in which various special features are incorporated.

**STAND No. 38.**  
**CITY ACCUMULATOR CO., LTD.,** 18, Normans Buildings, Central Street, E.C.

THE elaborate furniture shown on this stand gives some indication of the way in which the ordinary wireless receiver may be camouflaged, or at least combined with some useful article in the home. In too many cases the receiver is of such a size that it requires a table to itself and then takes up a lot of



In this Ardent radiogram a special control panel is fitted to enable the output from microphone, pick-up, or radio to be mixed and faded at will.

room in the modern small house, and the methods adopted by C.A.C. to incorporate the radiogram with a clock, a divan, etc., are very interesting. The circuits employed are modern, and embrace every refinement for simple operation and efficient results. The special H.F. tuning pack for home constructors is an interesting exhibit and simplifies the construction of a superhet incorporating the heptode valve.

**STAND No. 39.**  
**NEW LONDON ELECTRON WORKS, LTD.,** East Ham, E.6.

THE Globe aerial identifies this stand, and it is accompanied by the Superial, two devices which have been developed in the interests of the listener who cannot erect the full-size outdoor aerial with all the advantages of height and an unobscured position. The Globe aerial is claimed to have very good features and will no doubt appeal to the flat-dweller. A new screened aerial is also to be shown on this stand, in addition to some insulator plus for the support of aerial or lead-in wires.

**STAND No. 40.**  
**BRITANNIA BATTERIES, LTD.,** Union Street, Redditch, Worcs.

THE Pertrix batteries are an attractive exhibit on this stand and include various types and capacities. In addition to those which are familiar to the wireless receiver user, there are bell cells, cycle lamp batteries, and other types. The special range of unspillable accumulators, which have been designed for portable apparatus, are also worth an examination, and it will be noted that they employ a glass container as a measure of safety and precaution against breakage.

**STAND No. 41.**  
**EMPIRIC LTD.,** 51, Calthorpe Street, W.C.1.

**STAND No. 42.**  
**BENJAMIN ELECTRIC, LTD.,** Brantwood Works, Tariff Road, N.17.

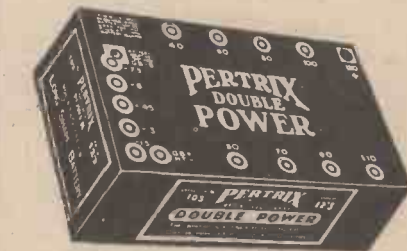
THE Magnavox Sixty-Six is undoubtedly the centre-piece of this stand. The imposing array of other Magnavox models also lends attraction to the stand and some interesting features are to be found in these speakers. They are, of course, well known among the older experimenters and have been popular for a long time. The Sixty-Six now has several improvements and is a powerful speaker which will fill a large hall for dance purposes, or may be operated from a modest home receiver with just as good results. The remaining Benjamin products, such as valveholders, chokes, etc., are also of considerable interest.

**STAND No. 43.**  
**BRITISH ROLA CO.,** Minerva Road, Park Royal, N.W.

THE new large oversize speakers are new-comers to the Rola stand, and these take their place with the other Rola models, amongst which are included special types for car radio in which every precaution has been taken to prevent the entry of dust into the gap. This is a vital point in a speaker which is fitted in a car, as there is considerable road dust swept up during a journey, and although it may not be visible in all parts of the car, it is bound (as it consists of quite a considerable amount of metal dust) to find its way into an unprotected magnet. The small speakers are also very interesting and lend themselves to the development of midget receivers which are capable of a really high-quality performance. The new Fidelity speakers will no doubt attract the quality enthusiast, and the 12in. D.C. model will probably be considered by many to be the ideal speaker for the new season's set.

**STAND No. 45.**  
**D. M. DAVIES WOODWORK, Trading Estate, Slough.**

**STAND No. 46.**  
**DENT, R. H. (ARDEnte),** 309, Oxford Street, W.1.  
ALTHOUGH the name of Ardent is ordinarily associated with Deaf Aid apparatus, the various public-address outfits on this stand indicate that their activities in the field of sound amplification have considerable range. The new receivers will no doubt attract many, and the combined control panel on the radiogram, which enables fading and mixing of pick-up, microphone, and radio, will no doubt prove a great



Two of the new Pertrix batteries. The lower model is of the new semi-insipillable type in glass container which is of value in a transportable receiver.

attraction. This is a useful device and gives the radio-gram a much wider field of entertainment. The circuit of this instrument possesses certain novelties and the tone-control operates on either microphone, pick-up, or radio.

**STAND No. 47.**  
**EPOCH REPRODUCERS, LTD.,** Aldwych House, Aldwych, W.C.2.

THE little Super Dwarf is an important item on Stand No. 47, and although only 5in. in diameter it will handle the output from a 2½-watt pentode or other similar output stage with ease. In addition to this valuable feature, it is sufficiently sensitive to operate on a quarter of a watt. For those who require large speakers there are some interesting models from which to choose, and probably the Model 60 is the most popular of these. The complete range of Epoch speakers is extensive and there are many different types which cover practically every purpose, from the simple home reproducer to the large cinema model.

**STAND No. 48.**  
**BRITISH N.S.F. CO., LTD.,** Waddon Factory Estate, Croydon, Surrey.

THE popular components for the home constructor which are seen on this stand embrace tubular condensers, resistors, volume controls, and so on. These components are of high quality, and have been well known for many years, and are now known as the Polar-N.S.F. components. The range includes wire-end resistors and condensers and some semi-dry electrolytic condensers which have a particularly low leakage current. These are designed for 500 volts working (D.C.) and are obtainable in capacities of 4, 6, or 8 mfd.

**STAND No. 49.**  
**WINGROVE & ROGERS, LTD.,** 188-9, Strand, W.C.2.

THE Polar range of components shown here is very impressive and the constructor will find practically every item which is of importance in the building of a receiver. The range of tuning dials covers full vision, straight-line, arcuate, and the small escutcheon type, and the condensers which are shown cover all types of circuit, from the single short-wave arrangement to the four-gang superhet type. In addition, there are reaction condensers, trimming condensers, and some interesting new condensers for short-wave work in which the vanes are made from a zinc alloy.

**STAND No. 50.**  
**BRITISH PERMEL ENAMELLED WIRE, LTD.,** Charlton, S.E.7.

THE making of wireless set connections is an important feature of the hobby, and the range of wires shown on this stand includes some enamelled wires which are also highly suitable for the construction of coils, transformers, etc. The difficulty in constructing some apparatus of this nature is that sufficient wire cannot be accommodated unless a thin covering is used and enamelled wire meets this requirement. Unfortunately, it is essential that the enamel covering does not crack or suffer from pin-holes, as there is a risk of arcing in such cases. The interesting pin-hole-finding machine displayed on this stand will thus prove very interesting to the visitor.

**STAND No. 51.**  
**GOODMANS (CLERKENWELL), LTD.,** Broad Yard Works, Turnmill Street, E.C.

THE most important item on this stand is no doubt the "Grille" P.M. speaker, in which the usual difficulties associated with the cone surround have been overcome. The cone is fully floating and consequently the response curve is much more free from resonances and covers a greater range. It is claimed that the range extends from 32 to 10,000 cycles free from frequency doubling. There are several other interesting models on the stand as well as a novel volume control, and it will be noted that this particular component is fitted to the extension speakers which are on show.

**STAND No. 52.**  
**DEPARTMENT OF OVERSEAS TRADE**

**STAND No. 53.**  
**HENLEYS TELEGRAPH WORKS, LTD.,** Holborn Viaduct, E.C.

THE Solon soldering iron in all its types is the main feature on Stand No. 53, and this is accompanied by the Solon Solder. The importance of soldering in receiver construction has often been stressed by us, and an electric iron with a resin-cored solder ensures that really sound joints may at all times be made. In addition to the small irons suitable for amateur use, there may be seen on this stand the large commercial irons which are employed for soldering large metal chests, etc., and with all models a novel heat-proof connecting box is fitted, as well as a substantial flexible lead.

**STAND No. 54.**  
**SONOCHORDE REPRODUCERS, LTD.,** Rothermel House, Canterbury Road, N.W.

THE piezo-electric items on this stand strike a new note in wireless equipment, and naturally attract a considerable amount of attention. In addition to the special high-note speaker utilising this device, there are microphones and a gramophone pick-up. The special speaker is intended to be employed in conjunction with a good moving-coil speaker capable of reproducing the lowest notes, when the combination will cover all ordinary requirements and, provided that it is fed correctly, will cover the entire range broadcast or included on gramophone records.

**STAND No. 55.**  
**COLVERN, LTD.,** Mawneys Road, Romford.

A NEW type of Ferrocart coil is the main exhibit on this stand and it is accompanied by various other types of coil which are already well known to amateurs. It will also be noticed that air-core coils are still being produced and one or two new types are exhibited. The new intermediate-frequency of 465 kc/s is employed for the new superhet components and,



One of the new Goodmans speakers. This may be seen on Stand No. 51.

in addition to standard lines such as resistances, pre set condensers and I.F. transformers, there is a special short-wave condenser which has been produced this year. Complete tuning units, in which coils are combined with a ganged condenser and wave-change switch, will enable a receiver to be easily constructed, as this is the most important part of any receiver.



The popular Multi-mu loudspeaker produced by Reproducers and Amplifiers, Ltd. This is a valuable extension model and the impedance may be accurately matched by means of the device on the rear of the speaker chassis.



A Philips receiver. This is one of the new models to be seen on Stand No. 62.

STAND No. 56  
REPRODUCERS & AMPLIFIERS, Frederick Street, 15, Wolverhampton.

ALTHOUGH the various loud-speaker designs are the main feature on this stand the interesting multi-ratio matching transformer undoubtedly forms a most important item. This provides sixty-five separate ratios and thus enables an output stage to be very accurately matched with any type of speaker. Its use is not confined to a simple output valve, for it may be used with pentodes, triodes in push-pull, or pentodes in push-pull. The Multi-mu transformer is a model designed especially for use with an existing speaker and receiver and the adjusting control on this speaker enables the matching to be accurately carried out.

STAND No. 57  
GARRARD ENG. & MFG. CO., LTD., Newcastle Street, Swindon, Wilts.

HERE is a wonderful display of gramophone apparatus, from the simple clockwork turntable to the complete all-electric equipment complete with pick-up and needle-cups. These complete playing-desks greatly facilitate the construction of a radio-gram and reduce the amount of constructional work considerably. The recording equipment is interesting, and the unique method of incorporating gramophone record-changing apparatus is well worth inspecting. The range of the exhibit is most complete, and equipment is available for every type of supply.

STAND No. 58 } B.B.C. PUBLICATIONS.  
STAND No. 58A }

STAND No. 59  
CHLORIDE ELECTRICAL STORAGE CO., LTD., 205-231, Shaftesbury Avenue, W.C.

A VERY comprehensive range of accumulators is to be seen here, including small unspillable types for portables and similar apparatus, and the large block units for high-tension purposes. There are many novel features to be seen in the construction of these cells, and the new type of plate is an important feature in trouble-free running. The indicating device which shows the condition of the cells is another feature which appeals to the battery user. The range of high-tension batteries is also an important part of the exhibit and there are various types of battery to suit all needs.

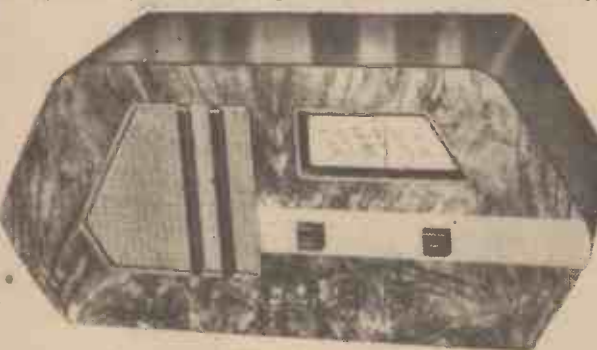
### OUTSTANDING RECEIVERS AT THE SHOW!

Every visitor to Radiolympia should make a special point of examining the many excellent value-for-money receivers exhibited on the Cossor Stand—No. 70. All of these incorporate several unique features and they are thoroughly up-to-the-minute.

Complete Test Reports on these outstanding sets will appear in future issues of PRACTICAL & AMATEUR WIRELESS.

STAND No. 60  
BEETHOVEN RADIO, LTD., Chase Road, North Acton, N.W.10.

THE large 5in. airplane dial renders the Beethoven receivers very conspicuous, and this type of dial is of great utility. Another interesting part of these receivers is the small tuning log which is concealed in the base of the cabinet in certain models. This is withdrawn by taking hold of part of the moulding, and thus the log is invisible under ordinary conditions, and yet is ready to hand when required. It is interest-



The new McMichael receiver. Note the novel cabinet design in this particular model.

ing to note that on the tuning dial the long-wave section is engraved "Long Wave and Aeroplane stations."

STAND No. 61  
BURDEPT, LTD., Light Gun Factory, Erith, Kent.

THE superhet-portable is probably the most interesting exhibit on this stand, as it has been found possible, in a very small compass, to incorporate a highly efficient superhet circuit without loss of efficiency. Another important feature of the receivers shown on this stand is the new method of sound radiation which has been called by the makers "Sound floodlighting." Other models on the stand incorporate all-wave tuning and similar modern features, whilst the exhibit is completed with a range of H.T. and G.B. batteries.



Here are some of the new Dubilier condensers which may be inspected on Stand No. 67.

STAND No. 62  
PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2.

THE peculiarly-shaped tuning dial on some of the Philips sets gives them an unusual appearance, and there are many valuable advantages to be gained from this type of dial. Not the least important feature is the replaceable portion bearing the names of the stations, which thus enables the receiver to be kept in permanent use despite changes in station wave-lengths. It will be seen that there are straight circuits employed in some Philips receivers, as well as the now popular superhet, and the cabinet-work of these receivers leaves little to be desired.

STAND No. 63  
GENERAL ELECTRIC CO., Magnet House, Kingsway, W.C.2.

SEE Stand No. 35.

STAND No. 64  
GRAHAM FARISH, LTD., 153, Masons Hill, Bromley, Kent.

IN addition to the Graham Farish components which have been seen for some time, there are some interesting new lines included with the Formo products which are on view on this stand. The short waves are obviously being well covered by the various items seen here, and, in addition to the special items for this purpose, the amateur will undoubtedly be interested in the various types of tuning coil which are available.

The tuning dials also cover some novel points and the clock-face or airplane dial with various types of escutcheon will enable this type of tuning device to be fitted to any receiver, irrespective of the type of cabinet which is employed.

STAND No. 65  
BALCOMBE, A. J., LTD., 52, Tabernacle Street, E.C.

A GAIN on this stand the novel forms of tuning dial render the receivers conspicuous. Searchlight tuning and the full airplane dial are the main items, and the range of models covered meets practically every need of the listener, no matter whether batteries or mains supplies are employed.



## STAND No. 66

**OLDHAM & SON, LTD.,** Denton, Manchester.  
THE Lively O readily identifies this stand, and the new indicating clock is a very popular feature of the exhibit. This is a device mounted inside the glass container and shows at a glance exactly the condition of the battery. In addition to the models fitted with this capacity clock there is an extensive range of



The car-radio chassis which is now being produced by the Marconiphone Company. Notice the compact assembly.

cells suitable for all purposes, and a comprehensive range of dry H.T. batteries.

## STAND No. 67

**DUBILIER CONDENSER CO. (1925), LTD.,** Ducon Works, Victoria Road, North Acton, W.3.

IT is difficult to pick out any one item in this display which merits more attention than another. The range of condensers is very complete and extends from the smallest mica type to large units suitable for incorporation in transmitters and power stations. There are electrolytics, block condensers, high voltage types and low voltage types, in addition to resistors of various sizes suitable for receiver or transmitter construction and also for use on car-radio apparatus. In addition to these special components may be mentioned the suppressor condensers for car radio equipment. There is also a range of interference suppressing devices for use with various types of apparatus.

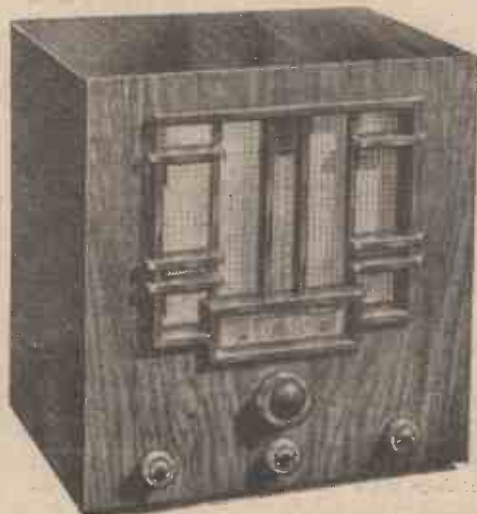
## STAND No. 68

**McMICHAEL RADIO, LTD.,** Danes Inn House, 265, Strand, W.C.2.

THE new Model 1935 Superhet is one of the main exhibits on this stand, and it competes with the flood-lit dial as an attraction. The latter is quite a novelty in tuning devices, but definitely possesses many advantages over the ordinary small type of dial. In addition to its large size and the method of flood-lighting, the arrangements which are made to ensure that the pointer is set in the correct position render this a very valuable tuning device.

## STAND No. 69

**MARCONIPHONE CO., LTD.,** 210, Tottenham Court Road, W.C.1.  
See Stand No. 11.



Here is the Cossor De Luxe Model 367, with Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Directly Heated Power Pentode Output, Heavy Duty Rect., Thermometer Tuning with illuminated wavelength scale, 8in. Energised Moving Coil Speaker. For A.C. Mains only 200-250 v. (adjust.) 40-100 cycles. It represents remarkable value at £9 19s. 6d.

## STAND No. 70

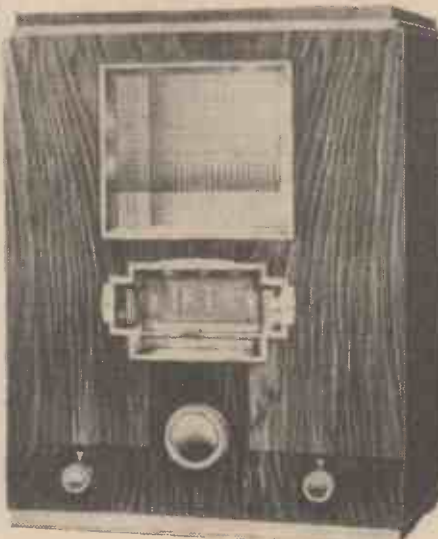
**COSSOR, A. C., LTD.,** Cossor House, Highbury Grove, N.5.

THE latest addition to the Cossor range to be exhibited on this stand is the de Luxe A.C. mains superhet. This has a ten-inch concert grand M.C. speaker and a volume control with a special scale. The neon tuning device is also fitted and the layout of the control panel lends a new atmosphere to the set. In addition to this receiver there are many others, and the complete range of Cossor valves and cathode-ray tubes make the stand one of the most attractive in the Grand Hall. Some of the sets which are on show are illustrated on this page.

## STAND No. 71

**EVER READY CO. (G.B.), LTD.,** Hercules Place, Holloway, N.7.

THERE are seven complete receivers and radio-grams on this stand, including a portable and a 6-valve superhet. The radio-gram incorporates a 5-valve superhet (including the rectifier), and has seven tuned circuits, fully delayed Q.A.V.C., visual tuning indicator, tone control, and a 9in. speaker.



The latest Cossor Superhet receiver. This is the De-Luxe Model 365. It has remarkable quality and freedom from background noise.

## STAND No. 72

**AERODYNE RADIO, LTD.,** Aerodyne Works, Tottenham, N. 17.

THE range of receivers on this stand exhibit some novel features, one of the most important of which is the tuning dial. The cabinet work also is on novel lines and renders the Aerodyne receivers very attractive. The receivers range from a simple battery-operated circuit to a comprehensive superhet circuit, and all types are catered for.

## STAND No. 73

**ULTRA ELECTRIC, LTD.,** Western Avenue, Acton, W.3.

THE Ultra receivers have many novel features, and the display is quite imposing. The arrangements for tuning are very simple on these receivers and the circuits embodied are quite modern.

## STAND No. 74

**FERRANTI, LTD.,** Moston, Manchester.

THE Ferranti exhibit covers complete receivers, radio-grams, measuring instruments, valves, and component parts. The home-constructor's amplifiers are also prominently featured and one of these may be seen on our cover this week. There are several models available, and constructional details may be obtained on the stand. The Gloria A.C. Radiogram is an impressive instrument, covering, in addition to a powerful superhet circuit, a complete automatic record-changing equipment. It will be noticed that Messrs. Ferranti make a great point of transformer coupling, and various transformers are obtainable for home set construction.

## STAND No. 75

**MULLARD RADIO VALVE CO., LTD.,** Mullard House, Charing Cross Road, W.C.

THE large valves on this stand are a clear indication of the main activities of this firm, and it is interesting to note that these giant valves are complete in every particular. Naturally they are shown open on all sides, but if they were fitted into bulbs and exhausted (that is, had the air pumped out) they would function perfectly. They would require an anode supply somewhere in the neighbourhood of 2,000 volts and a heater supply between 20 and 300 volts. In addition to these giants, there is a complete range of ordinary valves, including some new Universal models and types for battery, A.C., and D.C. use. There are also some complete receivers, the latest being the M.U.35, to which is fitted "geographical" tuning

## STAND No. 76

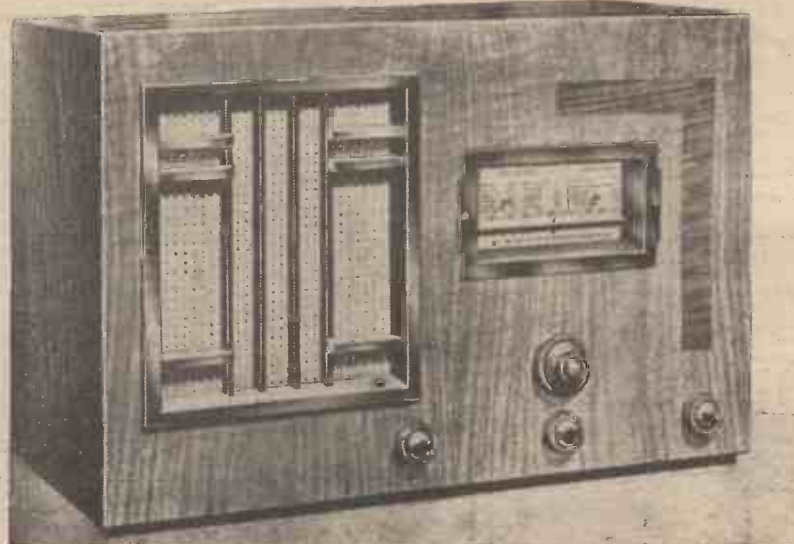
**COLE, E. K., LTD.,** Ekco Works, Southend-on-Sea, Essex.

THE receivers on this stand are notable for their moulded cabinets, and some pleasing designs are to be seen. There are circular models, black and chromium rectangular models, and other out-of-the-ordinary patterns, as well as a standard radio-gram in walnut and other woods. There is a car-radio equipment, and Ekco mains units in various types for the use of the listener with a battery receiver who has mains facilities, but does not wish to change to a mains receiver. A new system of sound reproduction is incorporated in the new season's models, and this should be carefully noted.

## STAND No. 77

**GRAMOPHONE CO., LTD.,** 108, Clerkenwell Road, E.C.

THIS stand is shared with No. 82 by the well-known H.M.V. products, amongst which are the fluid-light tuned receivers, the Autoradiogram, a new battery three-valver, and other items. There are many interesting features in the H.M.V. receivers, such as the double-cone speakers in the autoradiogram, and the circuit arrangement which provides silent tuning between stations which is incorporated in Models 441 and 541. There is a superhet for the battery user and a highly-sensitive three-valver fitted with an M.C. speaker also for battery operation. There are receivers for Universal mains operation, for use on D.C., and in addition the famous No. 11 pick-up unit and two models of M.C. speaker. Model 180 costs 8 guineas and Model 170 costs £4 15s. The pick-up unit costs 32s. 6d.



This illustration shows Cossor Battery Model 436B, with Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., High Slope Power Driver, and Class "B" Output. Special 8in. Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries. It costs only 8 8s. 0d. exclusive of batteries. The mains Model 368 is of similar external appearance, and costs £8 18s. 6d.



**STAND No. 78**  
**KOLSTER BRANDES, LTD.,** Cray Works, Sidcup, Kent.

**VARIABLE** selectivity is the key-note of the K.B. receivers shown on this stand, and in addition to various types of receiver there is shown the Rejectostat device which is designed to provide reception free from interference in the neighbourhood of machinery, neon apparatus, etc. The K.B. receivers are fitted for use with this type of device, but it is also obtainable separately for those who wish to fit it. It should be remembered that this device enables a large number of receivers to be operated from a single aerial without interference.

**STAND No. 79**  
**EDISON SWAN ELECTRIC CO., LTD.,** 155, Charing Cross Road, W.C.2.

**THE** newly introduced "pezolectric" pick-up is undoubtedly the greatest attraction on this stand, and it is ably supported by the range of Mazda valves and R.K. loud-speakers. In addition to these components there is the cathode ray oscillograph, the B.T.H. needle-armature pick-up, the B.T.H. Minor pick-up, the range of "Extralife" accumulators, and Tungar battery chargers. The R.K. speakers are obtainable in several models for both A.C. and D.C. use.

**STAND No. 82**  
**GRAMOPHONE CO., LTD.,** 108, Clerkenwell Road, E.C.

See Stand No. 77.

**STAND No. 83**  
**CLARKE & CO. (MCHSTR.), LTD.,** H., Atlas Works, George Street, Patricroft, Manchester.

**THE** well-known Atlas mains units are a popular feature of this display and the various models which have been familiar to us for a long time are now augmented by a new model designed for a modest output. In addition to this small model there are various other ranges covering all requirements, and extending to those which are necessary for use with Class B circuits and others where a large current is required. The D.C. user is also catered for by a range of D.C. units, and in addition to standard models Messrs. Clarke make a feature of special models suitable for mains of unusual periodicity.

**STAND No. 84**  
**PYE RADIO, LTD.,** Radio Works, Cambridge.

**STAND No. 85**  
**BUSH RADIO, LTD.,** Woodger Road, Shepherd's Bush, W.12.

**ESCALATOR** and Peaceful Tuning is the watchword on this stand, and the new Bush receivers incorporate these devices which greatly simplify the process of locating a station on the tuning dial. The receivers strike a novel note with the peculiar dials, and the circuits which are incorporated employ all the latest refinements, such as octode frequency changers, A.V.C., etc.



The new Lissen receiver. This is built on rather novel lines, and, as may be seen, the controls are very unorthodox in their arrangement. It is a very powerful receiver, and should be inspected on Stand No. 86.

**STAND No. 86**  
**LISSEN, LTD.,** Worpole Road, Isleworth, Middx.

**THE** all-wave superhet is probably the most interesting of the ten new receivers shown on this stand. This covers a band from 13 to 2,000 metres; and is provided with a neon visual tuning indicator. In addition there is a 4-valve battery portable and a low-priced 3-valve battery receiver, whilst for the enthu-



A Short-wave Converter, produced by Messrs. Kolster Brandes.

siast who wishes to build his own apparatus there is a "Bandspread" short-wave Three kit costing 69s. 6d. complete with valves. This is a detector-L.F.-pentode set covering from 13 to 55 metres, and the kit includes all the necessary components, including a ready-made Lissen low-loss dual-range S.W. coil.



One of the numerous types of suppressor produced by Messrs. Belling and Lee for use in obtaining noiseless radio reception.

**STAND No. 87.**  
**ANSON AND HOPWOOD, LTD.,** 11, Berkeley Square, W.1.

**THE** elaborate record-changing mechanism incorporated in the receivers on this stand is shown as a separate piece of apparatus and undoubtedly interests everyone. The radiograms are handsome pieces of work and embody all the latest features in addition to the record-changing apparatus. The pre-tuned receiver is a novelty, and undoubtedly many listeners will prefer an instrument of this nature where station selection is carried out by means of a switch and all difficulties of accurately tuning are avoided.

**STANDS Nos. 88 and 89.**  
**RADIO-GRAMOPHONE DEVELOPMENT CO., LTD.,** Frederick Street, Birmingham.

**THERE** are two new models seen on this stand—one an all-wave 8-valve superhet and the other a 12-valve radiogram. The latter embodies the very latest in superhet circuits, one of the main features being a special switch-controlled H.F. circuit giving three different degrees of selectivity between 3 and 10 kc/s. This receiver has twin-matched energised loud-speakers, a piezo crystal pick-up, automatic record-changing apparatus, and a highly-finished walnut and macassar ebony cabinet. It costs 83 guineas and is a very high-class instrument. The method of sloping the control panel on the R.G.D. instruments lends not only a novel appearance to the receivers, but definitely gives much better control and facilitates all the operations connected with the selection of the desired programme.

**STAND No. 90**  
**TANNOY PRODUCTS,** Canterbury Grove, West Norwood, S.E.27.

**THE** most novel item on this stand is no doubt the public-address apparatus which will work at will from A.C., D.C., or a car battery. This is truly universal, and delivers an output of 10 watts. There are many other P.A. sets and amplifiers on this stand, and a comprehensive range of microphones and loud-speakers suitable for the use of outdoor reproduction.

**STAND No. 91**  
**BELLING AND LEE, LTD.,** Cambridge Arterial Road, Enfield, Middlesex.

**ALTHOUGH** the home constructor will no doubt be chiefly interested in the various small components on this stand, the various pieces of equipment designed for the elimination of interference must also be carefully inspected. Interference occurs in so many different ways that careful choice of the method of suppressing it is necessary in order to avoid undue expense. There are to be seen on this stand suppressors for use on interfering apparatus and devices for use with a radio set or in the mains lead to the set in order to prevent noises. The range covered is most exhaustive and, in addition, the engineers of the company are prepared to study individual conditions and suggest an appropriate remedy.

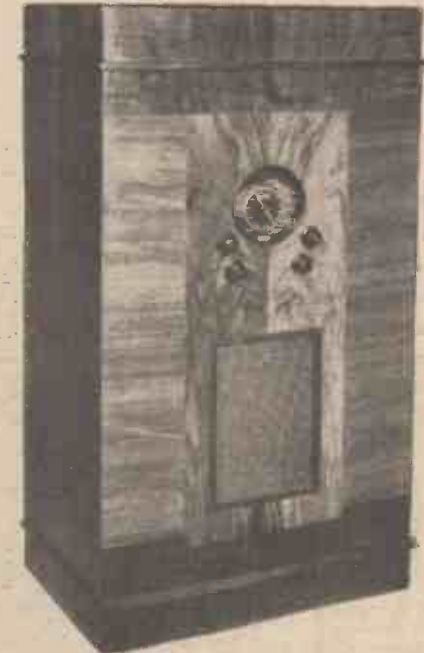
**STAND No. 93**  
**REGENTONE PRODUCTS, LTD.,** Worton Road, Isleworth, Middlesex.

**THE** "Twin-thermometer Tuning" device seen on the new Regentone receivers is an attraction to all, and the novel method of incorporating a column



The new Regentone receiver fitted with twin thermometer tuning scales. These may be seen on each side of the speaker opening.

of vividly coloured light to indicate the tuning of the circuits will no doubt appeal to many as being better than a moving pointer. The receiver presents a novel appearance with the "thermometers" set in small



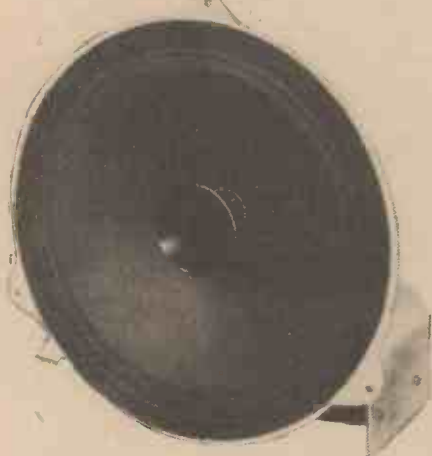
Another of the new Lissen instruments to be seen on Stand No. 86.



**1936 STENTORIAN** NEW MORE POWERFUL MAGNET

recesses each side of the speaker opening, and there is an added advantage in these receivers that the circuits may be checked without removing the chassis from the cabinet and without using any tools. This will, of course, appeal to the service man. In addition to this and some other receivers there is a complete range of mains units and an M.C. extension speaker.

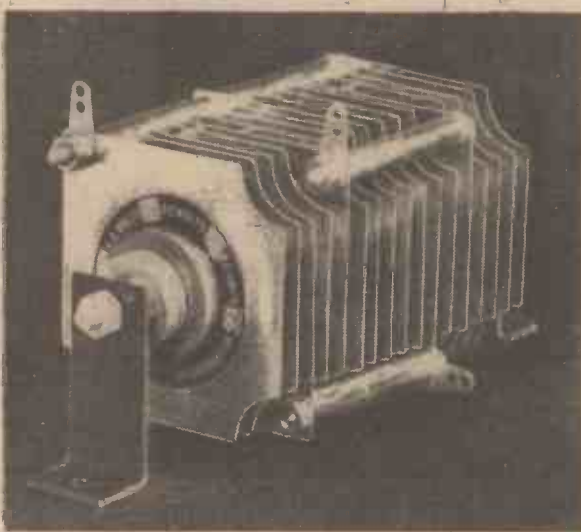
**STAND No. 94**  
**PETO AND RADFORD, 107a, Pimlico Road, S.W.1.**  
THE indicating device incorporated in the Dagenite accumulators seen on this stand is both simple and effective. Three coloured balls are enclosed in three small channels on the side of the cell, and according to the condition of the cell these balls sink. There are batteries with solid electrolyte, unspillable free-acid types, glass cased and celluloid cased, and in addition H.T. accumulators in glass blocks, with or without the indicating device.



The new W/B Duplex speaker. The high-note tweeter may be seen projecting from the centre of the cone.

**STAND No. 95**  
**WHITELEY ELECTRICAL CO., LTD., Victoria Road, Mansfield, Notts.**  
THE new Stentorians are features on this stand, and the model which is being presented as a prize in our new Competition forms the main attraction here. There are many new features incorporated in these speakers, including a new speech coil, larger magnets, special methods of winding the input transformer and a hand-made cone. A novelty is the reproduction on the top of models 36S and 36J of a list of popular commercial receivers and the setting of the microlode device for correct matching. Another novelty on this stand is the Duplex speaker, where the "tweeter" or high-note speaker (which is in the form of a small horn speaker) is mounted inside the cone and magnet system of the cone and thus projects all frequencies from one centre. This is claimed to hold many advantages over the more usual system of placing two speakers side by side.

**STAND No. 96**  
**ORR RADIO, LTD., 79a, Parkhurst Road, N.7.**  
THERE are no fewer than five new Invicta receivers on this stand, and they range from an all-wave 6-valve superhet to a 3-valve battery receiver. The "Fisherman's" receiver is being retained this year, although it has been improved upon. This particular model is designed—as its name indicates—for use at sea, and in addition to the ordinary broadcast wave-



One of the popular Westinghouse rectifiers used for L.T. supplies.

lengths it tunes to a waveband from 90 to 200 metres in order to enable reception to be obtained of the weather forecasts, special fisheries bulletin, etc.

**STAND No. 97**  
**ACE RADIO, 2a, West Arbour Street, E.1.**  
LIGHT-BEAM tuning is the main feature of the receivers on this stand, and there is a 3-valve all-pentode battery set as well as an all-wave 6-valve superhet for A.C.-D.C. operation. The latter covers a band from 15 to 2,000 metres. Other receivers are on view, and the various circuit arrangements incorporate such features as inter-station noise suppression, A.V.C. shadow tuning, and automatic-record changing.

**STAND No. 98**  
**VIDOR, LTD., West Street, Erith, Kent.**  
THE battery all-wave receiver is probably the greatest attraction on Stand No. 98, although this is ably supported by the universal allwave counterpart of the same set. The waveband covered is from 17.5 to 2,150 metres, and the dial is of the three-scale type with a list of all the main stations printed beneath it. The control knob is situated in the centre of these lists, and the cabinet work and control layout is identical in each receiver. There is also an interesting radio-gramophone, in which the speaker opening forms part of the control panel, and the whole of the lower part of the cabinet is devoted to record storage, the front falling forward to reveal the records in their storage envelopes.

**STAND No. 99**  
**PORTADYNE RADIO, Gorst Road, N.W.10.**



A school's receiver produced by Messrs. Radio Instruments and approved by the Central Council for School Broadcasting.

**STAND No. 100**  
**SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD., 39, Upper Thames Street, E.C.4.**  
THE lighthouse in the centre of this stand makes a very distinctive landmark, and the display of Full o' Power batteries shown covers practically every range. In addition to standard batteries of various types and capacities, there are torch batteries, cycle lamp batteries, grid batteries, and those designed especially for use with commercial receivers in which the standard dimensions cannot be accommodated.

**STAND No. 101**  
**WESTINGHOUSE BRAKE AND SIGNAL CO., LTD., 82, York Road, King's Cross, N.1.**

A UNIVERSAL A.C./D.C. Reflex Superhet for home construction may be seen on this stand, and a complete range of metal-oxide rectifiers is also to be seen. These cover practically every requirement in radio, from the rectification of mains voltages to the high-frequency type of rectifier, and some special high-voltage types for use with cathode-ray apparatus will also be seen.

**STAND No. 102**  
**RADIO INSTRUMENTS, LTD., Purley Way, Croydon, Surrey.**

THE Schools Receivers which have been designed and approved for use in schools and similar institutions are a notable feature of this exhibit. These receivers are provided with covered controls, so that they may be locked away from curious fingers, and give a high degree of reproduction. Some of the



A useful model from the Davenset range of charging equipment.

models which are shown have been approved by the Central Council for School Broadcasting. The Airlec receiver is also on view, and a model of this popular receiver, designed for all-wave use, is also to be seen. A short-wave converter is exhibited and this is obtainable in kit form for the home constructor, and costs £4 15s.

**STAND No. 103**  
**AUTOMATIC COIL WINDER AND ELECTRIC EQUIPMENT CO., LTD., Winder House, Douglas Street, S.W.1.**

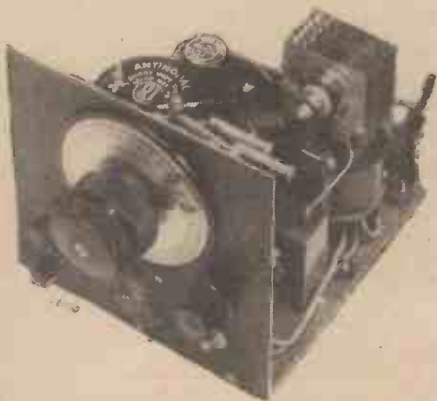
NO experimenter can carry on without meters, and the interesting range of test apparatus shown on this stand will appeal to every amateur. From the simple Avominor to the large signal generator for laboratory use, there is apparatus for every phase of set testing. In addition to meters, there are the smaller accessories, such as the Avodapter, the Avocoupler, and the Testing Leads, etc.

**STAND No. 104**  
**PARTRIDGE WILSON AND CO., LTD., Evington Valley Road, Leicester.**

IN addition to the smaller parts of battery chargers, such as transformers, chokes, and so on, there are complete chargers for every purpose to be seen on this stand. The new H.T.5 has been produced for the dealer of small means, and will charge up to 360 2-volt batteries at an average rate of 1 amp. There is also a model for use on mains supplies of 100 volts or less.

**STAND No. 105**  
**BURTON, C. F. AND H., Progress Works, Bernard Street, Walsall.**

IT is difficult to pick out any one item of outstanding importance on this stand in view of the importance of all the items shown. These include eliminators,



A new short-wave converter which is sold by Messrs. Radio Instruments for the home constructor. This is an A.C. unit and costs £4 15s.

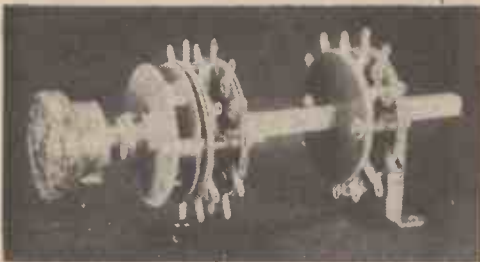
trickle chargers, coils, lead-in tubes, transformers, and complete battery and mains receivers. There are also many new lines.

**STAND No. 106**  
**R. A. P., LTD., Ferry Works, Summer Road, Thames Ditton, Surrey.**

THERE is a complete range of receivers on this stand, from the battery five-valve to the "Transatlantic" all-wave A.C. or Universal model. This covers the bands of 10.5 to 52, 200 to 500, and 1,000 to 2,000 metres, and costs 12 guineas. There is also a superhet at 18 guineas, comprising a heptode, H.F. pentode, double-diode-pentode, and pentode output valves.

**STAND No. 107**  
**DARWINS, LTD.,** Fitzwilliam Works, Sheffield.  
**A** MOST comprehensive range of magnets is shown here, and in addition to those which are well known to the average amateur owing to their use in loud-speakers there are also the smaller magnets which are used for pick-ups, microphones, instruments, and other smaller accessories. The use of the new nickel-aluminium and nickel-aluminium-cobalt alloys is a feature of the new magnets.

**STAND No. 108**  
**SOUND SALES, LTD.,** Tremlett Grove Works, Junction Road, N.19.  
**L** OUDSPEAKERS, condensers, battery chargers, and mains components are shown here, and the latter include many types of transformer and also



*This new switch, produced by Messrs. Bulgin, will be found of great value in the production of an all-wave circuit, or in any similar circuit where low-loss and efficient contacts are required.*

some interesting chokes. There are models for all purposes, and some specially-designed output components are also to be seen.

**STAND No. 109**  
**ALL-WAVE INTERNATIONAL RADIO AND TELEVISION, LTD.,** 242, High Street, Bromley, Kent.  
**T** HE Midget Portable which covers the short waves, the trawler band, and the medium waves, is a notable item on this stand, and there are also many other interesting all-wave receivers. The "Commander" is a superhet with a separate speaker, and employs a double superhet circuit. This comprises an H.F. stage, a frequency-changer, a second frequency-changer, and I.F. stage with variable-selectivity device, and a double-diode-triode feeding an output valve. The "folded chassis" method of construction is featured on this stand, and it is claimed that this makes for greater efficiency and ease of servicing.

**STAND No. 110**  
**JACKSON BROS. (LONDON), LTD.,** 72, St. Thomas Street, S.E.1.  
**T** HE new Airplane dial is seen on this stand together with many types of dial which have been popular with home constructors for the past year. The neat Baby Gang condensers are well displayed, and a new two- or three-gang superhet Baby Gang, designed for use on 465 kc/s, or 473 kc/s, is also to be seen. In addition, there are many condensers, dials, pre-sets, and short-wave components to be seen.

**STAND No. 111**  
**GRAMPIAN REPRODUCERS, LTD.,** Kew Gardens, Surrey.  
**T** HE speakers exhibited on this stand are made from the new nickel-aluminium alloy, and the Pantone is a novel speaker which attracts considerable attention. In addition to various models there is a public-address equipment of novel design. Measuring only 14in. by 14in. by 13in. and weighing only 35lbs., this may be used to address a crowd of from 500 to 1,000 and is complete with turntable and pick-up.

**STAND No. 112**  
**ELECTRO DYNAMIC CONSTRUCTION CO., LTD.,** Devonshire Grove, S.E.  
**A** WIDE range of converters and similar equipment is seen on this stand and the apparatus covered includes some special items for use in public-address equipment. Practically every type of converter is covered—D.C. to A.C., A.C. to D.C., and D.C. to D.C., and various outputs and inputs are obtainable.

**STAND No. 113**  
**SWIFT, LEVICK AND SONS, LTD.,** Clarence Steel Works, Sheffield.  
**I** N addition to the range of loud-speaker magnets shown on this stand there are the smaller types of magnet designed especially for measuring instruments, headphones, pick-ups, and microphones. There are magnets in chrome steel, nickel aluminium, and the latest material known as "Alnico."

**STAND No. 114**  
**ELECTRICO (CROYDON), LTD.,** 97, George Street, Croydon.

**F** OR the accommodation of the standard table-type receiver, Messrs. Electrico have developed a number of interesting walnut tables, and these are tastefully displayed on Stand No. 114. In addition to the various simpler types there are bookcase models and special de-luxe types fitted with a drawer for books, etc. The "Carryset" is also on show, and this is a device to enable the service man or dealer to carry a commercial receiver conveniently without damaging the highly-finished exterior.

**STAND No. 115**  
**LECTRO-LINX, LTD.,** 79a, Rochester Row, S.W.1.

**A** LL the various types of Clix valveholders are shown here, and in addition to the recently-developed short-wave holder there are many smaller devices suitable for the home constructor. Amongst these may be mentioned the Master Plug, and the voltage-selector plates which are obtainable in three- and four-way types with or without terminals.

**STAND No. 116**  
**PRISM MANUFACTURING CO.,** Lloyds Bank Chambers, Sutton, Surrey.

**A** N important feature of the radio-gramophone exhibited on this stand is the manner in which the cabinet is fretted at the sides as well as in the front. Double speakers are fitted and a high standard of quality is claimed.

**STAND No. 117**  
**BULGIN AND CO., LTD.,** A. F., Abbey Road, Barking, Essex.

**A** MONGST the many small component parts so familiar to the home constructor there are now to be seen some new items. These include over forty items which have been produced in the past year and which have not been seen before. They include a special I.F. transformer for television receivers, an oscillator coil for the same type of set,



*One of the Wharfedale speakers which will be seen on Stand No. 203. These speakers are provided with the new nickel-aluminium magnets.*

a watt-meter, H.F. chokes, insulators, screened flex, and many different types of switch. There are also some four-watt graded volume controls which are fitted with non-wearing "squash-band mechanism" and wire-wound elements, thus rendering breakdowns practically impossible.

**STAND No. 118**  
**BIRD AND SONS, LTD.,** S. (Cydon Radio), Cambridge Arterial Road, Enfield, Middlesex.

**A** COMPLETE range of condensers may be seen on this stand, and they include special models for transmission purposes, trimmers, and high-class short-wave components. Practically every type of condenser may be seen on this stand.

**STAND No. 119**  
**FULLER ACCUMULATOR CO. (1926), LTD.,** Woodland Works, Chadwell Heath, Essex.

**A** NEW type of carrier is to be seen on this stand, and the Fuller accumulators are now being fitted with this. In addition a new type of free-acid unspillable accumulator, which has been designed for certain commercial portables, is to be seen, and there is also a complete range of dry batteries for high-tension and grid-biasing purposes. A triple H.T. unit of 120 volts, costing 16s., is a popular item. Some interesting sections of various types of battery form a unique display on this stand.

**STAND No. 120**  
**RAWLPLUG CO., LTD.,** Rawlplug House, Cromwell Road, S.W.7.

**D** UROFIX and plastic metal and wood are the main features on this stand, and there are also some interesting features to be seen in

the electric soldering iron and novel heatless solder.

**STAND No. 121**  
**OSSICAIDE, LTD.,** 447, Oxford Street, London, W.1.

**T** HE public-address equipment here shown covers some novel and interesting types. The 6W equipment, for instance, is designed to operate from a 6-volt car battery, whilst there is also a novel arrangement for reproducing clock chimes without records, microphones, or similar arrangements. In addition to these items there is a complete range of deaf aids and similar equipment.

**STAND No. 122**  
**TUCKER EYELET CO., LTD.,** G., Jameson Road, Aston, Birmingham.

**T** HE exhibits on this stand consist of various types of eyelet and metal fastener used in the construction of components and receivers, and there are many interesting parts such as valve caps, battery sockets, etc.

This is the completion of the stands on the Ground Floor of the Grand Hall, and the exhibits are continued in the Gallery above the Grand Hall. Here the first stand is No. 201, and there are thus no stands bearing numbers between 123 and 200 (inclusive).

**STAND No. 201**  
**BRITISH PIX CO., LTD.,** Pix House, 118, Southwark Street, S.E.1.

**T** HE Modula volume control and the various Pix aerials are shown here, and there is no doubt that the invisible aerial is a novel arrangement for erection in a room without the usual disfigurement which arises when insulators and wall-spacers are used. It provides very good results and is obtainable in 30- or 60-ft. lengths. There is also to be seen a range of Pix valves for battery and mains use at prices from 4s. 6d. to 15s. 6d.

**STAND No. 202**  
**RADIO SOCIETY OF GT. BRITAIN,** 53, Victoria Street, S.W.1.

**STAND No. 203**  
**WHARFEDALE WIRELESS WORKS,** 62, Leeds Road, Bradford.

**T** HERE are a number of interesting P.M. speakers on this stand, all fitted with the new nickel-aluminium magnets. The method of construction is stated to be absolutely dust-proof, and the diaphragm has been designed to avoid focusing and other defects. A new volume control is also on view and this is designed for extension speakers and costs 5s. 6d. A cabinet speaker known as the "Queen Anne Cabriolet" is a new design and is fitted with the Golden speaker, and costs £8 (less transformer).

**STAND No. 204**  
**MILNES RADIO CO., LTD.,** Victoria Works, Church Street, Bingley, Yorks.

**I** N addition to the newly-designed H.T. unit to be seen on this stand there are now some complete receivers. These range from a simple battery 3-valve set to a six-stage A.C. superhet. There are also two loud-speakers fitted with 8in. diaphragms. These are fitted with a universal transformer, thus enabling them to be used with practically any type of output stage. They cost 32s. 6d. and 42s. 6d. respectively.



*The newly-designed Milnes H.T. Unit. This is a very efficient high-tension supplier, and delivers a smooth supply as well as offering the great facility that it may be recharged from an ordinary accumulator.*



**1936 STENTORIAN** NEW HANDMADE PAPER CONE

**STAND No. 205**  
**SUFLEX, LTD.,** Aintree Road, Perivale, Greenford, Middlesex.

**T**HIS forms an interesting exhibit of insulated sleeving, and the range covered extends up to that required for use with wires carrying 10,000 volts. The sleeving is obtainable in all colours and diameters, and the range is most exhaustive.



A novel method of construction adopted in the new 362 Power valves. This is the vertical-anode system, and is used in some interesting valves to be seen on Stand No. 212.

**STAND No. 207**  
**LONDON ELECTRIC APPLIANCES, LTD.,** 62, Glengall Road, S.E.15.

**H**ERE may be seen a really nidget portable. This receiver measures roughly 8in. by 8in. by 5in. and contains a four-valve circuit with moving-iron loud-speaker and batteries. The valves employed are the new Hivac Midgets, and the receiver covers long and medium waves. It costs 5 guineas.

**STAND No. 208**  
**ECONASIGN CO., LTD.,** 92, Victoria Street, S.W.1.  
**T**HIS display consists of stencils and similar apparatus for the shopkeeper.

**STAND No. 209**  
**EFFICIENCY MAGAZINE,** 87, Regent Street, W.1.

**STAND No. 210**  
**BROWN RADIO, LTD.,** W. F., Ossillo Works, Brierly Hill, Staffs.

**T**HE working oscillograph apparatus, which shows the waveform of the Brown oscillators and amplifiers, is an interesting exhibit on this stand. There are many types of apparatus here displayed, and the equipment is of interest alike to the amateur and the service man.

**STAND No. 211**  
**ALL POWER TRANSFORMERS, LTD.,** 8a, Gladstone Road, S.W.19.

**T**HERE is a wide range of transformers and chokes on this stand, covering the components for use in mains equipment and in chargers and car radio outfits. There is also a complete charger, suitable for 2-, 6-, or 12-volt accumulators, rated at 1 amp. and costing £1 17s. 6d.

**STAND No. 212**  
**362 RADIO VALVE CO., LTD.,** Stoneham Works, Stoneham Road, E.5.

**T**HE latest additions to the 362 range are well displayed on this stand, and cover a 9-watt pentode and a 15-watt triode. There are several new types, and the range includes battery as well as mains valves, and it is announced that this range is to be extended even more in the future, and will cover the small transmitter super-power types. This year's productions include a double-diode-triode, a heptode frequency changer, a 10-watt triode, and a 5-watt triode.

**STAND No. 213**  
**RIST'S WIRES AND CABLES, LTD.,** Waveney Works, Lowestoft.

**T**HERE is a very exhaustive range of wires and cables on this stand covering small instrument wire, twin flat extension speaker cords, battery cords, and novel aerials. There is also twin screened tinned copper braided tubing, screened tubing, and "slip back" connecting wire.

**STAND No. 214**  
**VANDERVELL, LTD., C. A.,** Well Street, Birmingham.

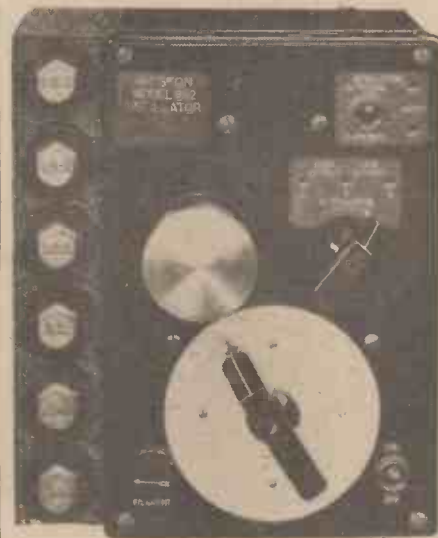
**I**N addition to the range of batteries on this stand, there are some new dry batteries in various capacities. The Standard, Super, and Cava are the three main series, and the prices vary according to the capacity. There is a free-acid semi-non-spillable accumulator as well as some "jelly-acid" types.

**STAND No. 215**  
**CRYPTO EQUIPMENT CO.,** Acton Lane, Willesden, N.W.10.

**V**ERY complete equipment for charging purposes is shown here, and the range includes many new items due to the amalgamation of the Lancashire Dynamo and Crypto, Ltd., and Newton's, of Taunton (Rotax, Ltd.). The apparatus shown includes oxide-cathode rectifiers, rotary transformers, and constant-potential battery chargers.



One of the combined Western Service Units and, below, the Oscillator, which is seen in the right-hand section of the combined tester.



**STAND No. 216**  
**WESTON ELECTRIC INSTRUMENT CO., LTD.,** Kingston By-pass, Surbiton, Surrey.

**T**HERE are some elaborate and very efficient testing instruments to be seen on this stand. In addition to the smaller items, there is now included an oscillator covering a range of 100 kc/s to 22 megacycles. The output may be controlled from 1μv. to .2 v. and is modulated by a 400-cycle note at 60 per cent. Each instrument is hand-calibrated.

**STAND No. 217**  
**WRIGHT AND WEAIRE, LTD.,** 740, High Road, N.17.

**I**N addition to the well-known Wearite coils, transformers, and other home-constructor's accessories, Messrs. Wright and Weaire are this year introducing

some novelties in testing equipment. These include a valve-tester, a wave-meter, and a multi-range meter. There will also be some new iron-cored coils, volume controls, and short-wave coils, as well as some newly-designed mains transformers. For the set-tester or service man there is a signal generator which costs £9 15s., and a special portable multi-range meter costing £6 17s. 6d.

**STAND No. 218**  
**CONCORDIA ELECTRIC WIRE CO., LTD.,** New Sawley, Nr. Nottingham.

**I**N addition to a complete range of wires for wireless purposes, there is a "R. W." aerial which is supplied complete with a bracket to facilitate erection as high upon the house as possible. There is also "Recepticon"—an insulated aerial wire obtainable in lengths from 25ft. to 100ft.

**STAND No. 219**  
**WATERHOUSE, LTD.,** F., Ashwood Street, Dudley Hill, Bradford.

**A** COMPLETE range of wireless tables is displayed here, and in addition to special models designed to accommodate well-known commercial receivers, there is a special model designed for use with the Milnes H.T. Unit. There are also some neat speaker and receiver cabinets, and some record-storage cabinets.

**STAND No. 220**  
**COSMOCORD, LTD.,** Cambridge Arterial Road, Enfield.

**T**HE Playing Desk is a novelty which will appeal to all listeners who are anxious to own a radio-gram but at present possess only a table model radio set. The latter may be placed upon the Playing Desk, and when the pick-up which is contained therein, is joined to the radio receiver the complete equipment becomes a radio-gramophone. In addition, there are pick-ups, motor-boards, complete with pick-up and needle cups, and a "gramo-chassis," which consists of an induction motor with all the necessary parts, and costs 55s.

**STAND No. 228**  
**BROWNING WIRELESS MFRS.,** 18, Shellgrove Road, N.16.

**T**HERE are three interesting receivers on this stand, two for battery use and one for A.C. mains. The latter is a four-valve model and costs 8 guineas, whilst the battery models cover a transportable and a simple S.G.-detector-pentode arrangement. The latter sells at £6 19s. 6d.



The Cosmogram playing desk, with a receiver shown in position over it. The complete apparatus thus becomes a radio-gram, and takes up very little more space than the receiver alone.

**STAND No. 229**  
**EVERETT, EDGUMBE AND CO., LTD.,** Colindale Works, Hendon, N.W.9.

**T**HERE is an interesting series of testing instruments on this stand, including the Radiolab Set Analyser and some Unit-system testers. These include an all-purpose tester, an "omni-selector," and an oscillator, all of which may be used in various combinations. There are some containing cases available which will accommodate three or six units with a separate compartment for spares.

### STAND No. 9!

Here you will find The Editor and Technical Staff of

## PRACTICAL AND AMATEUR WIRELESS

Who Are Ready To Solve Your Wireless Problems.

**WIRELESS COMMUNICATION FOR AFGHANISTAN**

THE Afghanistan Government has placed a contract with the Marconi Company for the supply and erection of five wireless stations in the most important centres in Afghanistan. The installation of an up-to-date wireless system of communication will be a valuable contribution to the development of Afghanistan's commercial and social relations with other countries, and an equally important factor in the country's internal communication service.

The most powerful of the five new stations will be situated near Kabul, and the other four at Maimana, Khanabad, Khost, and Diyazungi. The Kabul station will be fitted with a short-wave transmitter of the Marconi SWB.11 type, suitable for the transmission of telegraphy and telephony, and two receiving installations, one of the R.C.52 type and the other of the Rg.28 type.

**Transmitter for 15-80 Metres**

The SWB.11 transmitter covers a wave range of 15-80 metres with an output of 5-6 kilowatts on telegraphy, and 3½-4½ kilowatts on telephony, to the aerial feeders. The transmitter includes a flexible valve drive for stabilisation, with a stability of one in 20,000. The advantage of this type of drive is that it enables any wavelength within the range of the transmitter to be selected rapidly, which is of obvious advantage in the case of a transmitter being used for different services operating on diverse wavelengths. The calibration of this drive or master oscillator is so precise that no wavemeter is required for setting the transmitter to the required wavelength.

The R.C.52 receiver is a high-class commercial instrument suitable for the reception of high-speed telegraphy and telephony, embodying the latest refinements of modern wireless technique. The receiver, which is of the double-superheterodyne type, covers a wave range of 14-80 metres, and it is contained in two steel cabinets with sliding panels which allow for easy and rapid inspection of the different parts of the receiver.

The second receiver of the Rg.28 type will be used as a stand-by. It is a four-valve general-purpose receiver also designed for telegraph and telephone reception. Its waveband covers from 10-200 metres by means of plug-in coils. Special attention has been given to obtaining maximum selectivity and stability combined with ease of adjustment.

The Kabul station will communicate with the principal capitals of Western Europe, with Moscow, Tokio, Shanghai, and New York, by means of directional aeri-als, and to Rio de Janeiro, Cape Town, and Melbourne with omni-directional aeri-als.

**Directional Aerials**

For reception, directional aerials will also be installed, thus providing a better signal-to-noise ratio, and reducing the effects of atmospherics. Automatic transmitting and high-speed recording is provided for one transmitting and one receiving channel, arranged for a maximum speed of 200 words per minute. The receiving and transmitting sites will be separate and will be about ten miles from the City of Kabul, where the central telegraph office for the control of the wireless stations will be located.

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# PRACTICAL TELEVISION

# 6<sup>D</sup> AND SHORT-WAVE REVIEW 6<sup>D</sup>

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ABOUT COIL  
WINDERS

# BEGINNER'S SUPPLEMENT



The Construction of an Efficient Coil Winder and Various Forms of Geared Drive are Dealt With in This Article By W. H. DELLER.

**A**LTHOUGH coil winding of almost any description is a process that may tediously be accomplished entirely by hand, the use of a winder, even in its most simple form, cannot but fail to speed up the operation and add considerably to the appearance of the finished coil.

Leaving out the question of the resultant cramping of the hand or fingers through holding and turning a former for only a few minutes, the chief drawback to purely hand winding is the lack of control it affords over the wire, and, further, once the winding or section of winding has been started it is only with difficulty that the hold on the wire may be relaxed until completion.

For the benefit of those readers who are new-comers to the experimental field it is proposed to review briefly some of the simple coil-winding expedients, and also to deal with the general difficulties encountered and methods of overcoming them.

In its simplest form a coil winder consists of a spindle mounted in bearings provided at one end with a cranked handle, and at the other with suitable means of holding and driving the coil former. It may be, of course, that some suitable bearing bracket and spindle is already at hand, in which case the additional means for holding the former only is required, with possibly the extra provision of a cranked driving handle.

### Making a Simple Winder

The winder shown in Fig. 1 is of very simple construction, and it is not necessary to adhere rigidly to the design as regards details, especially if a good collection of oddments are available from which suitable parts may be obtained. The spindle is a length of  $\frac{1}{4}$ ,  $\frac{5}{16}$  or  $\frac{3}{8}$  in. diameter bright mild steel rod cranked at one end to form the handle, and threaded at the opposite end and fitted with a winged or milled nut. Bearings may consist of suitable pieces of stout sheet brass or steel, bent and drilled for fixing to the wood base, or bench, and also drilled to receive the spindle. This should be a running fit in the bearings, a pair of small collars preventing the shaft from moving. The most effective way of mounting and driving cylindrical formers is between a pair of conical adapters which may be wooden turnings. If truly mounted such adapters are self centring, and also provide for infinite adjustment between the maximum and minimum internal diameters of formers that can be accommodated.

### Sheet Metal Adapters

The adapters shown in the illustration are made entirely from sheet metal, the

rear one being pinned on to the shaft, and the one against the adjuster made to slide along the shaft. Sheet metal that will bend fairly easily, such as aluminium about 18 s.w.g., is the most suitable material to use for these parts, the metal being cut to a rectangular shape, and bent in the centre over the corner of a chamfered wood block, Fig. 2. After the plates are bolted together, so as to embrace the shaft, the edges are cut to an angle of 90 degrees and trued up with a file when in position.

An additional pair of brackets may, with advantage, be included on the same baseboard, and a length of screwed rod fitted to hold the wire spool. These brackets require to be adjustable as regards centre distance to enable different length spools being held, and also for position in relation to the former being wound. The sides of the brackets grip the flanges of the spool to control the tension on the wire, and some form of friction brake acting on the winding spindle is desirable to prevent inadvertent run-back.

Where the winding is to consist of a great number of turns even this apparatus will prove tedious in use, but in such cases this objection can be overcome by fitting some simple form of geared drive.

### Fitting a Geared Drive

The means most likely to be available for adapting the winder to a geared drive are a geared hand-drill or a hand-bench grinder. To use a hand-drill for the purpose it is only necessary to make an

adapter, as already described, but mounted on a short shaft, the end of which can be gripped in the drill chuck. The drill is then clipped to a block of wood, and it will also be as well to support the outer end of the adapter spindle. The spool holder and brake can then be arranged in the manner described. Where a bench grinder is used the adapter spindle will be coupled to the end of the wheel spindle, or, without making the conical form adapter, quite a lot of winding may be done in the following manner. Fit a nut to the end of the projecting thread of the wheel spindle, and into the screwed socket thus provided fit a screwed extension. The former to be wound is passed over the stud and lightly gripped by means of a nut and washer between the face of a larger three-ply washer and the side of the wheel. After the former has been adjusted to make it run true the nut is tightened again to retain it in position. In this instance the brake may consist of a belt or strap anchored at one end to the bench, passed over the wheel, and a weight attached to the free end hanging over the front of the bench.

A disused gramophone lends itself admirably for conversion to coil winding, for not only is the turntable capable of being driven at variable speeds, but also the use of the brake enables it to be stopped or started at will. The fitting of a thick plywood disc to the turntable by means of screws inserted from the under side will facilitate the mounting of adapters to cover almost any description of coil winding.

### Guiding the Wire

With regard to guiding the wire so that the turns when wound on the former will be even or close together, it should be pointed out that in the methods described this guiding is done by the fingers. While this is fairly easy where thick wire is concerned, with fine wire the turns are apt to run back on a partly finished winding and make a double layer.

If a new spool of wire is examined it will be noticed that the turns are evenly wound, and advantage can often be taken of this. It will be necessary, first of all, to arrange the spool with the flange holding the free end of the wire nearest to the end of the former from which the

(Continued overleaf)

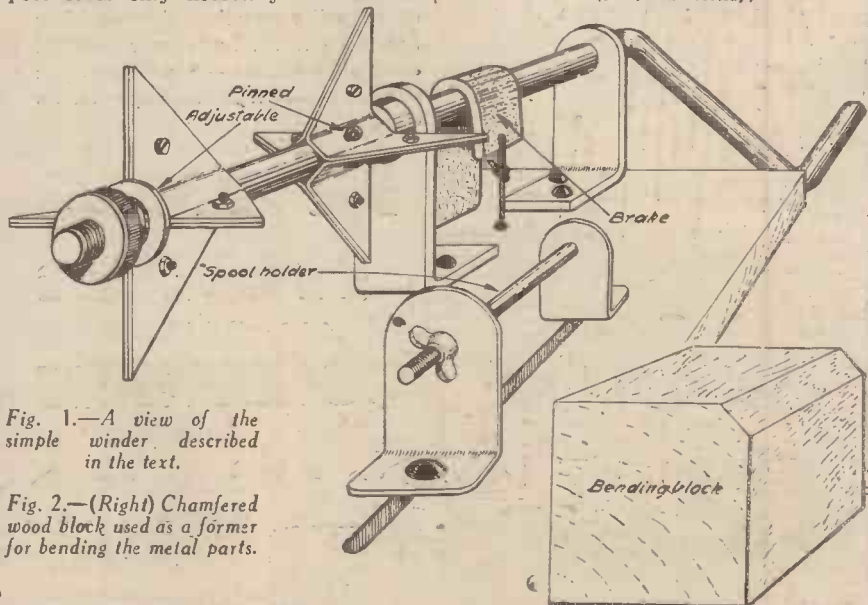


Fig. 1.—A view of the simple winder described in the text.

Fig. 2.—(Right) Chamfered wood block used as a former for bending the metal parts.

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### BEGINNER'S SUPPLEMENT

(Continued from previous page)

winding is to be commenced. After adjusting the spool between the brackets the whole is slid along until the end of the wire is in line with the starting-point of the winding. As the winding operation proceeds, the positioning of the turns is in some measure controlled by the wire reeling off in the same direction. Naturally this has greatest effect when the former and top layer of the spooled wire are equal, but even when this is not so, compensation for the difference can be made by shifting the position of the spool as the winding continues.

#### Counting Turns

Unless a proper revolution counter is employed to indicate the exact number of turns made by the former, the count will have to be noted as the winding proceeds. While for single layer coils this will present no difficulties, for pile winding it is another matter. The windings then should be marked off at, say, every 100 turns, not forgetting to take into account the ratio of the gearing, if any, between the turning handle and spindle. This factor should only be taken into account where the gearing is of a positive nature, otherwise the actual revolutions of the main spindle carrying the former is taken.

#### Winding Fine Wire

Great care has to be taken when winding fine wire if breakage during the operation is to be avoided. Therefore, particular attention should be directed to the mounting of the spool to ensure that it will run smoothly. Anything likely to hamper this movement or cause the wire to "hang up" must be rectified, as even a slight extra tension may lead to the rupture of fine gauge wire.

The manner in which the drive to the former is taken up has also an important bearing on immunity from breakages. Where a geared winder is employed, the drive must be taken up gradually and the speed steadily increased. The same care must be exercised where the drive is direct, but in this case the spindle is more easily controlled.

Benefit will be derived by inserting a flexible coupling between the spindle and the former to take the drive. This can be arranged by making the former a running fit on the shaft, and driving it through a light spiral or coil spring. Where this precaution is taken, providing that the spring used is not over strong, it will be impossible for the drive to take up too suddenly. An electric fan can be made to perform this class of winding in a remarkably efficient manner. It is first necessary to mount the former or bobbin to be wound on a spindle, in free running bearings, to the end of which is attached a light fibre or celluloid propeller. This is driven by the draught from the fan, and the interposition of a screen will prevent the disturbance of the wire as it is being wound.

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By JACE

**Blind Spot in Southern Russia**

SOVIET engineers have discovered a district situated between Odessa, Batoum, and the Crimea in which it has been found impossible to receive radio transmissions on short waves. Exhaustive investigations are to be made to ascertain the cause of this peculiarity.

**A Hair-raising Broadcast**

"BLACK Vengeance," which has been specially written for the microphone by Amy St. Loe Strachey, is a macabre play about a long-standing native curse that brought tragedy into a modern English home. Over a hundred years ago George Fellows, a planter in the West Indies, saved the life of a girl who had been selected as the victim of a human blood-sacrifice. The priest, or Obeah-man, swore vengeance, and George Fellows' descendants grew up with the shadow of a dreadful death darkening their existence. How the long-awaited blow falls, how the grim priests of voodoo claim their victim, listeners will hear for themselves on September 4th. Peter Creswell will produce

this thrilling play. Listeners whose nerves are not of the strongest should think twice before listening to it.

**Gramophone Records at Radiolympia**

OWING to the greatly increased interest in radio-gramophones, for the first time this year gramophone records are being shown at Olympia. "His Master's Voice" have a separate stand, No. 82, exclusively devoted to records, where, with special apparatus, visitors can hear selections from 550 different musical works, so that they can identify any tune they have heard broadcast, and which they do not know the name. Also exhibited on this stand is a collection of Royal and historical records, including speeches by H.M. the King, H.R.H. the Prince of Wales, and H.R.H. the Duke of York, and records made by famous artists more than thirty years ago.

**The "Magical Stand"**

THE H.M.V. stand is known as the "magical" stand at the Exhibition, as there are so many intriguing novelties to interest visitors. The lids of the radio-gramophones on show open and close themselves automatically, whilst visitors requiring advice on H.M.V. instruments can lift up telephones and ring up Harry Roy, Jack Hylton, Derek Oldham, Peter Dawson, or Les Allen, and hear their opinions as musical experts of H.M.V. sets.

The Magic Box is another "magical" device which mystifies visitors. On the top of a pedestal is an H.M.V. radio receiver and let into the centre of the pedestal is a small black box. When the

visitor places his or her hand in the box the dial of the receiver lights up and it starts playing, as soon as the hand is withdrawn the light is extinguished and the music ceases.

Many of the H.M.V. instruments are shown seen in home settings by means of a new form of stereoscopic photography. This is so realistic that it is possible to see round the edge of a cabinet, and the proportions of human figures are reproduced with absolute fidelity. These pictures have been taken by making more than 1,000 negatives for each photograph and superimposing them on one another. The effect is amazingly lifelike, each picture being finished in natural colours.

**Car Radio for Polish Premier**

PHILCO car radio is included in the equipment of a 25 h.p. Straight-8 Daimler with Hooper limousine coachwork, ordered by the Polish Government for the personal use of the Prime Minister, M. Klzowski.

**"Microphone Bows"**

LISTENERS will remember that a programme entitled "Microphone Bows" came from Bristol some months ago, when new-comers faced the microphone for the first time. A similar programme will be relayed from the Barnfield Hall, Exeter, on August 26th, for Western listeners. The Mayor of Exeter (Alderman J. W. Ackroyd) will be in the chair and Jan Stewer is to introduce the artists. Early this year a "drive" in search of talent was made in the district, and some of the artists were heard in the programme from Exeter entitled "You Pays Your Money."



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# SHORT WAVE SECTION

## Short Waves and Your Set

Simple Schemes for Converting a Standard Broadcast Receiver for Use on the Short Waves By W. J. DELANEY

**T**HERE are many listeners who are anxious to try short-wave reception, but who hesitate to build another receiver for the purpose. There is already in existence a broadcast receiver, and in general this serves for the home entertainment of the entire family, and thus it cannot be pulled to pieces simply to allow one member to experiment on the short waves. In view of the expense of the extra parts, many listeners therefore deny themselves one of the greatest pleasures of present-day wireless experiment—namely, short-wave reception. The interest of this section of wireless is tremendous, and our correspondence shows that those listeners who have once tried it do not regret the experiment. The difficulty which the majority of listeners experience is the conversion of an existing set, or, as mentioned above, the effort which is called upon to lay out money on new parts for a complete receiver. There are, of course, two simple schemes by means of which the ordinary receiver may be used for short-wave work, and these are the converter and the adapter.

### Converters and Adapters

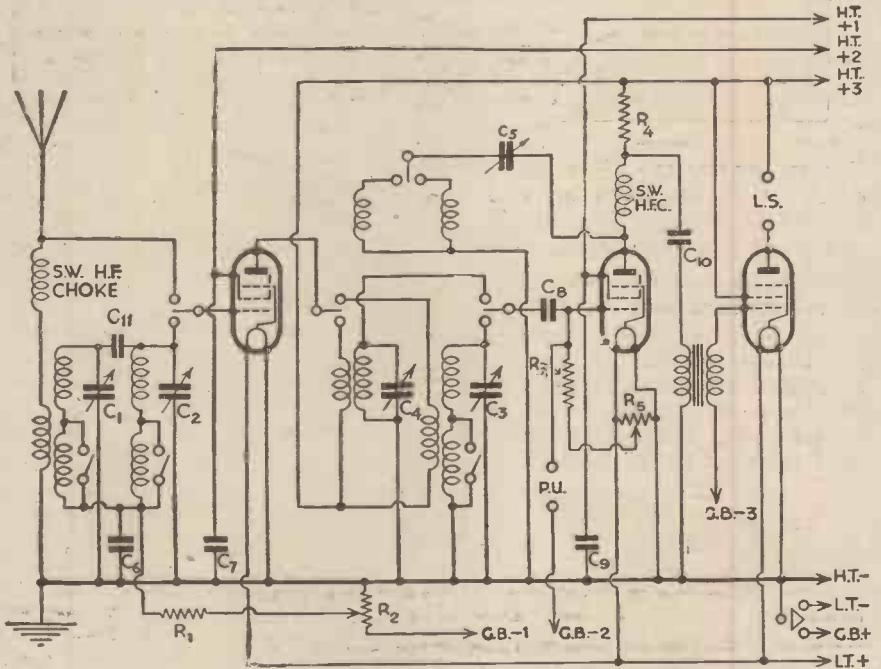
If the existing receiver employs an H.F. stage a converter may be built to enable it to function as a short-wave superhet; whilst if the receiver employs only a detector (followed by L.F. stages or used alone), then an adapter may be made up, and will enable the set to function as a short-wave set. Obviously, however, for either of these schemes it is necessary to carry out a slight modification of aerial connection, etc., in order to bring the extra apparatus into action, and this is deemed by some to be a drawback.

### All-wave Tuners

The simplest scheme, therefore, under the above conditions, is to replace the existing tuning coil with an all-wave tuner. There are now two or three on the market from which to choose, or one may be constructed at home from details which will be given later in these pages. When this change is made, all that is necessary when short-wave work is to be indulged in

is to operate the wave-change switch and the receiver is automatically converted into an all-wave set. To obtain maximum results, however, it is necessary to modify slightly the value of the ordinary grid-leak, which, in the average broadcast receiver, will have a value of 2 megohms. A value of 3 megohms will be found a suitable compromise; although in some cases a 5-megohm leak may be used without ill-

as band-spreading, and is, in effect, a vernier tuner and avoids the necessity of using a special low-capacity condenser for both short and broadcast bands. Some all-wave coils are designed to be used with a condenser having a maximum capacity of .0002 mfd., and in this case, of course, the existing condenser is replaced with one of this value, and no additional condenser will be required.



The all-wave switching arrangement used in the Silver Souvenir receiver.

effect on the broadcast band. For tuning an extra condenser will be found desirable, and this should have a very small maximum capacity (.000035 mfd.), and this should be connected in parallel with the present tuning condenser. On the broadcast bands this extra condenser is ignored, but on the short waves the ordinary condenser is adjusted a degree at a time, and the extra condenser is rotated through its entire movement at each adjustment of the main condenser. This arrangement is known

### Changing Coils

An alternative scheme, and one which will appeal to many, is to remove the existing broadcast coil and to fit in its place a small ebonite panel provided with sockets. (Those removed from an old valveholder or two will be found admirable.) The broadcast coil is then mounted on a small piece of ebonite, and plugs or old valve pins are mounted on this piece of ebonite, and connection is made to the coil by  
*(Continued overleaf)*



1936 STENTORIAN

NEW "MICROLODE" DEVICE—  
SECTION-WOUND & INTERLEAVED

**SHORT-WAVE SECTION**

*(Continued from previous page)*

plugging in the coil. Obviously, with this scheme it will be necessary to arrange the number of plugs and sockets so that any type of coil may be used, and in general it will be found that only four main sockets are required: aerial, earth, grid, and reaction. Thus, if the broadcast coil has to be used with a wave-change switch it will be necessary to arrange the sockets so that a standard pattern is formed and the switch connections will be made to sockets which are not in use when the short-wave coils are plugged in. In this way, the set may be slightly reconstructed to make the wiring more efficient, for instance, and the sockets may be arranged to provide the ideal arrangement for short-wave work. To many listeners the disadvantages of coil-changing are offset by the improvement in efficiency which is

obtained owing to the lack of switching and long leads.

**Combined Switching**

Another scheme which may be adopted, and which has been tried by us and found highly efficient, is to use a double circuit arrangement. For instance, in the Silver Souvenir you will see that a special short-wave condenser was mounted on the chassis in addition to the ordinary broadcast condenser. A multi-contact switch then changed the circuit and brought into action a special short-wave coil, and this was tuned by its own short-wave condenser. This arrangement has the great advantage that the broadcast receiver may employ a tuned H.F. stage (a scheme which is not efficient on short waves), and the operation of the switch converts the tuned stage into an aperiodic one and completely disconnects all the coils. Instead of a single switch, efficiency may be improved by

using a series of switches operated through a single control, and suitable components will be found in the Bulgin range for this purpose. Where it is felt that the experience gained in experimental work indicates that short-wave reception must in future form part of the ordinary listening period a dual set might be built up, in which a complete short-wave detector stage is constructed on the same baseboard as the ordinary receiver. This stage may be built in the ideal short-wave fashion, with the best of short-wave components, and may employ its own valve. The output from this stage may be connected to a switch or switches as above mentioned, and the change from broadcast to short waves may be arranged to completely change over the detector circuits. This scheme has much to recommend it, and is, in fact, to be found in a commercial receiver on view at Olympia this year.

**Aerial and Earth**

Nothing has been said regarding the modification of the aerial and earth, as this article is concerned more with the methods of trying short-wave reception, and thus, if it is found that sufficient interest is obtained in your particular case, a modification of the aerial and earth should also be carried out in order to obtain maximum results. The aerial may conveniently be converted to a vertical wire without loss of efficiency on the broadcast band, and the improvement of the earth connection will certainly improve broadcast reception as well as short-wave signals.



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**LEAVES FROM A  
SHORT-WAVE LOG**

MANY readers when searching for foreign stations on short waves pick up at various points of the condenser dial transmissions which they may recognise as emanating from experimental amateurs. As these are definitely confined to a certain number of frequencies, it is wise to make a note of the channels in which they may be found. They are roughly classified in the 14, 7, 3.5 and 1.7 megacycle bands, corresponding respectively to the frequencies: 20.84-21.43 metres (14,400-14,000 kc/s); 41.1-42.86 metres (7,300-7,000 kc/s); 75-85.7 metres (4,000-3,500 kc/s), and 150-175 metres (2,000-1,715 kc/s).

Amongst these you may come across transmissions, for instance, from South America, where the line between the amateur and the experimental station broadcasting a regular schedule of programmes is not very clearly marked.

**Summer Time**

The question of Summer Time in different parts of the world has caused some slight complications, inasmuch as, unfortunately, the alterations are not made on the same dates. In Europe the differences are very great, as will be seen by the fact that Great Britain and Northern Ireland have chosen April 14th and October 5th; France, March 31st—October 5th; Holland, May 15th—October 6th. As against this, the Argentine Republic changes over to Summer Time on October 1st, and back again on March 30th. In the United States the change has not been made throughout, but cities and towns which agreed to do so on April 28, and are now working to Daylight Time, alter their clocks again on the last Sunday in September.

# The 1936 SONOTONE THREE-FOUR

Further Operating Notes and Details of this Powerful Receiver, and Advance Details of the Mains Version

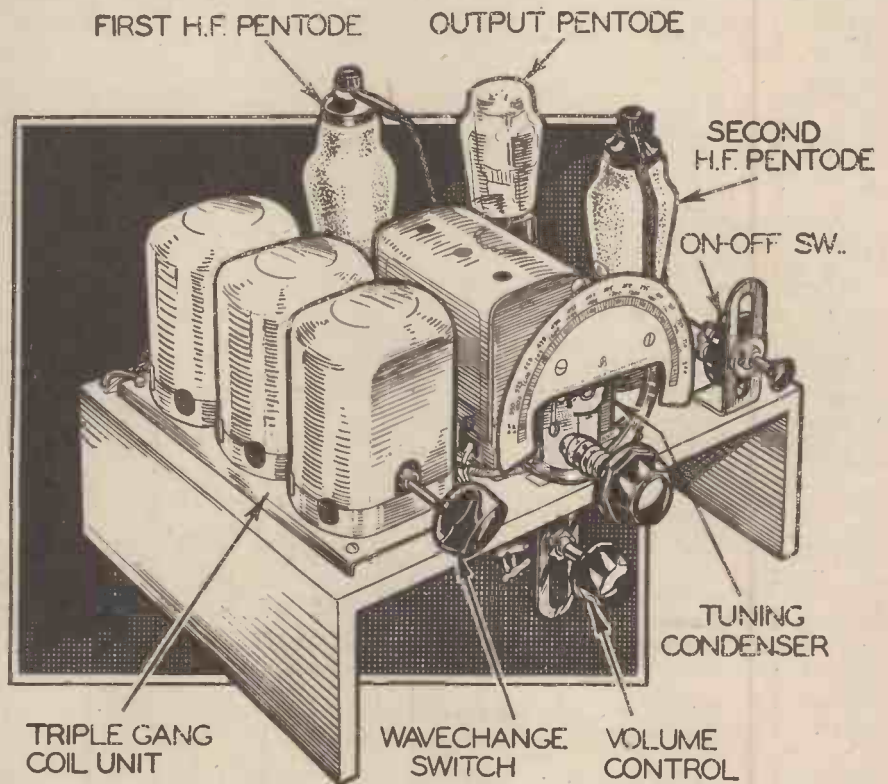
It will be seen from the circuit diagram given last week that no provision has been made for gramophone-record reproduction. Owing to the use of the Westector, it becomes difficult to arrange a satisfactory method of connecting the pick-up, and there are several alternatives available to the listener who is anxious to modify the set for this purpose. The simplest scheme is to fit the pick-up direct to the grid circuit of the output pentode. The drawback to this scheme is that the amplification afforded is hardly sufficient to give good signals on all types of record. A very loud record, such, for instance, as the H.M.V. recording of the massed bands at the Aldershot Tattoo, would prove quite suitable, but single instrumental records would hardly have entertainment value. The step-up afforded by the L.F. transformer makes a great deal of difference, and thus the pick-up may be connected on the input side of this component. All that is necessary is to join the two pick-up leads to the two primary terminals of the transformer, and if it is desired completely to silence radio the lead from condenser C9 should be disconnected. There is no L.F. volume control and thus a pick-up with combined control should be employed in order to compensate for differences in recordings.

### In stability

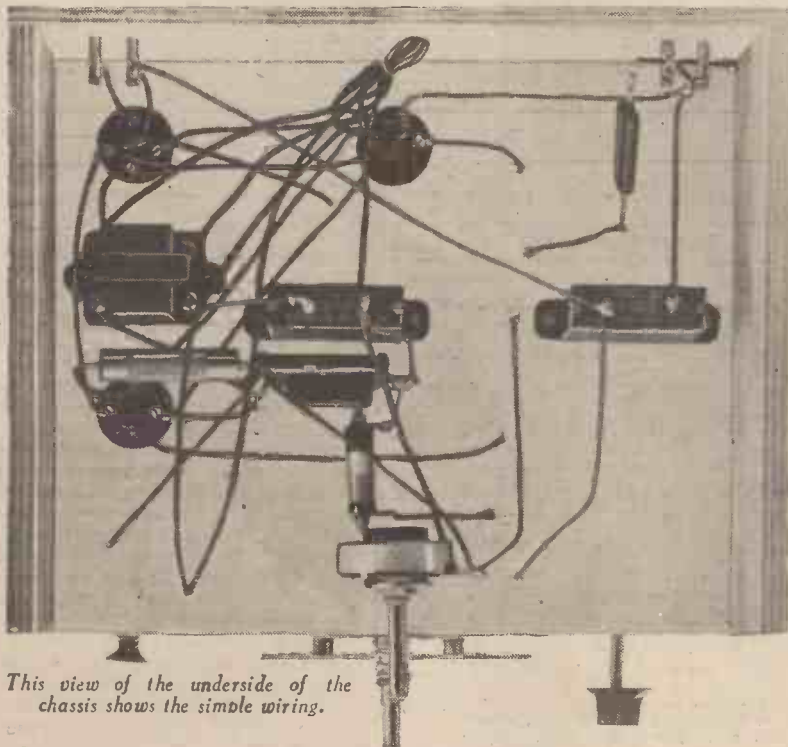
The circuit, as designed, is perfectly stable, and should there be any pronounced instability when first switching on, the wiring should be checked very carefully. In view of the fact that there are two H.F. stages, there is greater risk of instability occurring, although all H.F. components are adequately screened. If the wiring is carried out as shown in the wiring diagram, with the individual wires running as shown,

no instability should arise, and therefore whistles at various points on the dial should be put down to instability caused by a poor earth connection. In this case remove the earth lead, and if there is no alteration in the strength of the whistles it may be taken that the earth is inefficient

and the lead should be examined for a break—probably to be found where it has been joined to the buried section. If, on the other hand, removal of the earth results in worse troubles, then the earth may be passed as O.K. and the circuit should be examined for wiring mistakes or defective



The complete receiver as seen by our artist.



This view of the underside of the chassis shows the simple wiring.

components. Do not be tempted to screen leads other than those shown screened in the wiring diagram. Although screening is very effective it can lead to difficulties if carried out in the wrong part of the circuit. Check the voltage at H.T.1 and make quite certain that this is not capable of improvement. H.T.2 should be the maximum taken by the valves, although any value from 100 volts upwards will give good results. For the maximum undistorted output, however, 150 volts should be used.

### Trimming Adjustments

Remember that the adjustment of the trimmers C1, C2, and C3 is all-important, and maximum results cannot be obtained if these three condensers are not exactly in step. A weak signal should always be employed for trimming, and as soon as an increase in signal strength is obtained the volume control should be adjusted so as to reduce the intensity. In general it is preferable to work with a signal so weak that it is only just audible from the speaker, and then the slightest change in volume is easily noticed.

### Earth Return Leads

It will be seen that on the upper side of the chassis the lead from terminal 2 on the BP51 coil is joined to a point marked

(Continued overleaf)

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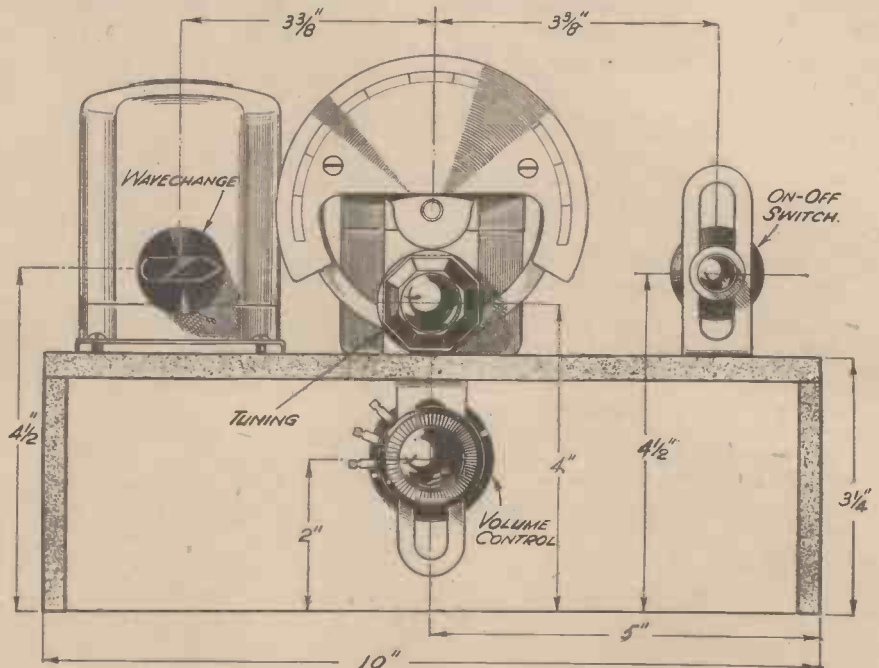
MB. This is a connection to earth, and is carried out by using a lead which is anchored by the screw that serves to hold down the coil chassis. The loop in the bared wire is placed round the screw before it is placed in position, and thus when driven right home the wire comes into contact with the metal baseplate of the coil unit. Do not tighten the holding-down screws too tightly or the baseplate will cut into the wood and a poor contact might arise. All the points marked MB are in good contact with the metallised surface and therefore particular attention should be paid to the connection at these points.

The on/off switch has its spindle in contact with the component bracket and this is in contact with the metal coating of the chassis. This is of no importance, however, as it will be seen, on tracing out the wiring circuit, that the lead which passes from the switch down through hole No. 1 eventually joins to the earth terminal, and thus completes the circuit through the actual wiring, irrespective of the extra contact through the chassis. As the latter is earthed *via*

the lead from the coil baseplate which passes through hole No. 10, the entire chassis is effectively joined to earth at two points and ensures that adequate screening is obtained.

### A Safety Hint

There is a hint worth mentioning in connection with this receiver, although the point also arises in any battery receiver in which S.G. (or H.F. pentode) valves of the metallized type are employed. The coating of these valves is joined to one of the filament pins and this is wired in all of our receivers in such a manner that the coating is automatically joined to earth. An examination of the wiring diagram shows that the H.T. and L.T. negative leads are also joined to the earth line. The lead which is attached to the anode of the S.G. or H.F. pentode valves is in practically every case connected direct to H.T. positive. Consequently, when this lead is to be removed from the terminal on top of the valves referred to the set must be switched off, or the H.T. negative plug removed. If this is not done, and the lead touched the metal coating of the valve,



Panel drilling dimensions of the 1936 Sonotone Three-Four.

### LIST OF COMPONENTS.

- One three-gang coil unit, type BP57, Varley.
- One three-gang .0005 mfd. Baby condenser with drive, J.B.
- Seven fixed condensers. Two .1 mfd., type 250; one 1 mfd.; one .5 mfd., type 65; two .0003 mfd.; one .0001 mfd., type M, T.C.C.
- One fixed resistance, 250,000 ohms, 1-watt type, Erie.
- One potentiometer, 50,000 ohms, Erie.
- One L.F. transformer L.F.12, Bulgin.
- One Westector, WX.6, Westinghouse.
- One three-point switch, type S.36, Bulgin.
- Two terminal strips, A.E., L.S., Clix.
- Three valveholders; two 4-pin, one 5-pin, Clix.
- One H.F. choke, type H.F.P.A., Wearite.
- Five plugs. HT1, HT2, GB-1, GB-2, GB, Belling Lee.
- One H.T. fuse plug with 60 m.a. fuse, Belling Lee.
- Two spades, L.T.+ , L.T.-, Belling Lee.
- Metaplex chassis (10 in. x 8 in. x 3 in.), Peto-Scott.
- Three valves; Two 210 V.P.T., one 220 P.T., Cossor.
- Batteries, 120 volt H.T., Drydex.  
15 1/2 volts G.B., Drydex.  
2 volts L.T., Exide.
- Two 2 1/2 in. component brackets, Peto-Scott.
- One permanent-magnet speaker, W. B.
- 18 in. screened lead, Ward and Goldstone.

the H.T. supply is short-circuited, and in the present receiver the fuse would be blown.

### Mains Version

Next week we shall describe a version of this receiver designed to operate from the A.C. mains. It is obvious that with the higher efficiency of A.C. mains valves there is a tremendous high-frequency stage gain, and a receiver of this nature is a very close competitor to the superhet circuit so far as range is concerned, whilst when good tuning coils are used in a correctly-designed H.F. stage the selectivity does not fall far short of that given by the superhet. It is, naturally, necessary to take special precautions to prevent instability, but the receiver in its final form has proved a very efficient three-valver, and in the form in which it will be presented next week we think readers will find the Sonotone Three-Four is a powerful and stable receiver which fully meets the needs of the majority of experimenters under modern conditions.

# LETTERS FROM READERS

The Editor does not necessarily agree with opinions expressed by his correspondents.



All letters must be accompanied by the name and address of the sender (not necessarily for publication).

## QSL from VUB

SIR,—I have been a reader of your valuable paper since No. 1 and noticed with interest, Greaves's letter in a recent issue. It is surprising that VUB has not acknowledged his QSL, as I have had a reply by return boat. I can claim to have had QSLs. from the following: FYA, PHI, W8XK, W2XAF, W3XAV, DJC, RW59, YV5RMO, YV3RC, 2RO, OXY, VK2ME, LCL, COC, CTIGO, ORK, HVJ, VUB, W3XAL and WKX1. With regard to Mr. J. C. Johnson's letter, I heartily agree with him and should like to see transmitting data published in your paper. Perhaps if either of your correspondents read this they will write to me and we could exchange notes. More than a year and a half ago I qualified for an artificial aerial licence, but at the time did not bother about it. However, I have now applied again for one, and have the transmitter rigged up for test as soon as I get the licence. One day when my morse is good enough I hope to become one of the "G" fraternity.—F. N. BEDWELL (Stratford-on-Avon).

## The Ideal Receiver for S. Africa!

SIR,—With reference to the ideal circuit suggested by Mr. H. Crouch, of Lady-smith, South Africa, appearing in your June 15th issue, and your request for other South African readers' views *re* same, I take the liberty of submitting my own opinion to your consideration, hoping that it will be of some little help.

In dealing with a circuit which would commend itself to the greatest numbers of overseas readers, I do not think that stating each one's needs helps much towards its design. Therefore, instead of telling you what are my own requirements, I will rather deal with the question broadly as far as South and East African conditions are concerned.

Overseas reception on other than short waves is very exceptional and hardly worth the trouble, as the welter of background noise and X's completely drowns the transmission, it being, therefore, devoid of any programme value. This being so, only the local stations, working on wavelengths between 200 and 600 metres, are of interest to residents in South and East Africa, south of the Zambesi river. Overseas entertainment is provided for by the S.W. band (15 to 85 metres), reception from Daventry, Pontoise, and Zeesen being reliable.

With regard to power supplies, it appears from information in hand that South African towns with D.C. mains are more numerous than those with A.C. supplies, although the population served by the latter outdistances the one with D.C. supplies. Voltage ranges from 110 to 400 volts in the case of A.C. and from 200 to 400 volts with

D.C. A point worthy of consideration in connection with the electric supplies is that some of them are subject to fluctuations, more so with D.C. mains. The cost of maintenance rules out battery receivers.

As to selectivity, the problem on the medium waves is non-existent as reception is confined to the locals, therefore a receiver designed for quality and sensitivity rather than selectivity would, I believe, appeal to most South African readers. On the short waves, however, this aspect of the question has to be reckoned with in view of the fact that most of the overseas transmissions are confined to somewhat narrow bands, interference being worst on 25 and 49 metres. On a receiver employing a straight circuit, unless it is of the band-spread variety, reception of Empire transmissions, for instance, on 25.29 metres, is marred by interference from Pontoise on 25.2, and Zeesen DJD, on 25.49 metres.

In order to counteract fading, self-adjusting volume control is a necessary requisite for South African conditions.

In view of the foregoing, in my opinion, the ideal receiver for South African conditions would be a superhet, to work from A.C./D.C. mains 200 to 240 volts, with the least number of valves (five to eight, including rectifier) consistent with adequate H.F. amplification, low level of background noise, A.V.C., and push-pull output for quality and power (anything between 1 and 5 watts). The inclusion of a voltage-controlling valve, if such a device is operative on D.C., is a refinement which would appeal to many.—F. P. RIBEIRO (Lourenço Marques, Portuguese East Africa).

## Transmitting Data

SIR,—Having been a reader of your paper for a number of years, I take the opportunity of replying to V. Walker (2BHT), of Heckmondwike, whose letter regarding transmitting data appeared in the August 3rd issue.

I see he holds an artificial aerial licence, therefore all he has to do is to pass his morse code test in order to qualify for a full licence.

There are six fully-licensed transmitters within ten minutes' bus ride of his address, and any one of them will only be too willing to give him any information he requires.—E. SPENCER, G6SP (Dewsbury).

## The R.S.G.B.

SIR,—Being a reader of Britain's leading weekly wireless paper since its inception, may I be allowed to make a suggestion?

During the last few weeks I have noticed a number of requests from readers regarding transmitting. May I suggest that these keen readers should join the Radio Society of Great Britain. They will then obtain all

the information they require through meetings, and information in the T. and R. Bulletin. They would also meet members who are very willing to give an inquirer all the information he desires.

Speaking from personal experience, I have always found the members of the above society very willing and helpful, and I have been keen on transmitting since 1926, holding call sign FO-A8H (Cape Town) in that year.—J. M. DAVIE, G2BDI (Chingford).

## A QSL from PIIJ (Holland)

DEAR THERMION,—With regard to your request for details of the Dutch station PIIJ, I have their QSL card, which runs as follows:—

"I received your 'card' of 'June 23rd, 1935,' and I thank you very much for your report and information concerning your reception of our short-wave transmitter PIIJ, J—7082 KC. We are very glad to state that you received our transmission O.K.

"We'll continue our experiments every Saturday afternoon at 16.10—17.10 G.M.T. during winter, and at 15.10—16.10 G.M.T. during summer. Transmitter: 4 stages: CO, FD, PA, PA; anode-modulation in the third stage.

"Aerial: horizontal Zepp 4/4  $\lambda$ , tuned feeders 2½ x ¼' with parallel tuning; power 50 watts.

"We shall always feel happy at the interest you are taking in our tests, and you may be sure we highly appreciate this.

"(Signed) Dr. M. Hellingman, operator."

My receiver is 0-v-1. Both valves are pentodes (1-H.F. and 1-L.F.). Antennae-omni-directional and "V" directional N.E. and S.W.

Have you heard the new Iceland station "TFJ," wavelength about 24.5 m.? It came in here R9 at 16.05 B.S.T. on July 31st, 1935.

With regard to the letter by "J. S., of Aberdeen," should not 7 metre and 14 metre read 7 megacycle and 14 megacycle (40 metre and 20 metre)?

By the way, in the "Letters from Readers" page, F. W. T. Atkins (Sheffield) says he knows of no British journal devoted to short-wave transmission. How about the "T. and R. Bulletin"?—R. M. McROBB (Aberdeen).

## Improving Short-wave Conductors

SIR,—The query by R. C. O. (Oxford) interests me greatly, not for short waves, but for wireless coils and aerials in general.

What chiefly is of concern is that copper soon tarnishes and I suppose that its efficiency in the H.F. stages is considerably and progressively impaired, whereas a silver-plated wire practically pure would not readily tarnish.

There is ample proof of this in the home; solid silver forks and spoons containing alloys tarnish with some foods at once, whilst first-class silver-plated ones do not.

It surprises me that this matter has not been taken up before. Perhaps it has, and R. C. O. and myself have discovered something of little import.—J. B. HARTNESS (London, W.1).

(Continued overleaf)



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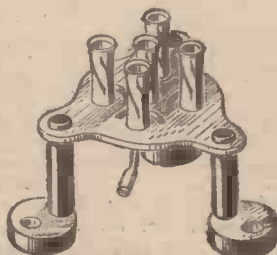
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## LETTERS FROM OUR READERS

(Continued from previous page)

### An Interesting S.W. Log

SIR,—The following list of short-wave broadcasting stations I have recently logged may be of interest to other readers.

On 49 metres—WIXAL (Boston), W8XAL (Cincinnati), VQ7LO (Nairobi), CT1AA (Lisbon), CP5 (La Paz), VE9GW (Bowmanville), W9XF (Chicago) and W2XE (Wayne).

On 46 to 48 metres—CJRO (Winnipeg), CTIGO (Paredo), W3XL (Bound Brook) and YV6RV (Valencia).

Thirty metres—VK3ME (Melbourne), W2XAF (Schenectady), W1XK (Springfield), VK3LR (Lyndhurst), VK2ME (Sydney), 2RO (Rome), HBL (Radio Nations).

Twenty-five metres and below—WIXAL (Boston), W2XE (Wayne), W8XK (Pittsburgh), RW59 (Moscow), VPD (Suva), PCJ (Eindhoven), CP7 (La Paz), HAS3 (Budapest), EAQ 17 metres (Madrid), and PHI (Huizen).

My receiver is a four-valve superheterodyne.—J. MORCOMBE (Sherborne, Dorset).

### Articles on Transmitting Wanted

SIR,—Having digested Mr. J. C. Johnson's letter which appeared in PRACTICAL AND AMATEUR WIRELESS of July 20th, I agree that such a series of articles dealing with the transmitting side of wireless would be welcomed by many readers.

I, too, hope to qualify for the P.M.G.'s transmitting licence in the near future, but lack certain knowledge that could be moulded into articles and in this way all interested readers would benefit.

Regarding the indiscriminate use of such knowledge, all readers of P. AND A.W. have read the consequences of such persons using unlicensed transmitters and, in my opinion, should any experimenter not conform to the regulations he would have only himself to blame.

I hope, Mr. Editor, that a sufficient number of interested readers have taken advantage of your note at the bottom of the above-mentioned letter, and that they have given their views in favour of data on this subject.—MORRIS CASEY (Salop).

### CUT THIS OUT EACH WEEK.

# Do you know

- THAT Russia broadcasts from 65 stations.
- THAT 30,000 people are employed full-time from the transmitting stations in America.
- THAT a radio valve has an average duration of life of 3,000 hours.
- THAT in America there are more cars than wireless sets, taking it that 48 per cent. of the population have a car, whereas only 35 per cent. possess a wireless set.
- THAT in America they want to construct a transmitter of 1,000 kW. power.
- THAT the Pope has ordained that the Latin translation of "Radio" is to be "Marconiana."
- THAT the double superheterodyne is one of the best methods of covering short and broadcast wavebands.

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, Geo. Newman, Ltd., 8-11, 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.



**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.

**P. W. McN. (Ulverston).** Your connections may be wrong, and it would be necessary to see a diagram showing the method of connecting the neon to the mains unit and the connections to the receiver. The arrangement should certainly function.

**H. V. C. (Withington).** The only suggestion we can offer is to obtain a Q.P.P. output choke and connect the two anodes of the Q.P.P. valve through 2 mfd. fixed condensers to the two terminals on the speaker. An alternative is to obtain a Q.P.P. output transformer and to join the secondary or output terminals to the speech coil direct, using a step-down ratio of the appropriate value.

**W. H. (Greenock).** A special H.F. choke for mains use, connected in each mains lead, should cure the trouble. If not, then some suitable apparatus must be joined to the refrigerator. Obtain a copy of the Belling Lee booklet on interference—this may be of assistance to you and help you to select a device within your means.

**Q. J. O. (Moretonhampstead).** We do not recommend the scheme. A better idea would be to connect a very small variable in parallel with the .0005 mfd. condenser and to use the band-spread tuning system. Your minimum capacity will always be high with your scheme, and it will lead to difficulty in tuning on the short waves.

**W. F. (Blackburn).** We cannot quite understand your query. There are wire-wound and composition resistances, the former carrying (in the majority of cases) a greater current than the composition type. Generally speaking, the wire-wound types are inductive, and thus should not be used in H.F. circuits. We regret that we cannot reveal the composition of named commercial components.

**G. B. (Swansea).** The coil unit is home-constructed, and was described in the issue dated March 4th, 1933, copy of which will be sent to you for 4d.

**G. H. (Manchester).** The valve may have lost emission, or your detector valve may be overloaded. This can cause distortion. Is your loud-speaker correctly matched?

**G. T. (Hull).** We regret that we cannot give circuit diagrams of commercial receivers. The manufacturers may be able to assist you.

**W. R. E. (Garden Town).** The change should not have caused the loss of signal strength. You will certainly find tuning flatter, and this should bring about an increase in signal strength. Perhaps you have made a wrong connection.

**J. P. (Glamorgan).** The mains unit is not suitable. The total current will exceed 20 mA and the unit you mention will only give about 12 mA at 120 volts.

**S. J. (Eccles).** The trickle charger only delivers a very small current, whilst the charging station charges at greater current, and thus the accumulator is available in a much shorter period of time.

**G. Y. A. S. (Manchester).** We cannot give any recommendation regarding commercial receivers. Call at your local dealer and hear a number of different sets, and no doubt suitable arrangements may be made to enable you to hear a selection in your own home.

**L. W. (Stratford).** We published a Test Report in our issue dated July 6th. This will, no doubt, interest you.

**J. R. (Portmadoc).** A capacity of .1 mfd. is ample, although there would be no objection to using a larger capacity. The condenser should, of course, be of the non-inductive type.

**B. A. S. (Kenton).** A ratio of 5 to 1 is suitable, and the special high-ratio 10 to 1 transformer is not to be recommended without a volume control. You will have difficulty in avoiding overloading of the output pentode.

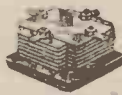
**C. W. (Penge).** If the coil is a commercial article and you are using the correct value of condenser, the trouble can only be caused by the H.T. applied to the valve. This should be increased.

**O. R. R. (Stoke Newington).** The valves are definitely not interchangeable. The A.C. valves have an indirectly-heated filament requiring 1 amp., and the whole circuit design would have to be changed to accommodate these valves.

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# Tuned Circuits

In This Article the Peculiarities of Tuned Circuits are Discussed With a View to Enabling the Would-be Designer to Select the Type Most Likely to Meet His Requirements

**T**UNED circuits are employed in radio receivers for a dual purpose. In the first place, they enable the listener to select the required station and, second, they act as a high-impedance load, across which a radio frequency voltage is developed for passing on to the following valve. For the function of station selection the circuits should be fairly sharply tuned,

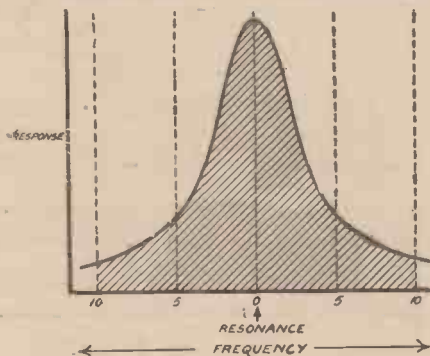


Fig. 2.—The shaded portion represents the band width for reproduction up to 10,000 cycles per second.

that is to say, give their maximum response at resonant frequency, the response falling off rapidly at frequencies above and below this value. On the other hand, sharply tuned circuits have a deleterious effect upon the quality of reproduction, since the falling off of response on either side of resonant frequency represents attenuation of the higher notes. Again, because a tuned circuit has its maximum impedance at the resonant frequency, accurate tuning and low radio-frequency losses are essential in the case of high frequency couplings since, as a general rule, the higher the impedance the higher the overall amplification or "stage gain."

### Points in Common

It is seen, therefore, that the requirements so far as selectivity and amplification

are concerned are common to all tuned circuits, but to a large extent are in conflict with the requirements for good quality reproduction, if by good reproduction is meant an audio-frequency output over a wide range of musical frequencies, and not merely intelligible programmes from half the stations in the world.

Obviously, designers of radio sets, whether commercial productions or home built equipment, must attempt some compromise between selectivity and high fidelity, the nature of this compromise depending in the one case upon the manufacturer's estimate of the average demand, and in the other case upon the constructor's personal preference.

The earliest tuners consisted of coils, the inductance of which could be varied either by a stud switch, slider or other device, the capacity element in the tuning being the distributed capacity of the coil winding, and was therefore constant. There are, also, in present-day radio practice, certain types of tuned circuits which rely mainly upon inductance. There are the comparatively recently introduced permeability tuners in which the coils have iron cores which can be withdrawn to a greater or less degree in order to vary the inductance and hence the resonant frequency, and a good example of this is shown in Fig. 1. The original tapped or sliding inductances went out of favour because they were unwieldy and not susceptible to very accurate tuning, while tuning itself was far too flat for modern requirements by way of selectivity. As will be shown later, however, permeability tuning is free from this objection, and has a number of additional advantages.

### Conventional Types

A simple coil and condenser is far too flatly tuned for modern reception conditions except for use in sets of the high fidelity type, and even then three tuned circuits are necessary to obtain a reasonable degree



Fig. 1.—The Brown permeability tuner.

of selectivity. Methods of improving the selectivity of a single circuit are well known, and mention can be made of bringing the aerial connection to a tapping near the bottom or earthed end of the tuning coil; or by bringing the aerial connection to a small untuned coil inductively coupled to the main tuning coil. In addition, a small condenser is often connected in series with the aerial lead in order to improve selectivity and to reduce the effect of the aerial capacity upon the tuned circuit.

A peculiarity of the ordinary condenser and coil arrangement is that its tuning is not equally sharp at all wavelengths, for such coils, when designed for use on the medium waveband, are more selective at the 200-metre end of the band than at the 550-metre end, which means that the musical quality is better at the higher wavelength than at the shorter. For best results the tone control should be continuously variable if uniform quality is required all over the waveband.

### Compensation

A further peculiarity of these circuits is that the amplification is not constant over

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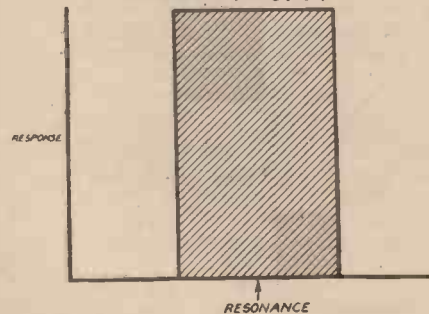


Fig. 3.—The ideal response curve for adjacent channel selectivity.

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**TUNED CIRCUITS**

*(Continued from facing page)*

the whole of the wave range, being greater on the shorter waves than the longer. There are, however, ways and means of compensating to some degree for this disparity in sensitivity at the two ends of the waveband. One scheme which has been used in a number of commercial receivers is to employ a mixed method of coupling the untuned aerial coil to the tuned circuit, the coupling being partly inductive, and partly by a very small condenser connected between the top end of the untuned coil and the top end of the tuned coil. This small capacitative coupling (a value of .00001 mfd. is suggested) increases the response at the lower end of the waveband, while the aerial coupling coil in conjunction with the aerial itself forms a resonant circuit with a natural frequency in the region of the upper limit of the medium waveband and thus improves the response at that end. Correct proportioning of these two features results in a much more uniform degree of sensitivity at all parts of the range.

On the other hand, it is fairly claimed for the permeability system of tuning that both selectivity and sensitivity are substantially uniform at all frequencies within

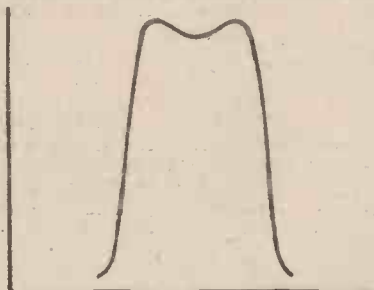


Fig. 4.—A double humped resonance curve.

the tuning range of the coils—a feature which may result in a very much wider adoption of this system of tuning.

**In Opposition**

It has already been pointed out that the requirements for reception free from interference by stations working on adjacent channels and for high fidelity reproduction are diametrically opposed, and that any receiver must therefore be in the nature of a compromise. In a simple way this can be done by limiting the number of tuned circuits to the minimum necessary for the required degree of selectivity, but even this does not give optimum reproduction conditions, since the falling off of response on either side of the resonant point represents serious high-note attenuation. This will be clear from Fig. 2, which shows the frequency response of a typical tuned circuit at resonance and at frequencies on either side of the tuning point. Now a modulated signal can be considered as a fundamental frequency equal to the carrier frequency, plus a band of frequencies on either side of the fundamental, having a width equal to the carrier frequency plus and minus the range of audio-frequencies transmitted. The portion marked with shading in the diagram represents these "side-bands," as they are called, and the degree to which these are cut is seen quite readily.

In order to be certain that interference from adjacent channels will not occur, the response at frequencies  $4\frac{1}{2}$  kc/s above and below the fundamental or carrier frequency should be very small, i.e., the sidebands should be almost entirely cut off beyond this point—and this reduces the high frequency

response, and quality tends to become gruff and drummy. Particularly so, since the falling off commences right from the fundamental, and if the response at 4,500 cycles is negligible, even that at 3,000 cycles will be poor.

**Ideal Conditions**

The ideal form of response curves for a tuning system would be a flat-topped figure similar to that shown in Fig. 3, in which a band of frequencies of the desired width is amplified uniformly and is then suddenly cut off to nil. The ideal in this case cannot be attained in practice, but a reasonable approximation to it is possible by a well-designed and properly adjusted filter circuit of the "band-pass" type, which is a development of the old loose-coupled or two-circuit tuner used in the early days of radio for obtaining a high degree of selectivity.

Listeners who remember those early days

will recollect that when the coupling was minimum, i.e., when the coils were at their greatest distance apart, tuning was extremely sharp, but as the coils were made to approach each other, tuning became broader. Some even may have observed that beyond a certain point increased coupling gave two distinct tuning points a few metres apart. The response curve of such an arrangement would be a double humped effect as shown in Fig. 4, and is due to the resultant of two similar curves which peak at different frequencies.

The modern band-pass circuit uses just this effect, but by a correct selection of the method and degree of coupling the two humps merge into an almost flat top curve with more or less steep sides, and of a width corresponding to various degrees of selectivity. We no longer employ swinging coils, and in general direct inductive coupling is not used, except in the case of intermediate frequency transformers.

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Big-power Melody Two with Lucerne Coil (SG, Trans)	—	AW338A
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Family Two (D, Trans)	—	WM278

Three-valvers: Blueprints, 1s. each.		
8 Radiogram (D, RC, Trans)	—	AW343
P.T.P. Three (Pentode-Triode-Pentode)	June '35	WM389
New Regional Three (D, RC, Trans)	25.6.32	AW349
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW304
Home-Built Coil Three (SG, D, Trans)	14.10.33	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher, Chassis Model (SG, D, Pen)	3.2.34	AW410
Lucerne Ranger (SG, D, Trans)	—	AW422
Cosser Melody Maker with Lucerne Coils	—	AW423
P.W.H. Mascot with Lucerne Coils (D, RC, Trans)	17.3.34	AW337A
Mullard Master Three with Lucerne Coils	—	AW424
Pentaquester (HF Pen, D, Pen)	14.4.34	AW431
£5 5s. Three: De-luxe Version (SG, D, Trans)	10.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
All Britain Three (HF Pen, D, Pen)	—	AW448
"Wireless League" Three (HF Pen, D, Pen)	3.1.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
Multi-Mag Three (D, 2 Trans)	—	WM288
Percy Harris Radiogram (HF, D, Trans)	Aug. '32	WM294
£6 Gs. Radiogram (D, RC, Trans)	Apr. '33	WM318
Simple-tune Three (SG, D, Pen)	June '33	WM327
Tyers Iron-core Three (SG, D, Pen)	July '33	WM330
C-B Three (D, LF, Class B)	—	WM333
Economy-pentode Three (SG, D, Pen)	—	WM337
All-wave Three (D, 2LF)	Jan. '34	WM348
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 5s. Three (SG, D, Trans)	Mar. '34	WM354
Iron-core Band-pass Three (SG, D, QP21)	June '34	WM362
1935 £6 Gs. Battery Three (SG, D, Pen)	Oct. '34	WM371
Graduating to a Low-frequency Stage (D, 2LF)	Jan. '35	WM378
Four-valvers: Blueprints, 1s. 6d. each.		
65/- Four (SG, D, RC, Trans)	—	AW370
"A.W." Ideal Four (2SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2SG, D, Pen)	—	AW421
Cruisers' A.V.C. 4 (2 HF, D, QP21)	18.8.34	AW445
(Pentode and Class-B Outputs for above: blueprints 6d. each)	25.8.34	AW445A
Quadradyne (2SG, D, Pen)	—	WM273
Calibrator (SG, D, RC, Trans)	Oct. '32	WM300
Table Quad (SG, D, RC, Trans)	—	WM303
Calibrator de Luxe (SG, D, RC, Trans)	Apr. '33	WM316
Self-contained Four (SG, D, LF, Class-B)	Aug. '33	WM331
Lucerne-Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2LF)	Feb. '35	WM381
The H.K. Four	Mar. '35	WM384
Five-valvers: Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans)	May '33	WM320
New Class-B Five (2SG, D, LF, Class-B)	Nov. '33	WM340
Class-B Quadradyne (2SG, D, LF, Class-B)	Dec. '33	WM344
1935 Super Five (Battery Superhet)	Jan. '35	WM379
Two-valvers: Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286

Three-valvers: Blueprints, 1s. each.		
Home-lover's New All-electric Three (SG, D, Trans) A.C.	25.3.33	AW383
S.G. Three (SG, D, Pen) A.C.	3.6.33	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF, Pen, D, Pen) A.C.	23.6.34	AW430
D.C. Calibrator (SG, D, Push-pull Pen) D.C.	July '33	WM328
Simplicity A. C. Radiogram (SG, D, Pen) A.C.	Oct. '33	WM338
Six-guinea A.C./D.C. Three (HF Pen, D, Trans) A.C./D.C.	July '34	WM364
Mantovani A.C. Three (HF Pen, D, Pen) A.C.	Nov. '34	WM374
Four-valvers: Blueprints, 1s. 6d. each.		
A.C. Melody Ranger (SG, DC, RC, Trans) A.C.	—	AW390
A.C./D.C. Straight A.V.C.4 (2 HF, D, Pen) A.C./D.C.	8.9.34	AW440
A.C. Quadradyne (2SG, D, Trans) A.C.	—	WM370
All Metal Four (2SG, D, Pen)	July '33	WM329
"W.M." A.C./D.C. Super Four	Feb. '35	WM382
Harris Jubilee Radiogram	May '35	WM380

SUPERHETS.		
Battery Sets: Blueprints, 1s. 6d. each.		
1934 Century Super	9.12.33	AW413
Super Senor	—	WM256
1932 Super 60	—	WM269
Q.P.P. Super 60	Apr. '33	WM319
"W.M." Stenode	Oct. '34	WM373
Modern Super Senor	Nov. '34	WM375
Mains Sets: Blueprints, 1s. 6d. each.		
1934 A.C. Century Super, A.C.	10.3.34	AW425
1932 A.C. Super 60, A.C.	—	WM272
Seventy-seven Super A.C.	—	WM305
"W.M." D.C. Super, D.C.	May '33	WM321
Merrymaker Super, A.C.	Dec. '33	WM345
Heptode Super Three, A.C.	May '34	WM359
"W.M." Radiogram Super, A.C.	July '34	WM366
"W.M." Stenode, A.C.	Sep. '34	WM370
1935 A.C. Stenode	Apr. '35	WM385

PORTABLES.		
Four-valvers: Blueprints, 1s. 6d. each.		
General-purpose Portable (SG, D, RC, Trans)	—	AW351
Midget Class-B Portable (SG, D, LF, Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Town and Country Four (SG, D, RC, Trans)	—	WM282
Two H.F. Portable (2 SG, D, QP21)	June '34	WM363
Tyers Portable (SG, D, 2 Trans)	Aug. '34	WM367

SHORT-WAVERS. Battery Operated.		
One-valvers: Blueprints, 1s. each.		
S.W. One-valve	—	AW320
S.W. One-valve for America	—	AW429
Roma Short-waver	10.11.34	AW452
Two-valvers: Blueprints, 1s. each.		
Home-made Coil Two (D, Pen)	14.7.34	AW440
Three-valvers: Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver	Jan. 19, '35	AW463
Short-wave Adapter	Dec. 1, '34	AW456
Superhet, Converter	Dec. 1, '34	AW457
The Carrier Short-waver	July '35	WM390

FOUR-VALVERS: Blueprints, 1s. 6d. each.		
"A.W." Short-wave World Beater (HF Pen, D, RC, Trans)	2.6.34	AW436
Empire Short-waver (SG, D, RC, Trans)	Mar. '33	WM318
Standard Four-valve Short-waver	Mar. '35	WM383

Mains Operated.		
Two-valvers: Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C.	10.11.34	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	Aug. '34	WM368
"W.M." Long-wave-Converter	Jan. '35	WM380

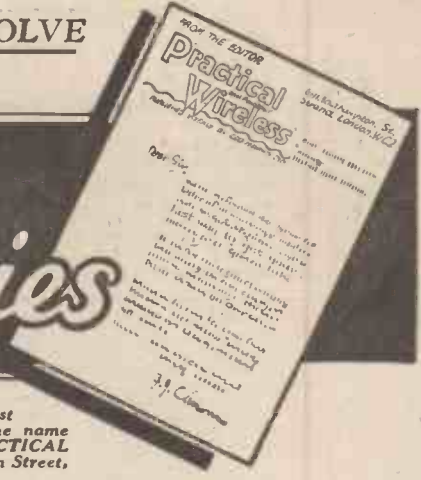
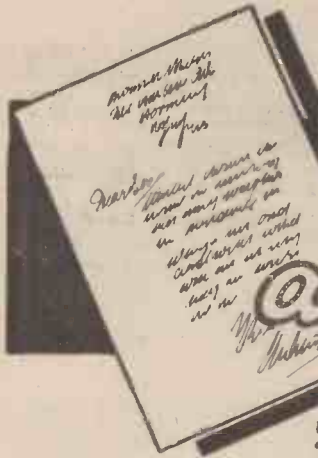
THREE-VALVERS: Blueprints, 1s. each.		
Emigrator (SG, D, Pen) A.C.	—	WM352
Four-valvers: Blueprints, 1s. 6d. each.		
Gold Coaster (SG, D, RC, Trans) A.C.	Aug. '32	WM292
Trickle Charger	Jan. 5, '35	AW462

MISCELLANEOUS.		
Enthusiasts Power Amplifier (1/6)	June '35	WM387
Newstyle Short-wave Adapter (1/-)	June '35	WM383

LET OUR TECHNICAL STAFF SOLVE YOUR PROBLEMS

Queries and Enquiries

If a postal reply is desired, a stamped addressed envelope must be enclosed. Every query and drawing which is sent must bear the name and address of the sender. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Neumes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.



SPECIAL NOTE

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. Please note also, that queries must be limited to two per reader, and all sketches and drawings which are sent to us should bear the name and address of the sender.

Hum and the Universal Hall-Mark

"I have built the Universal Hall-Mark and am very satisfied indeed, especially with the quality of reception. The presence of hum in the background, however, is annoying, especially when the volume control is turned down."—W. H. F. (Harrow).

WE have had no other complaints of hum on D.C. with this particular receiver and would therefore suggest that some component is faulty, or that the wiring is responsible for the trouble. However, you could try the effect of connecting a 2 or 4 mfd. fixed condenser between the chassis and the heater end of the main dropping resistance. If this fails to reduce the hum it may be found that the trouble is being induced from the mains and is due to machinery or some similar apparatus, and you should try the effect of the usual choke and condenser circuit across the mains input. A commercial noise suppressor could be purchased.

Making the Tone Deeper

"I have a mains set and am using a moving-coil speaker. The tone is medium, but I would like to have a deeper tone. Can you tell me how to make the adjustment?"—A. C. B. (Hackbridge, Surrey).

YOU cannot make the speaker itself deeper, but can improve the L.F. circuits of the receiver to give a better response, and the speaker, if it is a good one, will naturally deliver a better output.

If the L.F. stage is transformer coupled, you could replace this by a parallel-fed transformer, making the coupling condenser large to introduce a little bass resonance, or could use R.C. coupling or a higher-class transformer to give better low-note amplification. An artifice which is often adopted, especially if the output valve is a pentode, is to reduce the high note amplification, which naturally gives the overall reproduction a lower tone. A 10,000 ohms resistance in series with a .01 mfd. fixed condenser joined across the anode load is usual with a pentode, and will result in sufficient high-note loss to prevent "screechiness."

Lewcos Superhet Coils

"Have you the designs of a set using the Lewcos Superhet Coils. I think you published a set a long time ago with these and I wish to rewire it. It was in the 'Wireless Magazine,' I think."—T. H. (No address).

YOU are probably referring to the Super Senior, or the 1932 Super 60. There is a blueprint available for both of these receivers, but, unfortunately, the issues in which these were described are now out of print. The blueprint numbers are WM 256 and WM 269.

Improving the Earth Connection

"I rather fear that my earth connection is not as good as it could be. Are there any real rules which must be followed, and how is it possible to tell whether the earth is working or not? What is the best earth? I should like some explanation on these important points."—N. R. W. (Oxford).

THE earth should be as efficient as possible, and if the removal of the lead does not result in reduced signal strength or instability, then it is generally taken that it is inefficient. A good modern chemical earth may be employed, or you may re-arrange your own earth system on sound lines as described in an article entitled "The All-important Earth" which was published in our issue dated December 3rd, 1932. Low resistance is the keynote of the earth connection.

Going on to D.C. Mains

"I have moved into a new house and the D.C. mains are fitted. I have a three-valve battery set and I wish now to use this on the mains.

What must I do to the set, or buy, in order to carry out this plan?"—T. C. C. (Croydon).

YOU can only operate the H.T. section from the D.C. mains, unless you are prepared to re-build the set. To drop the voltage to the required 150 you will have to insert a series resistance, and the H.T. should also be smoothed. A good high-inductance mains choke should be joined in the positive mains lead to the set and a resistance in series with it. The value of the resistance may be ascertained by taking the total current of the three valves and dividing this into the excess voltage (that is, the difference between your mains voltage and 150 volts). A 4 mfd. condenser should be joined between H.T. positive and earth and between the positive mains lead and earth. A 2 mfd. fixed condenser should also be connected in the earth lead.

Circuit Design

"I have drawn up the enclosed circuit from various details I have gathered from your pages. Will you please criticise this and show any modifications which you think are necessary."—L. P. (Wrotham).

ALTHOUGH the circuit is quite in order there is one point which must be carefully watched. This seems to be a common point with home-designed receivers and often leads to trouble. You have employed an efficient H.F. stage and this feeds a pentode detector. So far there is very little to criticise, although under certain conditions there may be a risk of detector distortion, due to a powerful signal being picked up and consequently overloading the detector. A better selection of the grid condenser and grid leak will help to remedy this. The coupling arrangements must, however, be modified. You need a high impedance in the anode circuit of the detector and, therefore, a resistance-feed transformer or plain resistance-capacity coupling should be used, and a volume control must be included to avoid overloading the output pentode. An R.C. coupling with a grid leak in the form of a volume control pot. is preferred.

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

THE ONE AERIAL FOR THE MODERN SET

PIX INVISIBLE AERIAL

- Neat
Efficient
Blends with furnishings
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Double Length 3/6

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Miscellaneous Advertisements

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PREMIER SUPPLY STORES

ANNOUNCE a City Branch at 165 and 165a, Fleet Street, E.C.4 (next door to Anderton's Hotel), for the convenience of callers; post orders and callers to High Street, Clapham.

OFFER the following Manufacturers' Unused Surplus goods at a Fraction of the Original Cost; all goods guaranteed perfect; carriage paid over 5/-, under 5/- postage 6d. extra; I.F.S. and abroad, carriage extra; orders under 5/- cannot be sent C.O.D.; please send 1d. stamp for large new illustrated catalogue, also August bargain supplement.

SPECIAL Bargains for callers at our Clapham Branch where Summer Sale is now taking place.

WORLD Famous Continental Valve Manufacturer; mains types, 4/6 each, H.L., L., power; high and low magnification, screen grid; variable Mu screen grid; 1, 3, and 4 watt A.C. output, directly heated pentodes; V.H.P., D.D.T. Diode Tetrodes, 250 volt 60 m.a. full wave rectifiers; A.C. D.C. types, 20 volts, 0.18 amp. filaments; screen grid; variable Mu screen grid; H., H.L., power and pentodes.

THE following Types, 5/6 each; 350 v. 120 m.a. full wave rectifiers, 500v. 120 m.a. full wave rectifiers, 2 1/2 watt indirectly heated pentodes.

2-VOLT H.F., L.F., 2/3; power, low consumption 2 power, super power, 2/9; screened grid, variable mu screened grid, 5- or 4-pin pentodes. Variable-mu H.F. Pentodes, 5/-.

THE following American Types, 4/6; 250, 210, 245, 47, 46, 24, 35, 51, 57, 58, 55, 37, 80, 6A7, 2A7, 27, 77, 78, 2A5, 281. All other types, 6/6.

AMERICAN types 250 Valves 4.5 watts undistorted, 450 volts plate 4/6. Matched pairs 9/-.

B.T.H. Moving Coil Speakers, matched pairs, 8in. 1,500 ohms, 7,500 ohms. (1,500 speaker as choke 7,500 speaker in parallel with H.T. supply), with output transformer for pentode, 15/6 per pair; A.C. kit for pair, 12/6.

M.C. Multi-ratio output transformers, 2/6; 2-1 or 1-1 output transformers, 2/6; microphone transformers, 50 and 100-1, 2/6; 3 henry chokes, 2/6; 100 henry chokes, 2/6.

LARGE Selection of Pedestal, table and radio-gram cabinets at a fraction of original cost.

BLUE-SPOT 29P.M. P.M. Moving Coil multi-ratio transformers, 15/-; handles 4 watts. Sonochorde ditto. Ideal for Battery Sets.

ELIMINATOR kits, condensers, resistances and diagrams, 120v. 20 m.a., 20/-; Trickle charger, 8/- extra, 150v. 30 m.a. with 4v. 2-4 amp. C.T., L.T., 25/-; trickle charger, 6/6 extra; 250v. 60 milliamps, with 4v. 3-5 amps. C.T., L.T., 30/-; 300 v. 60 m.a. with 4 volts 3-5 amps., 37/6; 200v. 50 m.a. with 4v. 3-5 amps. L.T., 27/6.

PREMIER L.T. Charger kits, Westinghouse rectifier, input 200-250v. A.C., output 8v. 1/2 amp., 14/6; 8v. 1 amp., 17/6; 6v. 2 amp., 27/6; 30 v. 1 amp., 37/6; 2v. 1/2 amp., 11/-.

B.T.H. Trussed Induction Type A.C. only, Gramophone Motors, 100-250v. 30/- complete; ditto, D.C., 42/6.

COLLARO Gramophone Unit, consisting of A.C. motor 200-250v. high quality pick-up and volume control 45/-. Motor only, 35/-.

EDISON BELL Double Spring Gramophone Motors, complete with turntable and all fittings, 15/-.

WIRE Wound Resistances, 4 watts, any value up to 50,000 ohms, 1/-; 8 watts, any value up to 100,000 ohms, 1/6; 15 watts, any value up to 50,000 ohms, 2/-; 25 watts, any value up to 50,000 ohms, 2/6.

MAGNAVOX 144, 15/-, 144 Magna, 25/-, 152, 17/6, 152 Magna, 37/6, 154, 12/6, Dual-Matched Pairs D.C. 144/152, 32/6. Ditto Magna 62/6. A.C. Energising Kit to suit any of above 10/-, all 2,500 ohms. P.M. 7 inch, 16/6, P.M. 9 inch, 22/6. State transformer required.

12 TO 2,000 Metres without Coil Changing; huge purchase of all-band 2-gang screened coils, suitable for screen grid, H.F. stage (tuned) screen grid detector type receiver, complete circuit supplied, 12/6.

BRITISH made Meters, moving iron, flush mounting, 0-10, 0-15, 0-50 m.a., 0-100, 0-250 m.a., 0-1, 0-5 amps., all at 6/-; read A.C. and D.C.

POTENTIOMETERS by Best Manufacturers, 200, 350, 500, 1,000, 2,500, 5,000, 8,000, 10,000, 15,000, 25,000, 50,000, 100,000, 250,000, 500,000, 1 meg., 2/-; 5,000, 10,000, 15,000, 100,000, with mains switch, 2/-.

1,000 OHM 150 milliamp. Semi-variable resistance, 2/-; 1,000 ohm 250 milliamp, tapped, for any number .18 valves, 3/6; 800 ohms, 350 m.a., tapped, 2/-.

COSMOCORD pick-ups with Arm and Volume Control, wonderful value, 10/6.

(Continued at top of column three)

Easy Terms

N.T.S. offers you, on the EASIEST EASY TERMS in the Country, IMMEDIATE DELIVERY of all the

1936 MODELS as shown at

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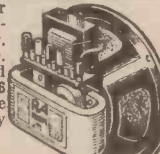
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Model 36S. New improved Microlode device, giving extended frequency range. Perfectly matches any output. Cash or C.O.D. Carriage Paid £2/2/0, or 2/6 deposit and 11 monthly payments of 4/-.



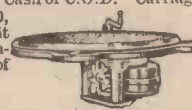
R & A MULTEX 1936 P.M. SPEAKER

1936 P.M. Speaker. Suitable for any type of output, and with 30-ratio transformer. Cash or C.O.D. Carriage Paid £1/12/6 or 2/6 deposit, balance in 11 monthly payments of 3s.



COLLARO B.30 DOUBLE SPRING GRAMO MOTOR

Double Spring Motor on 12in. beaded edge Unit plate with Automatic stop. 12in. turntable and all accessories. Cash or C.O.D. Carriage Paid £1/12/0, or 2/6 deposit and 11 monthly payments of 3/-.



ATLAS ELIMINATOR

Model C.A. 25. 200-250 volts A.C., 40-120 cycles. 4 voltage tappings: output 25 m.a. at 120/150v. Westinghouse Rectifier. Cash or C.O.D. Carriage Paid £2/19/6, or 5/- deposit and 11 monthly payments of 5/6.



PIFCO ROTAMETER

9 ranges, making possible over 100 tests. For Mains or Battery. In case, complete with leads. Send only 2/6; balance in 10 monthly payments of 3/-. Cash or C.O.D. Carriage Paid, £19/6.



De Luxe Moving-Coil Model. Cash or C.O.D. Carriage Paid, £2/2/0, or 2/6 deposit and 11 monthly payments of 4/-.

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Name .....

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Pr.W.20

(Continued from foot of column one)

THE following Lines 6d. Each or 5/- per dozen : 4- or 5-pin baseboard or 4-, 5-, 6-, or 7-pin chassis mounting valve holders, American valve holders, 1 watt resistances, wire end, every value; tubular wire end condensers, 1,500 volt, every value up to 0.5, 0.3 amp., 2- or 3-point switches, Cydon double trimmers, 6yds. Systoflex, 1, 1.5, 2 or 2.5 mm., 1 yd. 7-way cable, 9ft. resincoated solder, 6yds. push-back connecting wire.

L.F. transformers, AFS, 6/6; R.I.DUX, 4/-; Benjamin Transfeeda, 4/6; Telsen Radiogrand, 2/9; Voltra, 2/-.

RELIABLE Soldering Irons 200, 250 volts, 2 amps., 2/6 each.

ELECTROLYTIC Condensers T.C.C. 8mf. 440v.. 3/-; 550v., 4/-; 15 mf. 50v., 1/-; 15 mf. 100v., 1/-; 15 mf. 12v., 1/-; Dubilier 4 or 8mf. 500v., 3/-; 8 plus 4 500v., 4/-; 50v. 50mf., 1/9; 12mf., 20v., 6d. U.S.A. 4, 8 or 12mf. 550v., 1/9; 100 mf. 12v., 1/3; 2,000mf. 12v., 6/-.

PAPER Condensers. Dubilier 4mf. 500v. working 4/-; ditto 700v., 5/-; ditto, 800v., 6/-; Western Electric, 250v. working 1mf., 6d.; 2mf. 1/-; 4 mf., 2/-; 1mf. 2000v. working, 3/-.

CONDENSED Blocks 250v. working, various taps 6mf., 2/-; 10mf., 3/-; 8.5 mf., 2/6.

MAINS Transformers. Premier all have tapped primaries, C.T., L.T.'s and Engraved terminal Board. H.T.8 plus H.T.9, 2 L.T.'s 10/-; Rectifier, 8/6 extra; H.T.10 2 L.T.'s, 10/-; Rectifier, 9/6 extra; 250 plus 250 60 m.a. 3 L.T.'s, 10/-; 350 plus 350 120 m.a. 3 L.T.'s, 12/6.

WESTERN ELECTRIC Manufacturers type 300 plus 300, 60 m.a. 2 L.T.'s, 6/6; 350 plus 350 120 m.a. 3 L.T.'s, 9/6; 500 plus 500 150 m.a. 5 L.T.'s, 19/6.

VARIABLE condensers. Premier, all brass, short wave, .00015 slow motion, 3/9; British Radio-phon, all brass, 2-gang, .00015 each section, 5/6; Ormond, .00025, 1/6; Polar, all brass, .0005 slow motion 3/11; Lissen 2-gang, .0005, front trimmer, disc drive, 5/11; Utility 3-gang fully screened trimmers and disc drive, 7/6.

BAKELITE reaction condensers, .00015, .00035, .00055, .00075, 9d.

LISSEN 3-gang, superhet coils, 6/-; Lotus 3-gang band-pass coils, 12/6; Iron core coils with circuit, 2/11 each; Varley band-pass aerial coils, B.P.5 type, 2/9; ditto band-pass transformer, B.P.S., 2/6.

H.F. Chokes Premier screened, 1/6; Premier short-wave, 9d.; pre-sets, any value, 6d.

PREMIER smoothing chokes, 25ma., 20 henries, 2/9; 40 ma. 30 henries, 4/-; 60 ma. 40 henries, 5/6; 150 ma. 40 henries, 10/6; 60 ma. 80 henries, 2,500 speaker replacement, 5/6.

PREMIER auto transformer 100/200-250 and vice versa, 100 watt, 10/-.

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20-22, High Street, Clapham, S.W.4. 'Phone: Macaulay 2188. Nearest Station Clapham North (Underground).

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**14/-** Only.—As above, but with 10in. cone; a very powerful quality speaker, capable of handling large outputs, fitted with rigid die cast cone housing.  
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 Popular air cored canned coils, 2/3; iron cored canned coils, 2/6, with circuits. Differentials, .0001, .00015, .0003, 1/4. Tubular condensers. .1, .01, .02, 6d.  
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**P**EARL & PEARL Summer Bargain List free. 190 Bishopsgate, London, E.C.2.

**VAUXHALL.**—All goods PREVIOUSLY advertised still available. Guaranteed lines only.  
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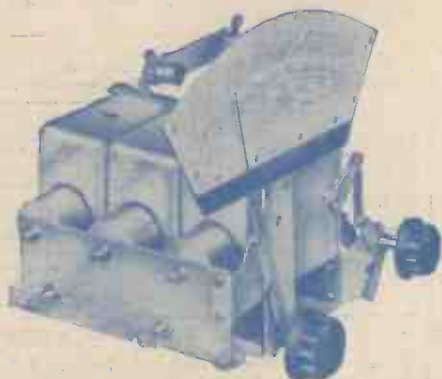
**"WORKING MODELS and How to Make Them."** Edited by F. J. Camm, 3s. 6d.—This Book will appeal to all who are handy with tools. Contains complete instructions for the making of every kind of working model. Each model has been actually constructed in accordance with the details given and subjected to stringent tests. The instructions and diagrams are so clear that even the most elaborate model can be built without fear of failure. Obtainable at all Booksellers and Newsagents.—Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

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**PRACTICAL AND AMATEUR WIRELESS,**  
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Superhet tuning units with two pre-selector sections and one oscillator section, covering medium and long wave bands, all necessary padding coils are enclosed in the oscillator section. List No. BP105 .. .. 71/6

Another Model with an additional pre-selector circuit enabling a preliminary H.F. stage to be used. List No. BP106 .. .. 89/-



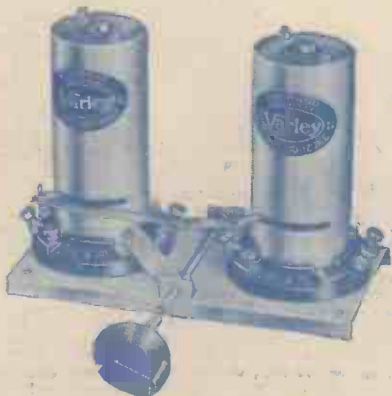
**MULTI-VOLT MAINS TRANSFORMER.**

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**AIR-TUNE I.F. TRANSFORMER.**

An I.F. Transformer for 465 K.C. having Litz wound iron-cored coils tuned by air di-electric condensers with steatite insulation. Frequency drift is eliminated and high amplification, low adjacent channel interference and freedom from second channel whistles obtained. Particularly suitable for all-wave superbets. List No. BP95 .. .. 15/-



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# Practical and Amateur Wireless



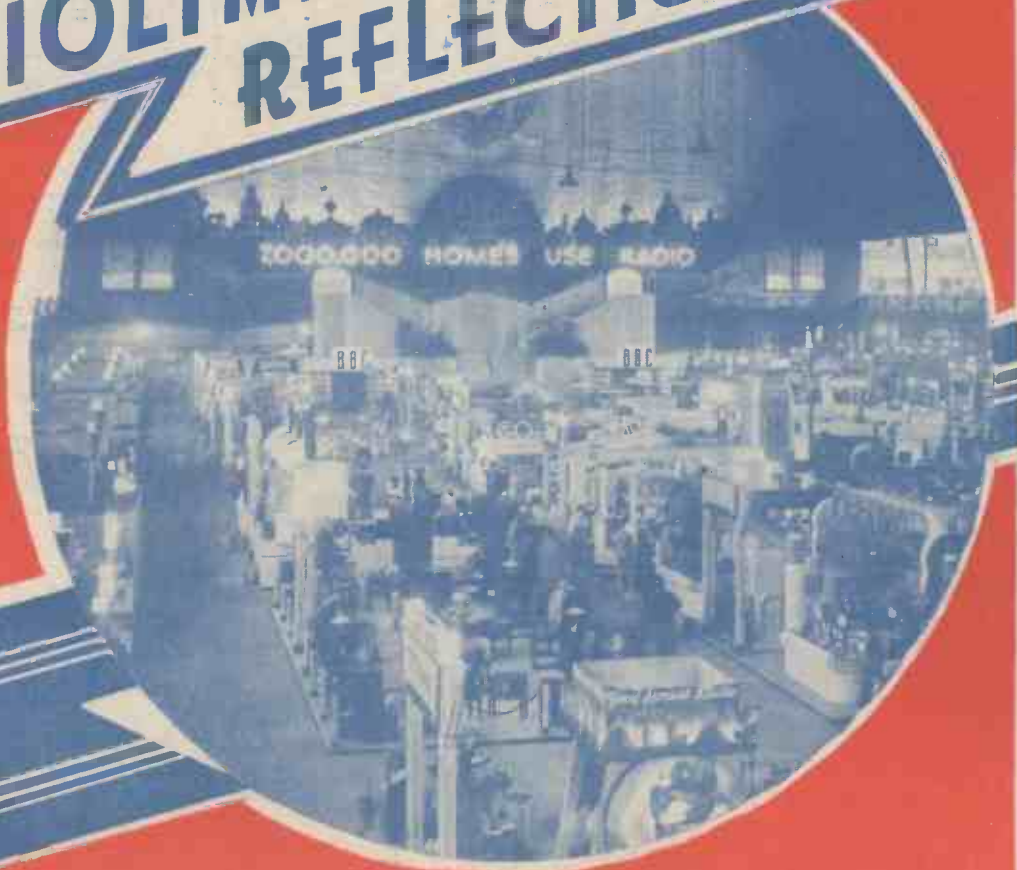
Edited by F.J. CAMM

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Publication

Vol. 6. No. 154.  
August 31st, 1935.

AND AMATEUR TELEVISION

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"CAN THERE BE A  
BETTER SPEAKER?"

asks Mr. F. J. Camm.



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'THERMOMETER'  
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THESE two new Receivers incorporate the most up-to-date superhet practice. Employing a Pentagrid Frequency Changer in conjunction with specially designed coils, they possess an exceptionally high degree of selectivity. Backed by a wealth of experience in manufacturing hundreds of thousands of receivers they are, above all, reliable.

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\*Please state Model required.

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# IRON- OR AIR-CORED TUNING COILS SEE PAGE 697



## 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 Praston.

VOL. VI. No. 154. August 31st, 1935.

# ROUND *the* WORLD of WIRELESS

### Automatic Tuning Note

AT the Budapest studio, previous to any orchestral broadcast, the conductor secures as preliminary and interval signal, from the transmitter, a normal A, to permit the tuning of musical instruments. The note is heard throughout the studio.

### Germany's Saar Station

SO far, only a studio has been installed at Saarbruecken, as no channel can be utilised for a special transmitter. The broadcasts are made through Kaiserslautern, and partly included in the Frankfurt and Stuttgart programmes.

### Public Television Rooms in Berlin

FIVE more free demonstration centres have been opened in Germany's capital, to permit the general public to convince itself of the utility of television programmes. In all there are now twelve separate centres for these free displays.

### Budapest's Tenth Birthday

TO celebrate its tenth anniversary, the Budapest Broadcasting Company has followed the example of the B.B.C. in production of a sound film of the studio's activities. The presentation includes a gipsy concert of three hundred musicians. Parts of the film are to be broadcast to listeners on September 3rd in the special jubilee programme.

### Radio-Algiers 100 Kilowatts

ALTHOUGH a decision has been taken to increase the power of Radio-Algiers, in view of financial difficulties the work of reconstruction will not be started before 1936.

### France Goes Ahead

ACCORDING to a statement recently made by the French Minister of Posts and Telegraphs, Radio-Paris is to see its power increased to 100 kilowatts in the near future, and two 100 kilowatt transmitters are to be installed without delay for the broadcast of the PTT Radio-Colonial overseas programmes on short waves.

### German Radio Propaganda

IN order to attract more visitors to the Berlin Radio Exhibition, the Government has reduced the railway fares by

roughly seventy-five per cent. A ticket from Germany's most distant frontier to the capital will cost only a few shillings.

### Tunis Broadcasting Station

A SMALL military transmitter calling itself the Poste Bizertin has been lent by the authorities for the transmission of radio programmes on 209 metres. In October next the power will be raised to 250 watts. It is on the air at B.S.T. 12.30, 13.15, and from 20.30-22.30 daily.

### Aerodrome Calls

ON 862 metres (348 kc/s) the Air Ministry has established a service for the benefit of civil aviation. The transmitters using this channel are GEB2, Hedon (Hull); GET, Newtownards (Belfast); GEM, Manchester; GEN, Portsmouth; GED, Croydon; GVC, Jersey; GER, Abbotsinch; GEL, Aldergrove, and GEG, Lympe. Other stations are also in course of construction.

### Listen to South America

BETWEEN B.S.T. 03.00-04.00 the following Buenos Aires stations are now to be heard, on favourable nights, at good strength: Radio-Prieto (LS2), 252.1 m.; Radio el Mundo (LR1), 280.4 m.; Radio-Splendid (LR4), 303 m.; Radio-Belgrano (LR3), 315.8 m.; Radio La Nacion (LR6) 344.8 m., and Radio-Excelsior (LR5) 361.4 m.

### Radio Stations for India

IN addition to the stations which are being erected by the Indian State Broadcasting Service, the Nizam of Hyderabad has decided to install two transmitters, one of which will be in the capital, the other at Anrangabad. The plant, which is to be of the most modern type, is being built at the Marconi works at Chelmsford (Essex).

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### Radio "Homing" Device for Aeroplanes

BY means of a new loop aerial equipment aviators, when flying by night or day, are now able to ascertain the exact direction of any wireless station. Using the device the pilot may thus maintain his correct direction, for by rotating the loop aerial his correct bearing can be read off a special scale. On 893 metres (336 kc/s) the Croydon radio station sends out, on request, short transmissions for the use of aeroplanes equipped with the new "homing" device.

### Curbing Noise in New York City

THE Police authorities in New York are following the example set by London and other cities, and in addition

### "Five Hours Back"

A FEATURE which was extremely popular during its run of three months early in the year is to be revived on October 5th next, and will continue into December. The same title namely, "Five Hours Back," will be used again, and the programmes to be heard by listeners on the National wavelength will be those which are being broadcast in America at about midday. The programmes are picked up from American short-wave stations and rebroadcast, so perfect reliability of reception cannot be guaranteed; but the aim is to permit British listeners to dip into programmes from the other side of the Atlantic in the early part of the day, the hour of broadcasting in this country being 5.30 p.m.

# ROUND the WORLD of WIRELESS (Continued)

## "America and Us"

**HAROLD NICOLSON**, the well-known author and critic, has recently been in America, and on September 9th in the Regional programme will give a talk entitled "America and Us." It will be the purpose of this talk to discuss different points of view upon controversial subjects of the two nations, and to suggest how the divergent view-points might be more closely reconciled.

## Variety from Carlisle

**VARIETY** will be broadcast from Carlisle for the first time on September 4th, when Northern listeners will hear excerpts from the bill at Her Majesty's Theatre. Built in 1874, the theatre was closed down in 1932 owing to lack of support, and was only re-opened in October last year.

## A Novel Irish-Scottish Broadcast

**A RADIO** trip from Ireland to Scotland will be undertaken by Northern Ireland and Scottish transmitters on August 29th. This is the second of the programmes to be given by Northern Ireland in co-operation with another station. The Irish starting-point is Larne, from which a number of relays will be heard, ending with the departure of the *Princess Maud* from Larne Harbour for Stranraer. As the ship disappears between the headlands, Scotland will take over the programme at Stranraer. Among the broadcasts from Larne will be a relay of Dance Music played by Sibbald Treacy and his Rhythm Kings in the Laharna Hotel.

## International Music from Vichy

**DUE** to the meeting in Vichy of the International Music Composers' Congress, which opens on September 2nd, under the presidency of Richard Strauss and the vice-presidency of Albert Roussel, the first two weeks in September will see an important programme of international music presented at the Grand Casino, in opera, oratorio, and concert form, some of it under the direction of the authors. Much of this music will be broadcast. The illustration on this page shows a concert being conducted on the terrace of the Grand Casino.

## Silver Prize Band Concert

**THE** Thornley Colliery Silver Prize Band, under the direction of Edward Kitto, will broadcast a concert to Northern listeners on September 1st. Formed in 1919, and consisting largely of ex-Service-men, the Band made splendid progress and has a long list of successes to its credit, having secured prizes at the Crystal Palace Championships on three occasions. Their programme is to include a selection from "The Desert Song," by Romberg, and

## INTERESTING and TOPICAL PARAGRAPHS

Allen's march, "Jupiter." Harry Shuttleworth, the well-known Bolton-born bass, will be heard during this concert, his items including Kennedy-Russell's "Simple Wisdom," "To-morrow," by Keel, and "In Summertime on Bredon," by Graham Peel.

## OPEN-AIR CONCERT AT VICHY



Mr. Louis Fourestier, orchestra leader of the Opéra-Comique in Paris, conducting an open-air concert on the terrace of the Vichy Grand Casino.

## "Happening Along"

**UNDER** this general title J. M. N. Jeffries, the famous war correspondent, will give a series of talks for Western

listeners beginning on September 7th. The subject of his first talk is Clovelly, and later talks in the series will deal with Land's End, the Salcombe district of Devonshire, Wells, Montgomery, and the Isle of Anglesey.

## "Transatlantic Bulletins"

**THE** last of the current series of "Transatlantic Bulletins" will be broadcast in the National programme on September 11th. The unqualified success of these broadcasts and the interest they have aroused among a wide variety of listeners will result in their early continuance. The method of presentation may be varied both in form and arrangement, but it is intended to extend the process to the British Dominions on appropriate occasions.

## "The Family Portrait"

**THE** advice given to young writers to write about conditions and things known to them from personal experience, receives a severe setback in "The Family Portrait," a comedy by John W. Coulter, which will be broadcast from Belfast on August 20th. In this play the hero writes a drama around the people he knows best, his family. It achieves unexpected success, and he becomes famous—so do the family, and they are not particularly amused as a result.

cast from Belfast on August 20th. In this play the hero writes a drama around the people he knows best, his family. It achieves unexpected success, and he becomes famous—so do the family, and they are not particularly amused as a result.

## A Russian Soprano

**ZINAIDA NICOLINA**, a Russian soprano who is a well-known radio star in America, will make her first solo appearance before the microphone in England, when she gives a recital in the Regional programme on August 28th. She is the possessor of a coloratura soprano voice of great range and singular warmth and sweetness, and has frequently and not ineptly been referred to as the "Galli-Curci of the air."

## First Broadcast from Oxford New Theatre

**MIDLAND** programme builders now have liberty to draw material from Oxford, and already some advantage has been taken of this privilege. It is hoped shortly to add the Oxford New Theatre to the list of playhouses from which relays are taken. In the meantime the orchestra of this theatre has its first broadcast on September 1st. This orchestra has been running since the theatre was opened in February of last year on the site of an old theatre. It is conducted by William Brightwell, who was formerly at Drury Lane; and its leader, Ernest Gipps, was musical director at Bexhill during the winter season.

## SOLVE THIS!

### PROBLEM No. 154

Jobbins had a simple two-valve receiver employing a detector and pentode stage. Results were quite good, but he decided to try and improve matters by using an S.G. valve instead of the triode detector. He accordingly obtained a modern S.G. valve in good condition and plugged it into the detector valve-holder, removing the lead from the L.F. transformer which was joined to the original plate terminal, and connecting this to the terminal cap on the valve. When switched on, however, he found that results were not so good and it was not possible to obtain any reaction effects. Why? Three books will be awarded for the first three correct solutions opened. Address your attempts to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Nevnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 154 in the bottom left-hand corner and must be posted to reach here, not later than the first post Monday, September 2nd, 1935.

### Solution to Problem No. 153

In the first place the transformer which Rodgers attempted to use was not of the correct type—the ratio was much too low. But in addition to this, Rodgers had connected it in the wrong manner and was using it as a step-down transformer instead of a step-up.

Only one reader successfully solved Problem No. 152 and a book is accordingly being dispatched to J. W. Winckworth, Sussex Lodge, Taunton, Somerset.

# THE BATTERY ALLWAVE THREE

An Excellent Three-valve Receiver Covering a Wide Range of Wavelengths, and Capable of World-wide Reception

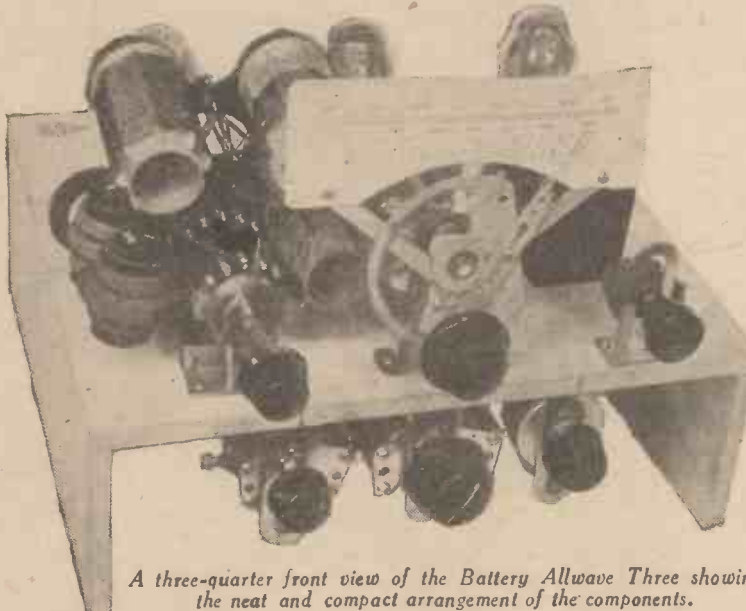
IN the last two issues of PRACTICAL AND AMATEUR WIRELESS constructional and operating details of the Allwave A.C. Three were given, and, as we anticipated, this design is proving very popular with our readers. One of the models constructed in our laboratory was on view at Radiolympia and created enormous interest. There seems to be a very large number of home constructors without an

condensers in the Battery Allwave Three to enable the set to be satisfactorily supplied from an eliminator. Constructors are advised to use a reliable accumulator for the valve filament supply, however, as direct mains supply is likely to cause hum, especially when listening on the short wavebands.

### Circuit Arrangement

It was decided to adhere to the straight three circuit arrangement as used in the A.C. model, as we find that this is the best valve sequence for a three-valve all-wave set which is also to be used for gramophone reproduction. When battery valves are used, the undistorted output is lower than with the mains types, of course, but

metre long waveband can be covered. It is pointed out, however, that the wave ranges obtained in practice will vary slightly, due to variations in stray capacity. It is possible that some constructors wish to tune below 260 metres and above 520 on the medium waveband, and therefore it is suggested that they use coil unit number 961 in place of number 960. With this unit the 150 to 600 metre band may be covered but the long-wave coil is omitted. In order to make this a multi-purpose as well as a multi-wave receiver, a radio-gramophone switch has been incorporated, and provision is made for headphone reception. The gramophone switch has been connected in the grid circuit of the first valve, as it is sometimes found that insufficient amplification is obtained from two valves. Constructors who possess very sensitive pick-ups may find it advantageous to wire the switch in the grid circuit of the second valve, however, or alternatively the L.F. volume control may be brought into operation in order to prevent overloading of the second valve. The reaction circuit is of the parallel type, a reliable all-wave H.F. choke being connected between the detector anode and the L.F. coupling condenser. This ensures smooth reaction control on all the wave ranges, provided that the aerial-earth capacity is low. It is probable that some readers will be using a long aerial in order to get maximum results on the medium and long wavebands, however, and therefore a .00025 mfd. variable condenser has been incorporated in the aerial circuit. If dead reaction spots are encountered when tuned to the lower wave ranges, the setting of this condenser should be reduced in order to reduce the total aerial-earth capacity.



A three-quarter front view of the Battery Allwave Three showing the neat and compact arrangement of the components.

A.C. mains supply, however, and, therefore, to meet with a great demand for a reliable all-wave three-valver, we decided to publish the design of a battery version of the A.C. model. There are other readers who have a mains supply but do not wish to go to the expense of an all-mains receiver as they already possess reliable battery eliminators. We have therefore incorporated the necessary decoupling resistances and

a super-power valve has been specified for the output stage of this set, and therefore sufficient volume with good quality of reproduction for the average sized living-room will be obtained.

The aerial input signal is fed to a multi-wave coil unit, tuned by means of a special short-wave type variable condenser having a maximum capacity of .00016 mfd. When a condenser having this capacity is used, it is claimed that the 13.5 to 91 metre short waveband, the 260 to 520 metre medium waveband, and the 1,100 to 1,900

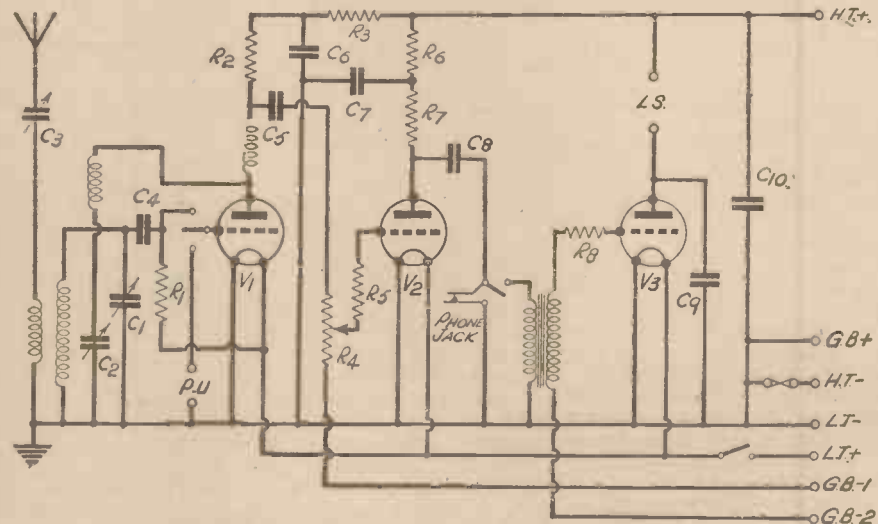
### The L.F. Amplifier

A study of the theoretical diagram will indicate that the L.F. amplifier comprises one resistance capacity coupled stage and one parallel-fed transformer stage. In the mains version both stages were resistance capacity coupled, but owing to the slightly lower efficiency of battery valves as compared with the mains types it was deemed

(Continued overleaf)

### LIST OF COMPONENTS

- One Multi-wave Coil Unit No. 960 (Eddystone).
- One .00016 mfd. Condenser, Type E (C1), with micro drive horizontal (Polar).
- One .00025 mfd. (C3) Aerial Condenser (B.T.S.).
- One .0002 mfd. Reaction Condenser (C2) (B.T.S.).
- Seven Fixed Resistances, 2 meg. (R1), 50,000 ohms (R2), 10,000 ohms (R3), 25,000 ohms (R7), 50,000 ohms (R5), 5,000 ohms (R6), 10,000 ohms (R8), 1 watt type (Dubilier).
- Seven Fixed Condensers: .0001 mfd. (C4), .01 mfd. (C5), three 1 mfd. (C6, C7, C10), .5 mfd. (C8), .005 mfd. (C9) (T.M.C.).
- One L.F. Transformer 1 to 3.5 Niclet (Varley).
- One Potentiometer, 500,000 ohms (R4) (B.T.S.).
- One All-wave H.F. Choke, Type H.F.O. (Wearite).
- One Change-over Jack with plug (B.T.S.).
- One 2-point Switch, Type S.91 (Bulgin).
- Three Terminal Strips, A.E., P.U., L.S. (Clix).
- Three Valve-holders, 4-pin type (Clix).
- Four Plugs: H.T.+, G.B.+, G.B.—1, G.B.—2 (Belling-Lee).
- One Fuse Plug with 60 m/a fuse (Belling-Lee).
- Two Spades: L.T.—, L.T.+ (Belling-Lee).
- One Metaplex Chassis, 12in. by 8in. by 3½in. (Peto-Scott).
- Three Valves: D.210, L.210, P.P.220 (Hivac).
- Four 2in. Component Brackets (Peto-Scott).
- 120-volt H.T. Battery (Drydex).
- 16½ volt G.B. Battery (Drydex).
- 2-volt L.T. Accumulator (Exide).
- One Permanent Magnet Speaker, Type F.720 P.M. (Rola).



Theoretical circuit diagram of the Battery Allwave Three.

**THE BATTERY ALLWAVE THREE**  
(Continued from previous page)

advisable to provide a higher step-up in the last stage by substituting a transformer for the R.C. coupler. The overall amplification of the two receivers is therefore approximately the same. The 500,000 ohms potentiometer has been connected in the grid circuit of the second valve in order that overloading of the second and third valves may be obviated, as it is sometimes found that the reaction control does not sufficiently control the volume of the local stations. It was decided to parallel-feed the transformer in the second stage so as to obtain good bass response; if the direct current in the anode circuit of the second valve were passed through the transformer primary winding, the inductance of this winding would be reduced and bass response would suffer. The use of a parallel fed transformer also enables one to incorporate a headphone jack in the same manner as with resistance capacity coupling. This is a great advantage when listening on the short wavebands, as two valves are found to be quite sufficient for 'phone reception. When the headphone plug is inserted in the jack the output valve is automatically isolated, and if batteries are used for supplying H.T. it is suggested that this valve be removed if two-valve reception is to be effected for a long period, in order to reduce the H.T. current consumption. The valve must not be removed if a battery eliminator is used, however. As previously mentioned, the output valve is of the super-power type, and therefore good quality reproduction is obtained if the specified speaker is employed.

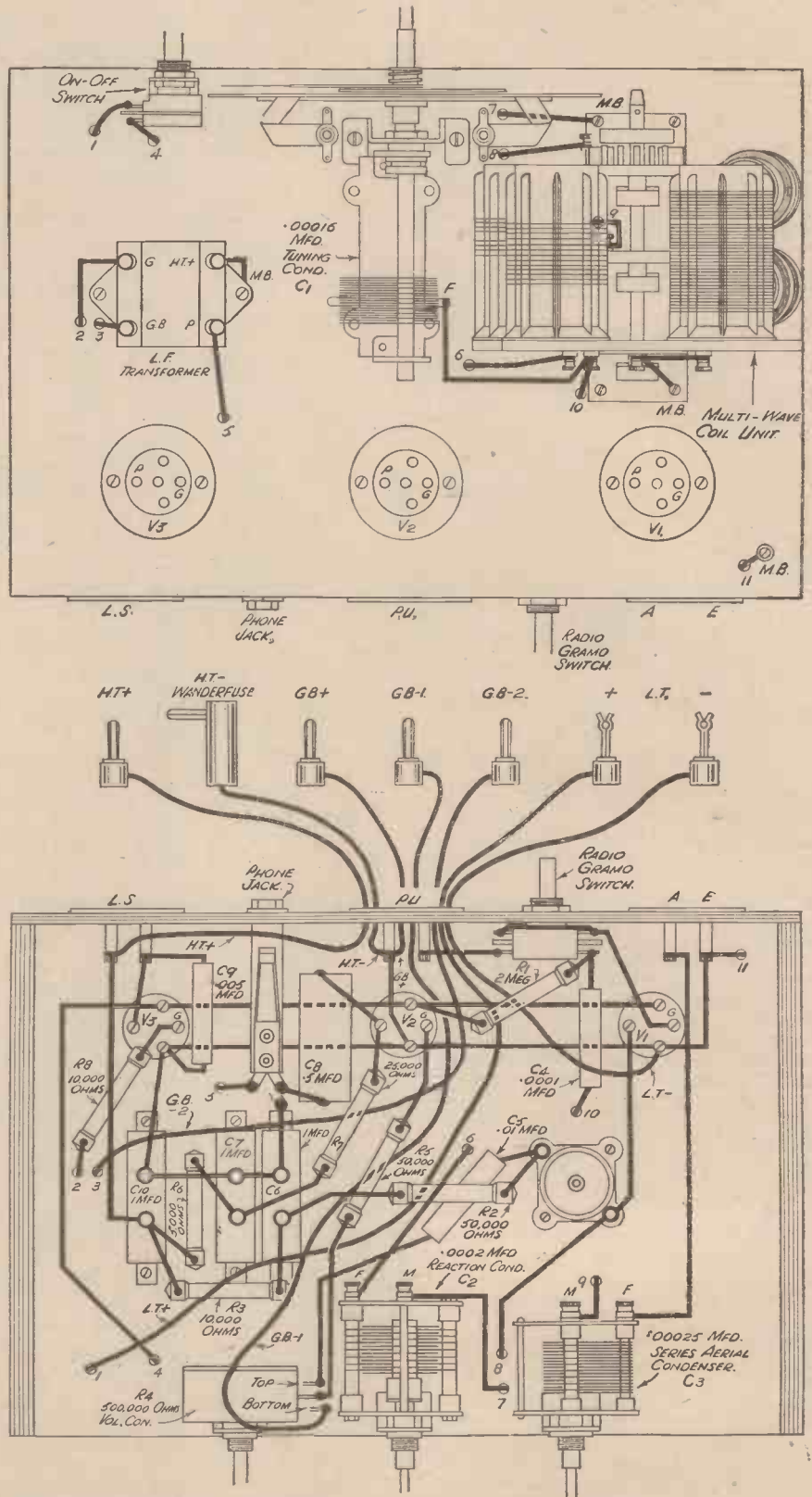
**Construction**

The actual task of constructing the receiver should prove extremely easy, as ample space has been allowed for all the components. The three valve-holders are of the 4-pin type and therefore a 1/8 in. drill should be used for the holes. The size of the holes required for the terminal strips is not critical, but a 1/8 in. drill will be found suitable. As in the case of the mains model, the valve-holder and terminal strip sockets must be mounted centrally in the holes so as to avoid contact occurring between the sockets and the metallised surface of the baseboard. It is also emphasised that the screws holding the aerial series condenser and reaction condenser brackets must be short, otherwise they are liable to provide a direct contact between these components and earth. The metal brackets of the coil unit and the tuning condenser must, however, be screwed tightly to the metallised surface of the baseboard as contact to the earth terminal is required in this case. The wiring is of a very simple nature, and is clearly shown on the wiring diagram. Constructors can therefore commence with the filament wires, proceeding to the coil unit and tuning condenser, and thence to the L.F. transformer and output stage.

**Adjusting**

The wiring should be carefully checked after completion, and if in order the battery leads may be joined up in the following manner. H.T. + lead should be plugged into the 120-volt socket of the H.T. battery and the plug marked Wanderfuse into the H.T. - socket. G.B. -1 and G.B. -2 must be plugged into the -4 1/2 and +10 1/2 sockets of the G.B. battery, and G.B. + into the positive socket. L.T. - and L.T. + spades should, of course, be joined to the positive and negative terminals of the L.T. accumulator respectively.

**WIRING DIAGRAMS OF THE BATTERY ALLWAVE THREE**



The aerial, earth and speaker leads may now be plugged into the terminal strip sockets, and the receiver switched on by means of the on-off switch on the right side of the chassis when viewed from the front. Tuning is then effected by rotating the top-centre control and adjusting the three lower controls until maximum volume is

obtained. The required waveband is selected by means of the control knob attached to the coil unit, and for preliminary tests it is suggested that the medium waveband be used; this is tuned in when the switch is on the second stop when the knob is turned in a clockwise direction.



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the reader might wonder why the condenser should also have a different capacity. The answer is that the greatest efficiency is obtained when there is a definite ratio between the condenser capacity, leak resistance, valve impedance, etc. We need not study this matter here since it was explained fairly fully in the series of articles entitled, "Components," and which appeared in this journal between April 20th and June 15th.

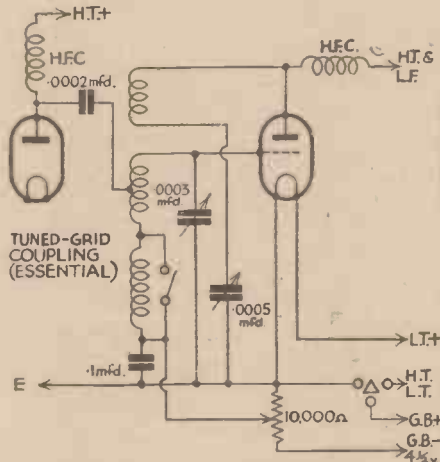


Fig. 4.—The wiring of an anode-bend detector in a battery receiver is shown in this theoretical circuit.

The main objection to power-grid as opposed to leaky-grid rectification is that it does not provide quite the same degree of sensitivity; but when the signal input is high this is not generally of great importance, although it does limit its useful employment in certain types of receiver. Another objection to power-grid detection is that the "load" of the valve on the preceding tuned circuit is comparatively high, due to the fact that the impedance of the valve is lowered by reducing the applied bias voltage. Because of this, it is important that the selectivity provided by the tuning circuits should be as high as possible, whilst it is also desirable that an efficient reaction circuit should be incorporated to compensate to a certain extent for the "damping" imposed by the valve.

### The Coupling Circuit

There is yet another difficulty which often presents itself in connection with power-grid, which is that the anode voltage required by the detector valve is appreciably

higher than when other systems of rectification are employed. It is not possible to state exactly what the anode voltage should be, for this varies with the valve in use, but a minimum figure of 100 volts should form the basis of resistance calculations, whilst in the case of mains valves it is advisable to work to a voltage of not less than 150. This matter governs to a great extent the form of inter-valve coupling which should be employed between the detector and the following L.F. stage. For example, an average mains L.F. valve (which type is most suitable for power-grid) takes an anode current of about 6 milliamps, and this is more than the primary windings of many low-frequency transformers are designed to carry; the same principle applies to battery valves, also, although the current is not generally so high. This suggests the use of one of three possible alternative methods of coupling: resistance-capacity, choke-capacity, or parallel-transformer. The first of these is nearly always ruled out, due to the fact that the anode resistance causes so great a voltage drop that the source of H.T. would require to have an unusually high value to ensure that the voltage actually applied to the anode terminal of the valve is sufficiently high. The second system (shown in Fig. 3) is far more satisfactory, since the choke offers a high impedance to the audio-frequencies without dropping the high-tension voltage to any very great extent. Special power-grid chokes are made and these generally have a D.C. resistance of about 2,500 ohms combined with an inductance of 200 henries when carrying about 7 milliamps, and a maximum current rating of approximately 10 milliamps. It can be seen that a choke of this type will produce a voltage drop of less than 20 volts when carrying 7 milliamps.

As is well known, choke-capacity coupling does not provide any inter-valve step-up, so that the output from the detector stage when using this form of coupling is insufficient to load a large power valve. Thus, when it is desired to use a valve of this type without an intermediate amplification it is better to choke-feed an L.F. transformer, as shown in broken lines in Fig. 3; by this means the combined advantages of choke-capacity and ordinary transformer coupling are made available.

### Anode Bend in Practice

A third form of rectification, and one which is, incidentally, passing out of favour, is that known as anode-bend. In some respects this can be considered as the opposite of power-grid, because the grid bias is increased well above that developed across even a high-resistance grid leak by

"artificial" means. Connections for an anode-bend detector for use in a battery set are given in Fig. 4, and for a mains set in Fig. 5. In both cases the grid of the three-electrode valve is joined directly to the "top" of the tuning coil, the "bottom" of which is connected to grid-bias negative. In the battery arrangement bias is obtained from a battery and potentiometer in the normal manner, whilst in the mains arrangement the bias is developed across a variable resistance included in the cathode-return lead. It should be mentioned in passing that it is not usual to provide a variable bias voltage, but this is particularly desirable with modern valves, and when the maximum efficiency is sought. It is generally agreed that anode bend is not quite so sensitive as leaky-grid, but the difference in this respect is often quite small when a suitable valve has been chosen and correctly biased. In this connection it should be explained that the most suitable valve is one whose grid-volts-anode-current curve shows a sharp "kink" toward the bottom; this means that a valve of the H.F. or H.L. class should be employed.

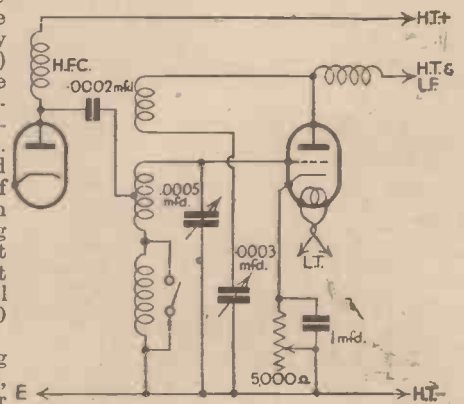


Fig. 5.—Anode-bend connections for an A.C. set. Variable G.B. is provided by the 5,000-ohm variable resistance.

### Limitations

Anode-bend rectification is useful when reaction is not to be employed, when the input to it is comparatively high, and when the degree of sensitivity required is somewhere between that provided by leaky-grid and power-grid. It should be added that anode bend always provides the most satisfactory results when the input to it is on the high side, and that it is liable to introduce distortion when the input is low.

Other systems of detection will be explained in the next article of this series, and further practical details will be given,

### Organ Recital from Glentanar House

MOST listeners probably know that a number of the larger Scottish residences contain fine organs, but it will not be until September 7th that the ubiquitous microphone will give them a taste of the quality of one of these organs. The organ recital from the music room of Glentanar House, Aboyne, will be undertaken by Alfred Hollins, the distinguished organist of St. George's West Church, Edinburgh. Dr. Hollins has already played on the Glentanar organ, which is reputed to be one of the finest instruments in a private house in Scotland. The programme will include Fugue in E Flat, by Bach; "Spring Song," by Hollins; Trumpet Minuet, by Hollins; and Scherzo specially composed for Hollins by H. J. Turner.

## PROGRAMME NOTES

### "There go the Butts"

THE microphone goes to the Central Fire Station, Glasgow, on September 6th, to pick up a programme entitled "There go the Butts." Firemaster James Marshall will take part in the programme, and a running commentary will be given by Jack House. Listeners will be able to check the time taken (actually ten seconds) for a complete turn-out of the brigade from the sound of the warning gong to the moment the engines take the road. For generations the Glasgow Fire Brigade has been known as "The Butts," a name which

goes back to 1830, when water butts were trundled through the streets to the scene of the fire.

### "Fishing off Siberia"

UNDER this title, G. F. Brough will tell the story of an adventurous journey in the days of his youth to Western listeners, on September 7th. He went to sea at the age of fourteen, but after three journeys round the Horn he decided that he had had enough of that kind of life, and prepared to run away. Unfortunately the captain found out and locked him up, but just before the vessel sailed from America he managed to break through the skylight, and dropped on to the wharf. He was without money, but in his search for work had some strange adventures, including a trip of 7,000 miles in a fishing vessel off the coast of Siberia.





# On Your Wavelength



By Jhermion

### At Olympia

It really was amusing to stand idly by on our stand at Olympia and listen to the various remarks about Thermion. In the adroit hands of the Editor, my reputation was safe, and I hope that my facial contortions at some of the remarks did not give me away. A parson I noticed was inquiring for me. He wished to enter the arena of the lists or something because of my recent paragraph about religious broadcasts. The pleasant reminder that our stand was not a pulpit from which to propagate religious arguments was unavailing, and he sailed into the Editor for per-

mitting my chance remarks to see the light of day. The Editor held the scales impartially, but should this paragraph catch the eye of the cleric concerned, I hope he will drop me a note, and I shall be glad to deal with the points he raised *seriatim*. The jazz protagonists were out for blood. They "wanted" me! And with ugly mien endeavoured to delineate my ancestry. Fortunately, the jazz antagonists arrived in almost equal force, so the fracas cancelled out by process of internecine conflict, leaving Thermion in complete command of the situation and the casting vote. On the whole, my readers were pleasantly disposed, and my safety was at no time in danger. Next year I must start a new Radiolympia game, in which readers are invited to challenge visitors to the Exhi-

bition: "You are Mr. Thermion. I claim a prize." There were the usual Radiolympia jokes. On the C.A.V. stand, for example, was a large notice bearing the words "Free Acid." This proved to be simply too much for one of the Scottish visitors, who, armed with a small carboy, presented himself for a free portion. I cannot vouch for the truth of this libel on the hardy race, three millions of whom I believe still reside in Scotland. I appreciated the wider gangways, and the fact that there were more genuine radio enthusiasts among the visitors. As in past years, the PRACTICAL AND AMATEUR WIRELESS stand attracted the largest crowd of home constructors, all of whom expressed the feeling they have of personal contact with the Editor and his staff. The Show is over, and I am glued to my desk for fifty-one weeks, so that any good I may do, let me do it now, for I shall not pass that way again until next August.

(Continued overleaf)



The PRACTICAL AND AMATEUR WIRELESS stand at Radiolympia, which was inundated with querists who sought the assistance of our technical staff, members of which were constantly in attendance.

(Continued from previous page)

### Powder and Shot

W. T. L., of Leyton, supports me in my personal objections to jazz. He says: "Quite a few of the so-called present-day popular numbers broadcast by dance-bands are revivals of old stuff, and a quarter of a century ago it was good stuff. In the hands of modern musicians these lively, swinging, melodious tunes have become ugly caricatures of the originals. Indeed, the junior element of to-day looks upon them as products of their own generation. When told that twenty-nine years ago I played many of these numbers on a piano, they refuse to believe it. This, I submit, is due to the fact that some dance conductors whose popularity cannot be judged by fan correspondence announce 'that old favourite' only after it has been played by their bands a score of times. The boys are whistling it in the streets by then, when the tune is looked upon as old. A correspondent in a newspaper recently stated that he introduced jazz in 1910. Well, I was then a frequenter of music-halls, but never once did I hear the awful noises which are supposed to be so popular to-day. Surely he means ragtime, which has no association with jazz." I agree with this reader that the two are often confused, but both of them are evidence of a jejune and degenerative cult which I find it difficult to associate with intelligent people.

### A Liverish Outlook

W. D. H., of Watford, tries to have a back-hander at me in the following missive handed to me by the Editor: "In a strain which indicates a liverish outlook, he or she (stun me with a soapsud—your Thermion a she!) periodically fills space with ideas which are often contradictory. In the current issue of your journal, your tendency is for a narrow-minded criticism levelled against the lack of precision in the speech of dance-band announcers. Your contributor should take up a more tolerant attitude. Might I suggest that you invite an expression of opinion from your readers and conclude by stating that I have no axe to grind." Well, if this reader likes noo toons and farxtrarts and hallow evribuddy, the splitting of the digraphic terminals of words ending with 'ng, such as speakin', talkin', playin', etc., and the de-gutted nomenclature of some of the band leaders, such as "We will now *play you*," he has plenty of opportunity to enjoy himself. I am not a didactic purist where grammar is concerned, but I like to obey some of the rules. I can pass a split infinitive or a terminal preposition, but I do not like the slipshod language of the gutter. Some dance-band leaders should be put through a short course of elocution, enunciation, pronunciation, etymology, syntax, and prosody. That would either cure them of their untidy English or, what is preferable, of their desire to concatenate the movements, the rhythm, the cat-calls, and the antics of aborigine Zulus.

Whilst I am on the trounce, J. N. H., of Wellingborough, thinks he has found a handle against me. He presumes that because I do not like jazz and yet admit that others do, I am inconsistent. On the contrary, it is this reader who is inconsistent, for he goes on to say that I profess atheism. This I have never done; he must have been seeing double after having one! It is nice to know that he hates crooners more than I do, but I am sure that the jazz group will flay him for passing as second-rate the "bub-bub" merchants.



## Notes from the Test Bench

### Variable Selectivity

IT is generally conceded that the superhet provides a higher degree of selectivity than the straight type of receiver, but the quality obtainable from the latter is usually superior to that from the superhet. In most cases this is due to the loose coupling used in the intermediate frequency stages of the superhet. This loose coupling is, of course, necessary when listening to distant stations, as it provides the required degree of selectivity. When quality reception of the local station is desired, however, it is an advantage to have a closer coupling between the primary and secondary windings of the I.F. transformers. Until this season very few I.F. transformers were available having variable control of the coupling between the two windings, but at this year's Radiolympia there are several intermediate frequency units available having a variable selectivity control, and in some cases two controls are ganged together for operation by means of a knob on the front of the panel. Readers who have superhets having a high degree of selectivity but providing poor quality of reproduction are therefore advised to substitute a variable selectivity intermediate frequency unit for their existing intermediate frequency transformers, making sure, of course, that they are of the same frequency.

### Using Westectors

OUR experiments with Westectors indicate that these components provide a very efficient method of rectification, and distortionless detection is obtained provided that the input signal is of sufficient magnitude. The Westector cannot, of course, be substituted for the crystal in a crystal detector receiver, and in most cases it is found that the Westector must be preceded by at least two stages of H.F. amplification if satisfactory results are to be obtained. In straight receivers the W.X.6 type must be used, as the W.6 type will not give satisfactory rectification below approximately 600 metres. In a superheterodyne receiver using an intermediate frequency of 110 k.c. the W.4 or W.6 type should be employed, but it is found that the type W.X.6 is slightly more suitable than the W.6 for a modern superhet employing an intermediate frequency of 465 k.c.

Although, as stated above, two or more H.F. stages are desirable, it is possible to obtain moderately good results with one efficient S.G. stage. The efficiency of most single H.F. stage receivers may be improved by providing a reaction control for the S.G. valve. There are several methods of doing this, but the most satisfactory are the following. The anode of the valve should be connected *via* a choke to H.T.+ and through a condenser to the top terminal of the following grid coil; the reaction condenser may then be joined between the valve anode and the reaction winding of the aerial coil. Alternatively, a choke may be connected between the screen terminal of the H.F. valve and H.T.+ and the reaction condenser between the screen terminal and the reaction terminal of the aerial winding.

### Oh, Boy!

AND, finally, let me refer to the letter from J. M. D., of Chingford. I will print this priceless gem *in extenso*:—

"Oh, boy! Oh, boy!! Oh, boy!!! Now you've gone and done it. If ever any previous epistle has brought the hornets and wasps round your ears this latest episode of yours is going to do it. It's a real beaut. How in the name of everything that's decent some of those ear-splitting rows called 'Jazz' earn what you say beats me. Yet if someone starts to play a real good piece of music which makes one want to sit back, close one's eyes, and revel in the joys of sheer harmony, up jumps someone and hollers, 'Crikey, more d—!! classic music.' Honestly, I would like to get some of these so-called 'jazz-experts' and bottle 'em up in a room to themselves, start up an automatic record-changing jim-jamb, playing the same piece all the time, output from a pair of DO60's push-pull, and so let 'em soak.

"Sure, I'm in whole-hearted agreement with all your sentiments about that nerve-racking din called jazz. I was going to compare it with a war dance, but I have too wholesome a respect for even my friend, the Zulu. It has (the Zulu war-dance or the Maori Haka) a rhythm of its own which gets quite hypnotic when you understand it; that's a dem sight more than you can say about Jazz.

"However, to finish off this tirade, I might say I really enjoy reading your notes. After reading 'Solve This,' I always turn to your page and enjoy myself. Been a reader of PRACTICAL WIRELESS since No. 1 and of *Amateur Wireless* since No. 1, which goes back some time."

### Car Radio at Olympia

IT was gratifying and interesting to observe the number of car-radio outfits which were on view at the Show, and it certainly appears that this type of receiver has at last "caught on" with the public. Despite the restrictions against its use in built-up areas, the enclosure of the various leads, the fitting of fuses, etc., it appears certain that prospective users consider that it is really worth while. The car sets which I examined were all beautifully made, and little complaint could be made concerning their appearance.

### Home-made Car Radios

SEVERAL visitors to the PRACTICAL AND AMATEUR WIRELESS stand at the Show asked why we had never given constructional details for a complete car-radio receiver in this journal. I mentioned this matter to the Editor, and he informed me that there were at least two reasons why this had not been done; one was that the demand, as expressed by readers in their letters, had not been sufficiently great, and another was that suitable converters do not appear to be available. Probably the first reason will vanish now that the constructor appears to be taking so much interest in the subject, but the latter is a matter for the manufacturer. The new M.O.T. regulations state that all electrical leads external to the set should be at a potential not higher than that of the car battery; this makes it essential to have the high-tension converter—which is operated by the car battery—built in unit with the set. In consequence of this, the converter must not only be very compact, but it must be well screened, and so designed that it does not generate any interference. So far as I am aware there is not as yet any suitable form of converter available to the home constructor.

# IRON- OR AIR-CORED TUNING COILS?

○ WING to widely divergent opinions expressed by leading radio technicians on the merits of tuning coils, and particularly the iron-cored types, many constructors, even "old hands" at home construction, find it sometimes difficult to make up their minds as to the ultimate choice.

Practically every point concerning the respective merits of iron and air-cored units have been discussed from time to time, and yet after about two years, corresponding to the introduction of the iron-cored versions, nobody has made out a case strong enough to warrant the exclusion of the air-cored coil.

In their early development iron-cored coils were severely criticised, and perhaps not unfairly, in that many manufacturers in their eagerness to exploit the radio market, produced tuning units which did nothing to enhance the reputation already given them.

The modern versions undoubtedly represent a considerable advance both in design and performance on the original counterparts, and in consequence many technical prejudices have disappeared.

It is interesting to note, too, that air-cored coils have been brought to a greater stage of perfection, and in keeping with modern practice. They have been arranged with screening cans, reduced in diameter and wound with Litz or multi-strand wires to compensate for H.F. losses. Research has enabled designers to proportion these smaller air-cored coils to provide at least a similar degree of the efficiency to those large solenoid types so popular in the early days of broadcasting.

## Iron-cored Units

What advantages, then, do iron-cored units offer? We can briefly enumerate their points of merit, but in fairness to the exponents of air-cored coils we must also tabulate their limitations.

### Merits:—

- (1) Iron-cored coils can be made a third or even a quarter of the size of the air-cored type for a general similar degree of efficiency.
- (2) They permit of more compact receiver construction.
- (3) A well-designed iron-cored unit of an equivalent size to an air-cored coil will exhibit a lower H.F. resistance and consequently greater selectivity.
- (4) Higher signal voltage amplification.

### Demerits:—

- (1) The inherent higher self-capacity due to the core restricts the wave ranges which can be covered.
- (2) The H.F. resistance varies considerably over each waveband, so that selectivity is not quite so constant as compared to the air-cored coil.
- (3) Iron-cored units demand an exacting degree of matching which is not always available in commercial gang condensers.
- (4) They are generally more expensive.

Now let us compare these details with those appertaining to air-cored versions.

## Air-cored Coils

### Merits:—

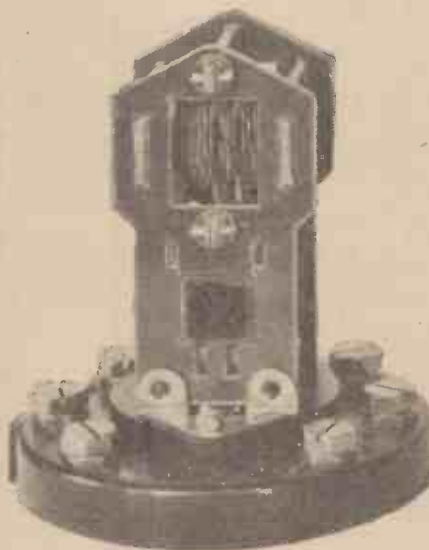
- (1) The general low distributed self-capacity allows a large wave-range to be covered.

## The Relative Merits of Both Systems Are Discussed in this Article by G. V. COLLE

- (2) The coils are more easy to gang in that slight variations in the tuning condensers are not likely to be so perceptible.
- (3) They are cheap.

### Demerits:—

- (1) Within limits, the efficiency decreases with reduction in size.
  - (2) They require comparatively large screening cans.
  - (3) Less selective than iron-cored units.
- Although the above facts speak for



A typical modern iron-core coil—the "Goltone".

themselves, they by no means provide a true deduction of the possible results. In a superhet, for instance, having as many as four circuits tuned to the signal frequency, the improvement due to the use of iron-cored coils is problematical. The variations in the residual circuit capacities and gang condensers, apart from the possibilities of instability, are more than likely to offset the advantages. On the other hand, a very considerable improvement is likely to be effected in a less ambitious similar type of set by replacing the air-cored tuning units with the iron-cored type.

A simple receiver, such as a det.-L.F. combination, will exhibit a marked increase in sensitivity and selectivity in the same manner.

## Reaction

The ultimate results on this latter class of set give rise to interesting speculations. Owing to the greater signal amplification and higher sensitivity with the iron-cored coil, it should be possible to receive weak transmissions in a clearer manner than hitherto, due to the smaller amount of reaction required. If reaction is not always required for maximum sensitivity with an air-cored

coil, it is nevertheless often desirable, in the interests of selectivity, as the mere fact that the H.F. feedback decreases the H.F. resistance of the coil circuit is sufficient to increase the latter. At the same time, any heterodyne interference is eliminated, due to middle and bass frequencies being amplified more than the higher audible tones. Iron-cored coils in det.-L.F. sets provide all these advantages without the limitations.

A somewhat different state of affairs exists on the "locals." Unless suitably designed, the detector valve will tend to overload more easily, owing to the great signal input.

On a high-quality det.-L.F. type of set, the inclusion of the iron-cored coil may result in a noticeable loss of the higher audio frequencies. Fortunately, it is a simple matter to flatten the tuning and to restrict the signal input, as one can provide an input volume control and perhaps a variable resistance across or in series with the coil to reduce its inherent selectivity properties.

## Selectivity

The chief argument in favour of an iron-cored coil in a simple receiver having one tuned circuit is that such a coil will provide sufficient selectivity for the reception of, say, eight to ten stations free from mutual interference. With air-cored coils, at least two tuned circuits are necessary to achieve a similar degree of selectivity, assuming the receiver is installed within the swamp area of a powerful transmitter.

When reception conditions are such that no swamp effects are likely to occur, any suitable coil will do, although the effects of heterodyne interference between adjacent stations are likely to be more noticeable with a coil of low inherent selectivity than with one having the better characteristics.

One of the main reasons for "straight" sets of the multi H.F. stage type having become unpopular is due to the overall selectivity being inferior to that afforded by a modern superhet of equivalent size. With the advent of modern iron-cored units, and up-to-date metallised and high magnification H.F. valves, there is no technical reason now why a "straight" receiver should not regain its original popularity, particularly as it is free from many of the minor faults associated with superhets.

The self-generated whistles and possibilities of imperfect tracking of the oscillator circuit in a superhet are entirely absent in a straightforward H.F. amplifier. The overall magnification of signals for a given number of valves will, no doubt, show itself to better advantage in the superhet, due to the intermediate-frequency valves operating at a lower frequency (higher wavelength).

If, therefore, a "straight" set with iron-cored units cannot quite hope to compete in overall amplification, it at least provides a relatively inexpensive means of receiving a large number of stations with approximately the same degree of selectivity.

To sum up, iron-cored coils confer distinct benefits on all classes of "straight" sets and provide improved results in simple superhets having not more than three signal circuits (including the oscillator). For other receivers, air-cored coils are preferable.

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*they're blended better*

*-as they say at Mrs Wiggins'*



# THE A.C. 1936 SONOTONE

A Mains Version of the Popular and Efficient Receiver Described in the Past Two Issues. Although Employing Only Three Valves, there are Four Stages, and Results are Equal to those Given by a Normal Four-valver

**D**URING the last year or two the one-time popular three-valve receiver of the S.G., detector, pentode type has gradually fallen into disuse. This has been mainly due to the congested state of the ether caused by the increase in the number of stations, and the increased power used by the European transmitters. Owing to the higher degree of selectivity obtainable with the superheterodyne this type of receiver is superseding the "straight" set. It is a generally-accepted fact, however, that the superhet has

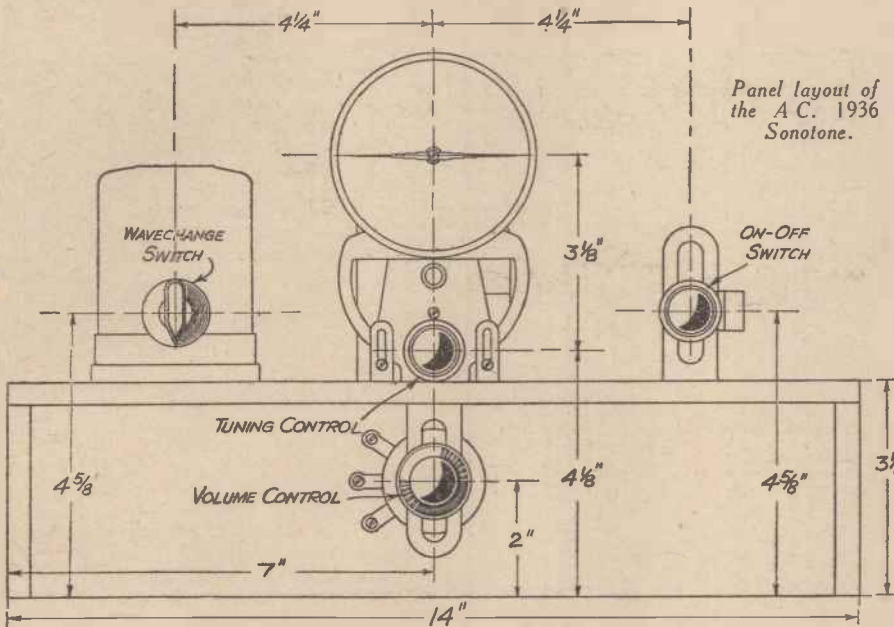
improved by reducing the value of this condenser to .0002 mfd. or even to .0001 mfd. It will be noted that the coupling between the first and second H.F. valves is of the tuned-grid type, an efficient screened H.F. choke being connected between the anode of the first valve and H.T. +. The coil used in this stage is also of the tapped type, thereby providing a high degree of selectivity. In the interests of stability it was decided to use H.F. transformer coupling after the second valve, however, but as the primary winding of

two efficient H.F. stages will probably have found that the reaction control, if fitted, has very little effect on volume.

## "Westector" Rectification

The third tuned circuit is connected to a WX6 "Westector," which acts as a detector, thereby obviating the necessity for connecting a valve in this position. Our experiments have indicated that the "Westector" gives distortionless rectification provided that two or more H.F. stages are used. The transformer following the detector has a ratio of 4/1, and as no direct current is passed through its primary winding its inductance is maintained at a high level, and excellent bass response is obtained.

A directly-heated pentode having a high undistorted output has been chosen for the output stage, the required H.T. voltage of 250 volts being obtained from a mains unit incorporating a reliable metal rectifier operating on the voltage doubler principle. The use of a directly-heated output valve instead of the normal in directly-heated type ensures freedom from voltage surges and smoothing-condenser breakdowns during the heating-up period immediately after switching on.



Panel layout of the A.C. 1936 Sonotone.

disadvantages as compared with the "straight" type of receiver, chief among these being the presence of whistles in many of the existing models, and inferior quality of reproduction. It is true that second-channel whistles can be eliminated by careful design, and good quality can be obtained by providing variable selectivity control in the intermediate-frequency stages, but these are refinements which are not included in the cheaper type of superhet. It is not surprising, therefore, that a vast number of our readers keep asking us for the design of a "straight" set that will cope with modern reception conditions. The 1936 Sonotone is the result of our successful attempt to meet this demand. We do not claim that the degree of selectivity obtained with this set is equal to that provided by a good superhet, but the quality of reproduction is superior to that of the majority of receivers incorporating the superhet principle, and selectivity is adequate for existing reception conditions. This high degree of selectivity has been made possible by employing modern iron-core coils in conjunction with efficient H.F. pentode valves.

## Circuit Arrangement

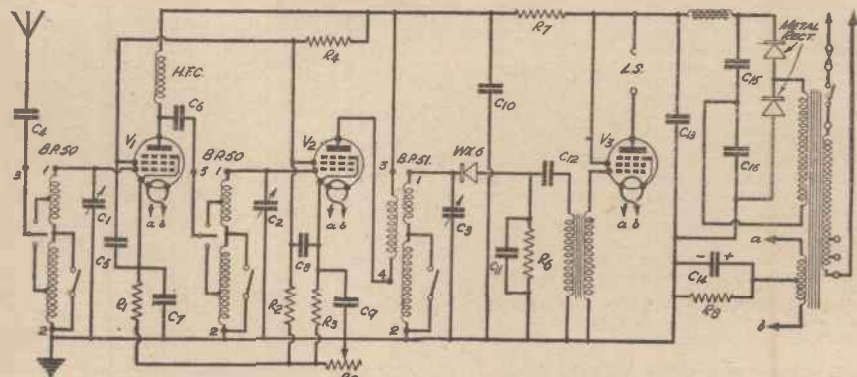
A tapped coil has been used in the aerial circuit, and a fixed condenser has been connected between the aerial terminal of this and the aerial lead. If a very long aerial is used, selectivity may be further

this transformer has less turns than the secondary the high degree of selectivity obtained in the previous stage is maintained. A separate bias resistance is connected in the cathode circuit of each of the H.F. valves in order to provide a steady bias voltage of the required value when the volume control is set at maximum. By means of a variable potentiometer which is common to both cathode circuits the bias voltage can be increased to a value at which no signals can be passed on to the detector. This is the only volume control incorporated, it being considered inadvisable to add a reaction condenser. Most constructors who own receivers employing

## Construction

As in all our receivers, the component layout has been carefully thought out, and therefore the veriest novice should experience no difficulties if the wiring diagram is studied. The drill for the five-pin valve-holders should be a 5/16 in. size, and a 1/4 in. size may satisfactorily be used for the two terminal strips. It must be borne in mind at this stage that the metallised surface of the chassis is in contact with the earth terminal and, therefore, the valveholder and terminal strip sockets must be kept clear from the edges of the holes. For the same reason the metal chassis of the tuning condenser and the coil unit must be securely screwed to the metallised surface of the baseboard as the H.F. circuit is completed through the metallising. The wiring should be commenced with the heater leads as these run close to the underside of the baseboard, but the remaining leads may be attached in any order, as all wires and components are adequately spaced and therefore easily accessible. It will be noted that some of the

(Continued overleaf)



Theoretical circuit-diagram of the A.C. 1936 Sonotone.

**THE A.C. 1936 SONOTONE.**

*(Continued from previous page.)*

wiring is screened; it is essential that the screening covering be connected to a point at earth potential, and the bare ends of the leads must be kept clear from the metal covering.

**Adjusting and Operating**

After the mains leads have been plugged into the correct sockets of the mains transformer the receiver may be switched on by means of the switch on the right side of the chassis, and stations may be picked up by rotating the control knob of the three-gang condenser. In order to obtain best results, however, it will be necessary to adjust the gang condenser trimmers. These should be set to approximately half-way position and a station tuned in at the lower end of the scale, adjustment of the trimmers being then made by means of a screwdriver until maximum volume is obtained.

When this has been accurately carried out—and accuracy will only be ensured when the volume is kept at a very low level by means of the volume control—the condenser should be turned to a position at the upper end of the medium-wave band. When a station is located the trimmers should be turned slightly in each direction, in order to ascertain whether any change in the setting is required. In general, it will be found that the trimmer farthest from the panel may require a slight decrease, after which the setting will be found to hold at any portion of the dial. On the long-wave band no modification should be required, and if carried out a return must be made to the medium-wave band in order to adjust for any discrepancy there, and thus it is apparent that some slight compromise is generally required in order to obtain maximum results with three ganged circuits at every part of the dial.

This may sound a complicated procedure, although in practice the whole operation may be carried out in less than half an hour, but once adjusted the settings will hold until the aerial or valves are changed, when some slight compensation may have to be made. It should be emphasised, however, that maximum results will not be obtained unless the three circuits are accurately lined up, and, therefore, the operation is most important.

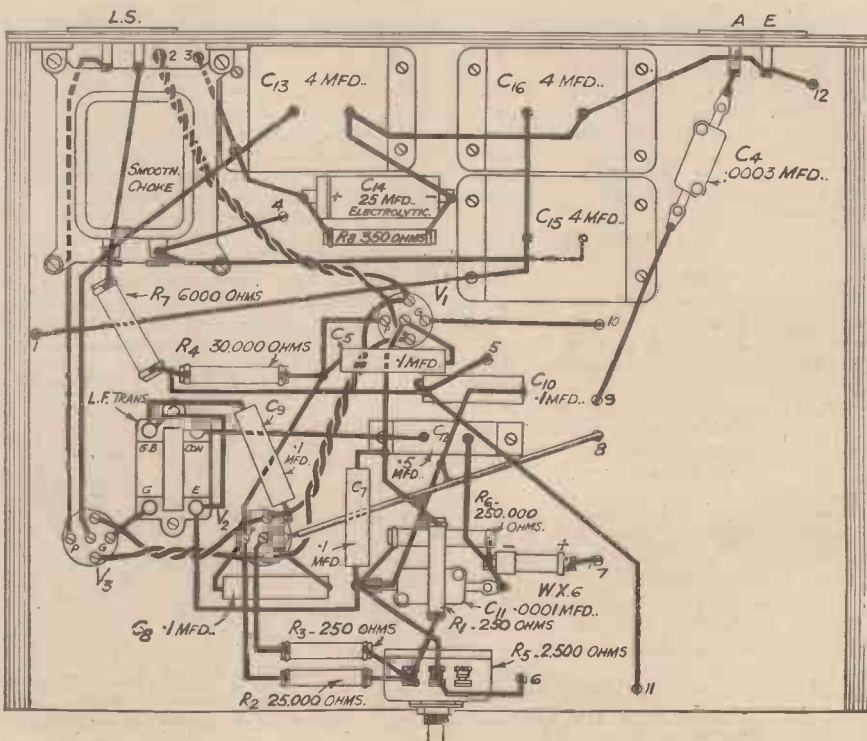
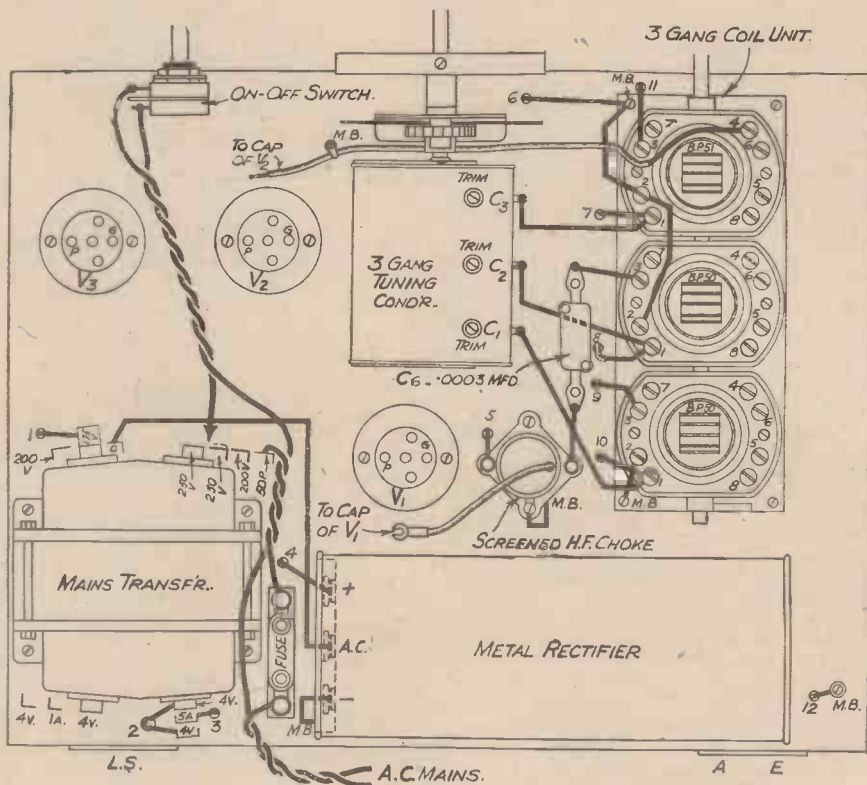
In view of the absence of reaction, when a station is located there is no method of building up signal strength other than with the ordinary volume control, and thus

when this is in the position of maximum strength and a very weak station is located, it will have no entertainment value and cannot be "boosted" as is usual with reaction circuits. The advantage of this type of circuit is, therefore, that only really worth-while programmes are heard, and when two efficient H.F. stages are employed there are sufficient programmes available

to satisfy even the most fastidious and the quality thus reaches a high standard.

The remarks concerning the use of a gramophone pick-up which were made in connection with the battery model of the Sonotone will also apply to this model and they will be repeated next week when dealing more exhaustively with the operating and adjusting procedure.

**WIRING DIAGRAMS OF THE A.C. 1936 SONOTONE**



**LIST OF COMPONENTS  
THE A.C. 1936 SONOTONE**

- One three-gang coil unit, type BP57 (Varley).
- One three-gang condenser, .0005 mfd., Baby type with airplane drive (J. B.).
- Thirteen fixed condensers: two .0003 mfd. (m), five .1 mfd. (250), one .0001 mfd. (m), one .5 mfd. (65), three 4 mfd. (84), one 25 mfd. 25 v. electrolytic (AT) (T.C.C.).
- Seven fixed resistances: two 250 ohms, one 350 ohms, one 25,000 ohms, one 30,000 ohms, one 250,000 ohms, one watt type, one 6,000 ohms, 2 watt type (Erie).
- One potentiometer, 2,500 ohms (B.T.S.).
- One L.F. transformer, type L.F.12 (Bulgin).
- One Westector, type W.X.6 (Westinghouse).
- One H.F. choke, type H.F.P.A. (Wearite).
- One L.F. choke, type H.T.13 (Wearite).
- One H.T.8 rectifier (Westinghouse).
- One mains transformer, type W.31 (Heayberd).
- One fuse with holder, 500 m/a (Microfuse).
- One on-off switch, type S.91 (Bulgin).
- Two component brackets (Peto-Scott).
- Two terminal strips, A.E., L.S. (Clix).
- Three valveholders, 5-pin type (Clix).
- Metaplex chassis, 14in. x 11in. x 3 1/2in. (Peto-Scott).
- Three valves: two M.V.S./Pen., one P.T.41 (Cossor).
- One permanent magnet speaker, Senior Stentorian (W. B.).
- 18in. screened wire (Ward and Goldstone).

A PAGE OF PRACTICAL HINTS

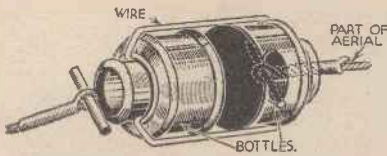
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Improved Aerial Insulators

THE only materials required to make the insulators shown in the sketch are four empty ink-bottles, some wire, and four strong wooden pegs. Cut the pegs



A novel method of using ink bottles as aerial insulators.

so that they just fit crosswise in the bottles, and fasten one end of the aerial to one of the pegs, as shown in the sketch. Put the peg lengthwise into the bottle, and then turn it crosswise, so that it cannot come out again when the aerial is pulled tight.

Next make four rings of wire which can just go over the necks of the bottles, and connect two of them with two pieces of wire, as shown. Take a second bottle and put its neck through the second ring, so that the two bottles have their bases towards each other. In the same way another piece of wire is secured to a second wooden peg, and fitted in the second bottle. This piece of wire is then fastened to the aerial post. The other end of the aerial is treated in a similar way.—TIENIE COETZEE (Cape Province, S. Africa).

A Useful Coil-winder

I HAVE seen several suggestions for coil winding machines, and I think my own apparatus has several points of interest. From the accompanying illustrations it will be seen that an old gramophone motor is used to rotate the coil former, and this is held in position by means

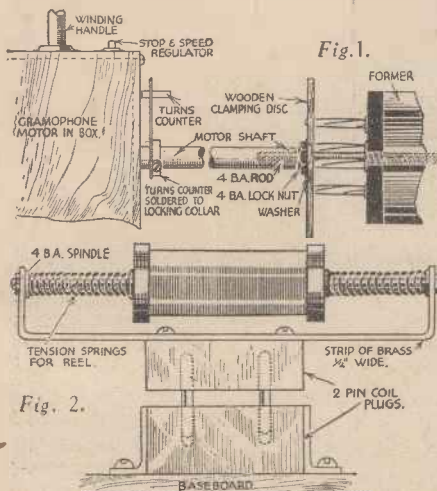


Fig. 2.

Details of construction of a simple coil-winder in which a gramophone motor is used to rotate the coil former.

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., 8-11, 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 Wrinkle.

of a standard 6-pin base. To maintain an even tension on the wire, and to avoid breakages and loose windings, a special spring-grip holder is used for the reel of wire, and this is shown in Fig. 2. An old two-pin coil holder and coil base enables the holder to be quickly removed and a



VARIOUS DISCS CAN BE MADE UP WITH CENTRE HOLE FIXING, THIS ALLOWING FOR GUILS WITH A CENTRAL PIN

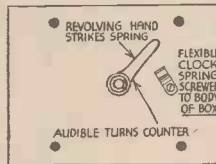


Fig. 3.

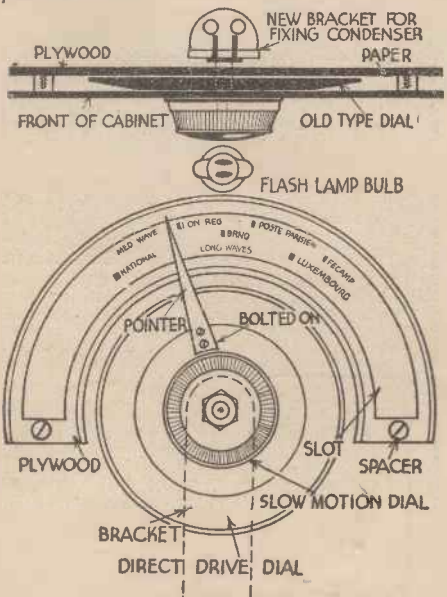
Details of wooden clamping disc, and front view of counter for a simple coil-winder.

different reel of wire to be plugged in. The turns counter is an audible one and a spring rides over a piece of clock spring at each revolution, thus avoiding the expense of a proper counting instrument. It is easy to listen for the "ping" as the wire is being watched, and in practice I find no difficulty in keeping count by ticking off each hundred on a piece of paper. The counter is shown in Fig. 3, whilst Fig.

1 shows the main parts of the complete winder. To wind coils on ordinary formers a length of ordinary threaded rod is passed through the six-pin disc, and a disc of thin ply or thick cardboard is placed against the other end of the coil former and held in position by means of an ordinary nut on the threaded rod.—G. OSBORN (West Brompton, S.W.10).

A Dial Conversion

THE appearance of a set fitted with the old type dial may be greatly improved by fitting a modern illuminated pointer type of tuning. This can easily be done as follows: First of all, a new support for the condenser is made so as the direct drive dial comes inside the cabinet and the slow motion dial outside. A half circular slot is then cut in the front of the cabinet above the spindle of the condenser. A piece of ply-wood is cut the same shape as the slot but rather wider and longer, one side of this being pasted over with paper or thin cardboard. The plywood is fixed about 1/4 in. behind the slot and attached by means of short wooden formers. A metal pointer is bolted to the direct drive dial so that the pointer rotates around the scale. Stations can be tuned in and their places noted on the paper surface of the plywood, which is then removed and the names of the stations inked in. The plywood is then replaced and a flash lamp bulb attached above.—L. S. KING (Tonbridge).



Converting an old type tuning dial to an illuminated pointer type.

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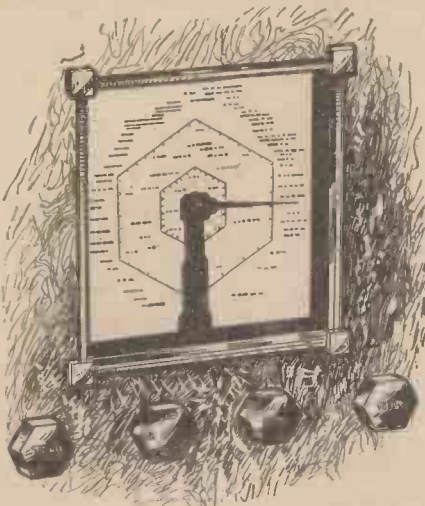


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# RADIOLYMPIA

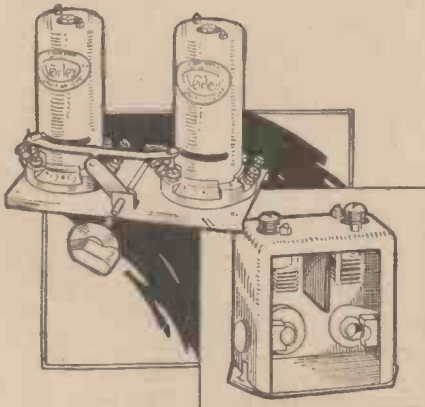
By THE

The First of a Series of Articles in which the Outstanding Items  
These "Reflections" will be of Interest to Those Who Visit

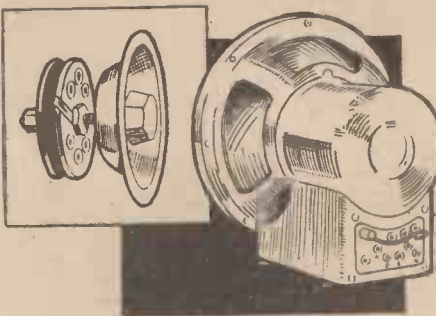


One of the numerous dials which could be seen. This is a McMichael dial.

THE visitor to Olympia was at once assailed by the serried ranks of glittering cabinet-work, flashing signs, and flamboyant announcements which convey that every manufacturer makes the best radio. The juxtaposition of these conflicting statements sometimes results in their cancelling one another out, and the non-technical visitor sometimes is left in the same mental state as that in which he entered the portals of the annual show. I have always felt a measure of sympathy for the genuine visitor to Olympia—he who goes to inspect the year's progress, to analyse the rival claims, and, let us hope, finally to choose a new receiver. Manu-

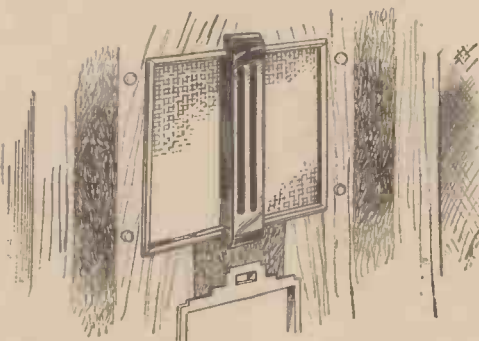


(Top) The new Varley Variband I.F. Unit with coupling controlled from the panel, thus enabling a wide frequency to be used for "high fidelity" reception, and (below) a high-efficiency I.F. transformer for 465 Kc. incorporating Litz-wound iron-cored coils also introduced by Varley.



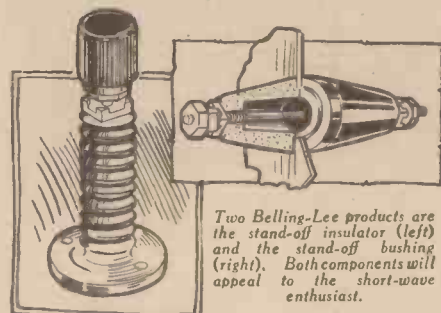
(Right) The new Grampian "Pantone" permanent magnet unit fitted with a multi-ratio transformer, and (left) the Grampian volume control which is provided with a handsome flush-fitting plate and dished escutcheon.

facturers render him very little assistance in this respect. Seven or eight years ago the listening public were perhaps a little more technically-minded than now, and were able to extract the wheat from the tares. So, during my annual analytical peregrination, the first thing which impressed me was the veneer of it, and so successfully has this been applied that it is difficult, if not almost impossible, to get down to the base. Manufacturers are loath to disclose too much about the internals. The visitor should not conclude from this that no progress has been made, for it is my considered opinion that what I might call the engineering side of radio has shown the most marked advance. There is nothing startlingly new, considering the matter from a purely radio point of view. That,



A neat loud-speaker opening seen on an Ever-Ready receiver.

in my opinion, is just as well; for in past years the succession of developments produced by rival manufacturers has had a subversive effect on sales. This was particularly so in the valve industry, and I welcome the fact that a halt has been called. Competition in that direction tended to create stunts, and stunts are not enduring things; they do not produce tangible results, and they deflect designers from genuine development. Probably as a result of this commercial receivers are better this year from all points of view than ever before. Chassis and the assembly generally have obviously been handled at long last by genuine engineers and not by those who like to masquerade under the vainglorious and inappropriate title of



Two Belling-Lee products are the stand-off insulator (left) and the stand-off bushing (right). Both components will appeal to the short-wave enthusiast.

radio engineers. I hope this development will continue, for there are still some details which need to be improved. Surprisingly enough, that which needs most attention from skilled hands is that which has received it, namely, tuning scales. These are chiefly, even to-day, made of celluloid or xylonite, and in mains receivers the heat dissipated by the valves (no matter how carefully the cabinet be ventilated) causes this to cockle, so that it does not maintain uniform and even contact with the viewing window. Many of these scales, smothered with station names, are inaccurate, and merely indicate where the station ought to be. The general finish of tuning scales and escutcheons leaves a little bit to be desired; some of them are reminiscent of cheap and ornate press work. I presume that the receivers this year are more reliable than formerly, for most of them are now so constructed that it would be almost impossible to get at some of the parts should they fail to function. I register a plea for greater accessibility and enjoin the manufacturers not to make the same mistakes as have been made by motor-car manufacturers. Even to-day, non-technical listeners like to be able to attend to simple troubles. I am aware that the servicing of radio receivers has been vastly improved, and that dealers are equipped with ample instructions and service data, but it is not always desirable nor even convenient to call in an agent. As one would naturally expect, universal receivers are marketed by almost every



The W.B. switching device all their loud-speakers so popular in



A de luxe table that will match and fit any set. Incorporating many ingenious features, it is 25 1/2 in. high, 19 in. wide and 11 in. deep. It is made by the Electrico (Croydon), Ltd.



# REFLECTIONS. — 1

EDITOR

of Interest which were to be Seen at Olympia are Described. of the Show and to Those Who Were Less Fortunate

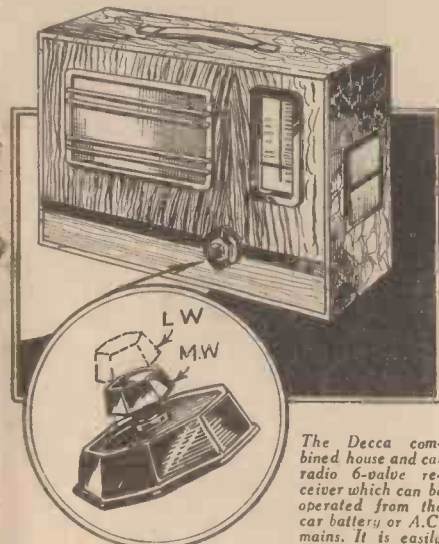
manufacturer. The change-over under the Grid Scheme will not impose hardships on listeners, for those at present on D.C. can purchase a receiver at reasonable price which will operate on D.C. and A.C. without alteration.

A tendency which pleased me was the efforts of manufacturers in the direction of remote control, and I congratulate one manufacturer in particular on the ingenuity of his device—an unailing piece of mechanism which, attached to the arm of your chair, enables you to go round the stations receivable on your set merely by pressing a button. I imagine that next year most manufacturers will list such a device.

Cabinet-work has undoubtedly improved. The styles have changed from the American coffin-like structure to pleasing designs which will blend with modern and period furniture. The finish and the veneering are beyond reproach, even on the cheapest receiver. The baseboard system has vanished, too.

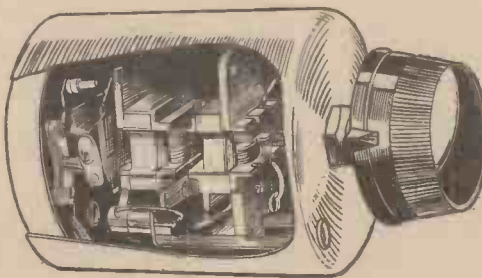
There are many, I know, who will regret its passing, but I am not among them. It is almost impossible to make a compact or well-designed receiver on a flat baseboard without introducing a multiplicity of controls, and the instability, particularly H.F. instability, from which receivers formerly suffered, has vanished largely as the result of the chassis system. Stripped components are the order of the day.

The home constructor needed to fish behind the ornate display to find the bits and pieces in which he is mostly interested.



The Decca combined house and car radio 6-valve receiver which can be operated from the car battery or A.C. mains. It is easily transportable, is economical and fool-proof. The method of switching to the L.W. is shown in the inset sketch of the control knob.

All of those with whom I conversed at our stand regretted the entire absence of television apparatus. The sales of our "Television and Short-wave Handbook" and our sister journal, *Practical Television and Short-wave Review*, indicated the enormous public interest in the new science. The announcement that the first transmissions from Alexandra Palace would commence within six months, and which was made on the eve of the opening of the show, did not have the anticipated effect of restricting or destroying sales. I am still of the opinion that it would have been wise to have permitted the exhibition of television apparatus. I had ready for Radiolympia an excellent cathode-ray tube television receiver which can be made for about £18, but the rules did not permit me to show it. It is only fair that I should

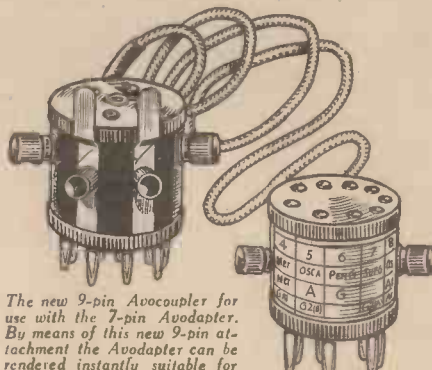


Colvern's new variable-selectivity I.F. transformer.

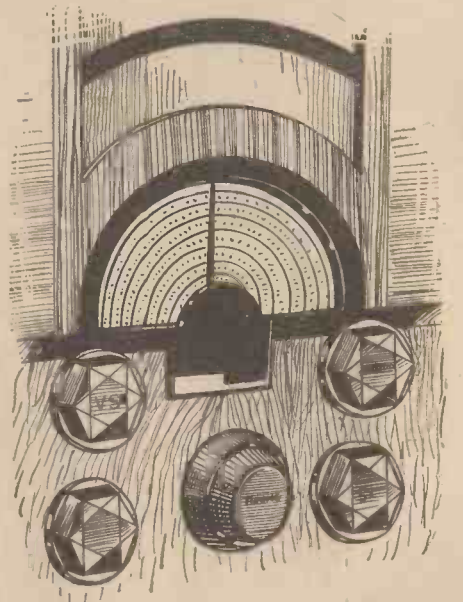
set this fact on record, for I owe my readers an explanation for our apparent oversight in not exhibiting television apparatus.

Notwithstanding the millions of radio receivers which have been sold, the market does not seem to have reached absorption point, and the competition of the cheap receiver has not caused the erosion of the home-constructor market.

Although I carefully searched every exhibit, I failed to discover any feature or any piece of apparatus which could really be described as startlingly new. Within a short time we shall all be experimenting



The new 9-pin Avocoupler for use with the 7-pin Avodapter. By means of this new 9-pin attachment the Avodapter can be rendered instantly suitable for making tests on the recently introduced valves fitted with 9-pin bases. It is made by The Automatic Coil Winder and Electrical Equipment Co., Ltd.

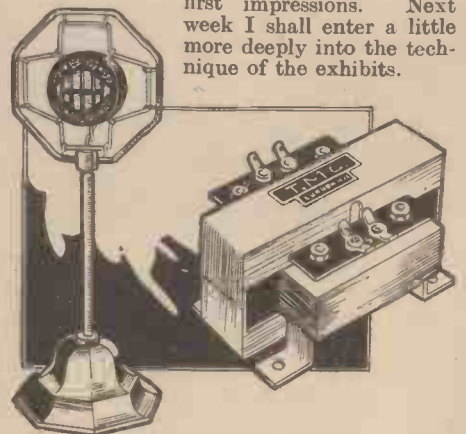


A comprehensive panel layout on a Lissen receiver.

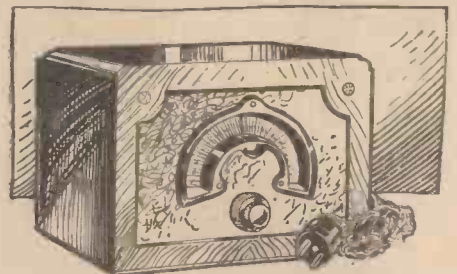
with 5-metre receivers. Only component manufacturers catered for this field, with one or two exceptions. I do not feel that the all-wave receiver will be of great use in connection with television. The vision apparatus will probably only require a one-valve set for the vision signals, since the cathode-ray tube does not need to be fed with a very strong signal.

Receivers "with knobs on" are in the descendant. This indicates sounder radio engineering and closer matching of the various tuned circuits.

These disconnected jottings convey my first impressions. Next week I shall enter a little more deeply into the technique of the exhibits.



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## HOW TO TEST YOUR VALVES

# BEGINNER'S SUPPLEMENT

With a Voltmeter and a Milliammeter You Can Easily Test Your Old Valves and Check Their Characteristics. The Method is Explained in This Article. By W. J. DELANEY

**M**ANY listeners have had their receivers working for a long time and are still using the original valves. Doubt often arises as to whether these old valves are still in an efficient condition, or whether the emission is failing and thus the receiver is being operated in an uneconomic condition. No elaborate apparatus is required to check the valves, and, in fact, only two

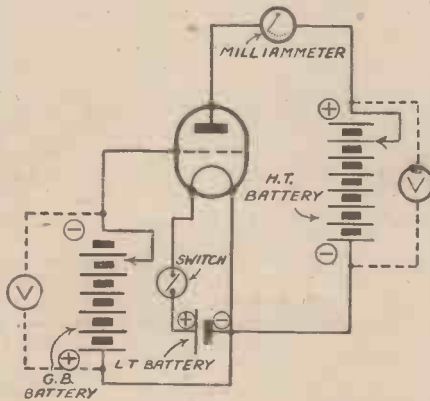


Fig. 1.—Circuit diagram for a simple valve testing unit.

instruments are required in addition to the ordinary type of broadcast receiver. For those readers who have spare apparatus, or who wish to build a complete valve testing unit, the arrangement required is given in Fig. 1. It will be seen, however, that this is, more or less, a single valve stage, such as may be found in any standard receiver, and the following description will be given on the assumption that a receiver is used, and the operation and taking of the various measurements will thus apply to both cases.

### The Essentials

Apart from a valveholder and an L.T. battery, the only other essentials are an H.T. battery, a grid bias battery, and the voltmeter and milliammeter. In Fig. 1 the valve is shown with the grid-bias battery joined direct in the grid circuit, but in practically any L.F. stage this circuit also contains a grid leak or the secondary of an L.F. transformer. This in no way affects the apparatus, and this component may be ignored. Similarly, in the anode circuit will usually be found a resistance, the primary of an L.F. transformer, or the loud-speaker. Again the component may be ignored, although if the last stage of a receiver is being employed for the test, the milliammeter may be joined in series with the speaker across the L.S. terminals in order to maintain the usual valve load.

In Fig. 1 the voltmeter is shown in dotted lines across both the H.T. and the G.B. battery. This does not indicate that two meters are necessary, but simply that it is necessary to check both of these supplies. Thus an ordinary dual-range or double-reading voltmeter may be used and joined across each battery in turn, or two separate meters may be connected permanently if a complete valve tester is being constructed.

### Checking Conductance

The simplest check which the average listener can make is the mutual conductance, slope, or goodness factor of the valve. This is always given by the valve manufacturers and is expressed as "so many milliamps per volt," and is taken at 100 volts H.T. and zero grid volts. To make this calculation, apply 100 volts to the anode, or in other words plug in the H.T. positive plug for the valve at the 100-volt tapping on the battery. Connect the grid-bias negative plug to the negative terminal of the L.T. supply. The needle of the milliammeter will rise to a certain figure and this should be written down on an ordinary piece of paper—there is no necessity for squared or "graph" paper for this particular calculation. Now without altering the H.T. voltage, insert the G.B. plug into one of the low voltage sockets—first switching off the L.T. supply if the valve is one of the L.F. or power types. In fact, to avoid damage and to cultivate a good habit it is always preferable to switch off the L.T. supply before breaking the grid circuit. Now increase the grid-bias voltage and again switch on. The milliammeter will now show a lower reading, and this should be noted, after which a similar change should be made, taking a still higher grid-bias voltage. You will now have three separate anode current figures (the readings shown on the milliammeter) and three separate grid-bias voltages.

The mutual conductance is the amount of change in the anode-current for each

volt change in the grid circuit, and thus all that is necessary is to subtract the first anode-current figure from the second anode-current figure, and the first grid-bias figure from the second bias figure, and from this work out the change per volt. An example will make this clear.

### An Example

Suppose with the first G.B. figure 0 (or zero) volts the anode current reads 5 milliamps. Now suppose that the second bias voltage was 3 volts, and the anode current reading with this bias was 1 milliamp, 1 milliamp. from 5 milliamps. gives us 4 milliamps., and 0 volts from 3 volts gives us 3 volts.

Therefore, we have ascertained that a change in bias or grid voltage of 3 volts produces an anode-current change of 4 milliamps, and thus the change may be expressed as  $1\frac{1}{3}$  (or  $\frac{4}{3}$ ) milliamps. per volt, which again may be expressed in the usual manner as  $1\frac{1}{3}$  mA/V.

### A Check Figure

You will notice, however, that I suggested that you take three separate readings, and the reason for this is that a check may be made by taking the difference between the second and third figures and working this out also. It should come to approximately the same figure and thus serve as a check in case of slight discrepancies in meter readings due to the use of cheap or single type metres. Owing to the curvature of the average characteristic at the bottom of the curve, it is preferable to take these measurements with only very small values of grid bias, so that the (straight) portion of the curve is utilised. If there is any great difference in the figure obtained and that which is given by the valve makers for that particular valve, it may be taken that the valve requires replacement.

Without using any special paper it is also worth while to take some readings of anode current with varying H.T.



Fig. 2.—The Bulgin All-valve testing unit with adapters.

voltages and G.B. voltages and to check these with the figures which are given by the makers. It will thus be possible to see whether or not the valve is in good condition by the amount of variation. If there is a considerable discrepancy at certain values it may be taken that the valve has completed its normal life and the receiver will be considerably improved by the substitution of a new valve of similar characteristics. The amplification factor and the impedance may also be ascertained quite easily, although some special graph paper is necessary. This may be obtained from any good stationer, and next week we will discuss the taking of these characteristics and deal with the question of the undistorted output of a power or super-power valve.

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**F. C. H. (Manchester, C.C. 1732.** A valve may be losing emission, or your speaker may be incorrectly matched. You do not state whether the latter point has been checked. The maximum undistorted output cannot be obtained unless the correct load is used with the output valve.

**D. E. (Glasgow).** We would not advise you to get a new speaker until you are certain that the set is not faulty. We cannot help you without knowing the circuit arrangement and the various voltages applied. The two separate condensers instead of a ganged unit would not give weaker signals. Write us again with further details.

**D. O. V. (Leighton Buzzard).** We are sorry we have no details of the coils which are, of course, of rather old design. The coils have not been on the market for some years.

**P. M. (Roehampton).** The trouble is almost certainly caused by a faulty grid circuit. Check the grid leaks, transformers, and grid-bias battery and you will soon locate the trouble.

**W. F. (Winchester).** The addition of the Class B stage will not affect the pick-up connections which you have already been given.

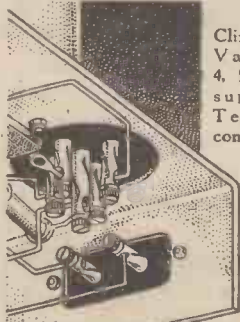
**J. K. (Co. Clare).** It is possible that the short circuit has damaged a resistance and consequently the first valve is now faulty or the voltages applied are now incorrect. Alternatively the choke may have become damaged, due to the short circuit, and thus there is no choking effect on the valve.

**J. A. (Pitteneem).** The Magazine in question is out of print, but the blueprint W.M. 350 is still available. A two-gang condenser may certainly be used in a "straigh" set, but the actual coils used must also be matched in order that the tuning of the two sections will hold throughout the entire tuning range.

**A. W. F. (Sutton-in-Ash).** The Radio Amateurs' Call Book will help you. This is obtainable from Mr. F. L. Postlethwaite, of 41, Kinfauns Road, Goodmayes, Essex.

**G. B. (Cardiff).** The circuit is entirely wrong. The H.T. is short-circuited on the input side and thus the valves would not function and the battery would be discharged in a very short while. Neither of the tuning circuits are connected to the valves. The output valve must be biased and the transformer would not function as shown.

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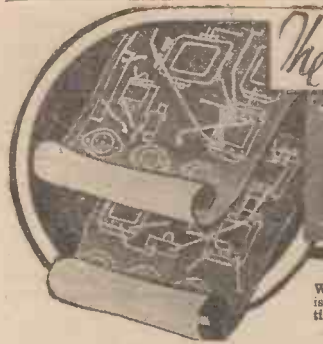
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Economy-pentode Three (SG, D, Pen)	Oct. '33	WM337
All-wave Three (D, 2LF)	Jan. '34	WM348
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans)	Mar. '34	WM354
Iron-core Band-pass Three (SG, D, QP21)	June '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	Oct. '34	WM371
Graduating to a Low-frequency Stage (D, 2LF)	Jan. '35	WM378

Four-valvers: Blueprints, 1s. 6d. each.		
65/- Four (SG, D, RC, Trans)	—	AW370
"A.W." Ideal Four (2SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2SG, D, Pen)	—	AW421
Crusaders' A.V.C. 4 (2 HF, D, QP21)	18.8.34	AW445
(Pentode and Class-B Outputs for above blueprints 6d. each)	25.8.34	AW445A
Quadradyne (2SG, D, Pen)	—	WM273
Calibrator (SG, D, RC, Trans)	Oct. '32	WM300
Table Quad (SG, D, RC, Trans)	—	WM303
Calibrator de Luxe (SG, D, RC, Trans)	Apr. '33	WM316
Self-contained Four (SG, D, LF, Class-B)	Aug. '33	WM331
Lucerne-Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2LF)	Feb. '35	WM381
The H.K. Four	Mar. '35	WM384

Five-valvers: Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans)	May '33	WM320
New Class-B Five (2SG, D, LF, Class-B)	Nov. '33	WM340
Class-B Quadradyne (2SG, D, LF, Class-B)	Dec. '33	WM344
1935 Super Five (Battery Superhet)	Jan. '35	WM379

Mains Operated.		
Two-valvers: Blueprints, 1s. 6d. each.		
Consoelectric Two (D, Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286

Three-valvers: Blueprints, 1s. each.		
Home-lover's New All-electric Three (SG, D, Trans) A.C.	25.3.33	AW383
S.G. Three (SG, D, Pen) A.C.	3.6.33	AW390
A.C. Triodyne (SG, D, Pen) A.C.	10.8.33	AW399
A.C. Pentaquester (HF, Pen, D, Pen) A.C.	23.6.34	AW439
D.C. Calibrator (SG, D, Push-pull Pen) D.C.	July '33	WM328
Simplicity A. C. Radiogram (SG, D, Pen) A.C.	Oct. '33	WM338
Six-guinea A.C./D.C. Three (HF Pen, D, Trans) A.C./D.C.	July '34	WM364
Mantovani A.C. Three (HF Pen, D, Pen) A.C.	Nov. '34	WM374

Four-valvers: Blueprints, 1s. 6d. each.		
A.C. Melody Ranger (SG, DC, RC, Trans) A.C.	—	AW380
A.C./D.C. Straight A.V.C.4 (2 HF, D, Pen) A.C./D.C.	8.9.34	AW446
A.C. Quadradyne (2SG, D, Trans) A.C.	—	WM379
All Metal Four (2SG, D, Pen)	July '33	WM320
"W.M." A.C./D.C. Super Four	Feb. '35	WM382
Harris Jubilee Radiogram	May '35	WM385

SUPERNETS.		
Battery Sets: Blueprints, 1s. 6d. each.		
1934 Century Super	9.12.33	AW418
Super Senior	—	WM256
1932 Super 60	—	WM260
Q.P.P. Super 60	Apr. '33	WM310
"W.M." Stenode	Oct. '34	WM373
Modern Super Senior	Nov. '34	WM375

Mains Sets: Blueprints, 1s. 6d. each.		
1934 A.C. Century Super, A.C.	10.3.34	AW425
1932 A.C. Super 60, A.C.	—	WM272
Seventy-seven Super A.C.	—	WM305
"W.M." D.C. Super, D.C.	May '33	WM321
Merrymaker Super, A.C.	Dec. '33	WM345
Heptode Super Three, A.C.	May '34	WM359
"W.M." Radiogram Super, A.C.	July '34	WM366
"W.M." Stenode, A.C.	Sep. '34	WM370
1935 A.C. Stenode	Apr. '35	WM385

PORTABLES.		
Four-valvers: Blueprints, 1s. 6d. each.		
General-purpose Portable (SG, D, RC, Trans)	—	AW351
Midget Class-B Portable (SG, D, LF, Class B)	20.5.33	AW380
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Town and Country Four (SG, D, RC, Trans)	—	WM282
Two H.F. Portable (2 SG, D, QP21)	June '34	WM363
Tyers Portable (SG, D, 2 Trans)	Aug. '34	WM367

SHORT-WAVERS. Battery Operated.		
One-valvers: Blueprints, 1s. each.		
S.W. One-valve	—	AW320
S.W. One-valve for America	—	AW429
Roma Short-waver	10.11.34	AW452

Two-valvers: Blueprints, 1s. each.		
Home-made Coil Two (D, Pen)	14.7.34	AW440

Three-valvers: Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenters' 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver	Jan. 10, '35	AW463
Short-wave Adapter	Dec. 1, '34	AW456
Superhet, Converter	Dec. 1, '34	AW457
The Carrier Short-waver	July '35	WM390

Four-valvers: Blueprints, 1s. 6d. each.		
"A.W." Short-wave World Beater (HF Pen, D, RC, Trans)	2.6.34	AW436
Empire Short-waver (SG, D, RC, Trans)	Mar. '33	WM318
Standard Four-valve Short-waver	Mar. '35	WM383

Mains Operated.		
Two-valvers: Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C.	10.11.34	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	Aug. '34	WM368
"W.M." Long-wave Converter	Jan. '35	WM380

Three-valvers: Blueprints, 1s. each.		
Emigrator (SG, D, Pen), A.C.	—	WM352

Four-valvers: Blueprints, 1s. 6d. each.		
Gold Coaster (SG, D, RC, Trans) A.C.	Aug. '32	WM292
Trickle Charger	Jan. 5, '35	AW462

MISCELLANEOUS.		
Enthusiasts Power Amplifier (1/6)	June '35	WM337
Newstyle Short-wave Adapter (1-7)	June '35	WM388

# Realistic Reproduction and its Problems

In this Article the Essential Features and Possibilities of Quality Receivers are Discussed. By DAVID SUTTON

IN a previous article it was stated that the average "general-purpose" receiver, whether factory built or constructed at home, could not pretend to anything approaching perfection as regards realistic reproduction. Many of these sets, it is true, give a very "pleasing" performance, which is, of course, a very different thing; and many, alas, give a very unpleasant performance.

The reason can be given in very few words—in the present state of broadcasting it is not possible, at an economic cost, to make a set which will give ideal performance in every direction—long range, a long list of programmes, and really natural reproduction. What I have called the general-purpose set must be in the nature of a compromise—it must represent an attempt to reconcile several sets of conflicting requirements and conditions, and for this reason its performance must be mediocre.

## Quality Reproduction

Equally, the "quality" receiver must be a special purpose apparatus, and the builder must be prepared to sacrifice something in other directions in order to achieve a closer approach to perfection in realistic reproduction.

But before examining the technical reasons for this state of affairs, it is very necessary to understand exactly what is meant by quality reproduction. Readers of PRACTICAL AND AMATEUR WIRELESS are aware that what we call "sound" is the effect produced upon our ears and upon certain nerves connected thereto, by variations of air pressure (the so-called sound waves).

These waves of air pressure are, of course, produced by the vibration of the instrument emitting the sound—the beaten drum-skin, the violin string, or the human vocal cords, for example. Most listeners also know that every note has its own frequency, or number of vibrations per second. Deep (bass) notes correspond to vibrations at the rate of only a few times per second; treble notes have higher frequencies. The range of sound frequencies is from about twelve per second to about 20,000 per second—the exact range varies with different individuals. Frequencies below twelve do not produce the sensation of sound, and very few people can recognise notes having a frequency greater than 20,000, although it has been proved that many animals can detect these higher frequencies.

Every note, then, has its own fundamental frequency. For example, the middle "C" string on the piano vibrates at a frequency of 256 per second.

But the vibrations of most musical instruments are not simple ones producing a single frequency. Usually a number of additional frequencies, bearing some simple ratio to the main frequency, are also produced—frequencies of twice, three times, four times the original, and so forth. These extra frequencies are called "over-tones," and upon the number and relative strength of the overtones depends the quality of the note. For example, everyone can distinguish between a certain note played on a violin and the same note

played on a piano. The difference in "tone" or quality is simply the result of different numbers and strengths of the overtones.

This brings us at once to the one fundamental definition of quality reproduction—good quality natural reproduction is achieved when the sounds given out by the loud-speaker are identical with those performed before the microphone, every overtone being reproduced at the correct relative strength with nothing added and nothing lost.

## "Useful" Audio Frequencies

From this it is not difficult to state the one and only technical problem of quality reception—the whole train of apparatus from microphone and speaker must be so designed and operated that the complete band of useful audible frequencies passes from stage to stage without loss or addition—that is to say, without the introduction of distortion.

The phrase "useful" audio frequencies is used advisedly because even under the best conditions it is at present impossible to achieve absolute perfection, and for all practical purposes a range of from some fifty to about 15,000 vibrations per second will have to represent high-quality reproduction.

Now it is a very simple matter to set down the broad condition which must be observed to ensure realistic reproduction, but it is quite another thing to translate this into actual achievement, and we shall see later how this can be attempted.

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—asks Mr. F. J. Camm



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"Can there be a better speaker?"

*F. J. Camm*



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### Simplifying Identification

GENERALLY speaking, the question of identification is simplified if the listener has means at his disposal to gauge—even within rough limits—the wavelength or frequency on which a transmission is picked up. For this reason, when compiling a register of stations based both on those already logged and on a published list containing many you have not yet heard, but are seeking, divide it into as many bands as you can, inserting, wherever possible, the condenser readings with corresponding wavelength or frequency of the transmitter you have definitely identified. You could not possess better landmarks; they will narrow your search and prevent great loss of time and patience.

As an example: if by chance a broadcast is heard on a reading situated, say, between DJA, Zeesen (31.38 metres) and CT1AA,

## LEAVES FROM A SHORT-WAVE LOG

Lisbon (31.25 metres), according to the time of reception it will not be a difficult matter to determine whether it is an Australian or an American transmitter. If the issue then is narrowed down by a process of elimination it will be possible to state definitely to which particular station the receiver is tuned. I would, therefore, strongly advise that a search be made at the start for the most powerful stations, of which there are already a number in Europe; the logging of these readings with the accompanying data collected will allow a calibration of the set, and thus provide known sign-posts

for the further identification of other signals.

### OER2, Vienna

Some Europeans, however, may prove elusive; one, in particular, OER2, Vienna, which hitherto has been working on comparatively very low power. However, this station, on 49.4 metres, is now operating on 1.5 kilowatts, and for some days as an experiment has been broadcasting until B.S.T. 04.00 for the benefit of North and South American listeners. As soon as reports have been received from various parts of the world, the authorities will establish a regular nightly schedule of transmissions.

Rome, I2RO, on 31.13 metres (9,637 kc/s), now broadcasts every Monday, Wednesday, and Friday from B.S.T. 00.00-01.30 to listeners in North America, and from B.S.T. 01.45-02.30 or later on Tuesdays, Thursdays, and Saturdays for South and Central America. For the programmes destined to Canada and the United States all announcements are made in the English language; for the other transmissions, in Italian, Spanish and Portuguese. In every instance the station opens with the call, followed by the Fascist Hymn (*Giovinazza*), and closes down with Puccini's *Hymn to Rome*. Tests are sometimes made between B.S.T. 22.30 and 00.00 to allow comparison of reception in U.S.A. with broadcasts carried out on 49.3 metres (6,085 kc/s), but transmissions on the latter wavelength as a regular feature are being suspended until next autumn, as the lower channels at this period of the year are found to be more favourable.

### A New Station

Another new station of which tests are reported is CMBH, San Spiritus, Cuba, on 29.41 metres (10,200 kc/s). It is on the air daily between B.S.T. 22.00-01.40, but has been picked up at a later hour. The call in both Spanish and English is given out every ten minutes or so; it would appear to relay a medium wave Cuban station advertised under the same call letters and working on 241.9 metres (1,240 kc/s).

HJ4ABA, Medellin, now on 25.6 metres (11,720 kc/s), although not one of the most powerful of the Colombian stations, is well heard in Western Europe on favourable nights between B.S.T. 02.00-03.00. In addition to announcements in Spanish, an English call is given every thirty minutes: *You are listening to short-wave station HJ4ABA, Medellin*, and reference is made to its slogan: *Echoes of the Mountain*.

HCJB, Quito (Ecuador), formerly on 56 metres, then later on 37 metres, has now reduced its wavelength to 36.59 metres (8,200 kc/s). It broadcasts daily (Tuesdays excepted) from B.S.T. 01.00-04.00. Here again calls are also given in the English language. Times given are B.S.T. 01.00-03.00 daily.

### Another Mexican Short-waver

Another short-waver is reported from Mexico City, namely, XECR, on 40.60 metres (7,390 kc/s), which appears to be operated by the Authorities inasmuch as reports are to be sent to the Secretaria de Relaciones Exteriores, the equivalent of our Foreign Office in this country. I am informed that it only works on Sundays between B.S.T. 00.00-01.00, apparently for official broadcasts and government communications.

Also HKV, of Bogota (Colombia), on 34.09 metres (8,800 kc/s), is a newcomer. It is described as an experimental station belonging to the Radio Department of the Ministry of War.

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# IMPRESSIONS ON THE WAX

By  
T. O'nearm

A NOTABLE Columbia record this month is Charles Kullman in Vladimir's aria from Borodine's "Prince Igor" and, for companion, Lenski's aria from Tchaikovsky's "Eugen Onegin," on Columbia LX396. The two songs reproduced are typically Russian in mood and story, with a picturesque and historical romance as a background. These factors were responsible for their selection. The Columbia Company, realising the artistic value of Kullman, have decided to place him in their celebrity series. His recent successes at the Berlin, Vienna, and Covent Garden opera houses have brought him well to the fore, and next season he is to appear at the Metropolitan in New York.

### Sandler's Light Classics

THERE has been a tendency of late for Albert Sandler to record some of the lighter classics. In Rubinstein's "Toreador et Andalouse," for instance, he gives a fine performance, and his inspiration as strongly lifts Delibes' famous Pizzicato (from his "Sylvia Ballet") from the rut of an average performance into something of sheer joy. His able co-partners, J. Byfield at the piano, and R. Kilbey on the cello, assist him in these gems, both of which appear on Columbia DB1567.

### Orchestre Raymonde Novelties

TWO brilliant little novelties from the Orchestre Raymonde appear this month on Columbia DB1563. "The Dancing Clock," by Montague Ewing, and Poldini's "Poupee Valsante" are familiar to most, and here it is the light-hearted treatment and innumerable instrumental touches that stamp them as refreshingly different interpretations.

Turner Layton is a man of many parts, and besides being one of the best-liked exponents of popular songs and a fine pianist, he is equally at home in ballads of the more serious type. He demonstrates this perfectly in his latest record—Columbia DB1565—on which he sings "As I Sit Here" and "My Treasure," two songs that enjoyed their heyday some thirty odd years ago.

### Flotsam and Jetsam Return

THOSE well-remembered favourites, Flotsam and Jetsam, are together again, and the re-union is happily marked by the issue of a new record in the Columbia list for this month. The famous partners sing "Melodrama of the Mice" and "King Canute," subjects which they exploit in their own particular brand of clever humour. Flotsam and Jetsam write all their own songs, and what has attracted them perhaps more than anything to a very wide public is the cleanness of their humour. The number of this record is Columbia DB1566.

The gramophone companies frequently have to cope with an overnight demand for "sudden" hits. Two such records have had to be rushed out by the Columbia Company to meet with such an emergency

call. One is of "South American Joe," a new rumba played by Geraldo and his Orchestra on Columbia FB1093, and the other, "The Oregon Trail" and "Chasing Shadows," played by Henry Hall and the B.B.C. Dance Orchestra on Columbia FB1077.

### A First-Class Baritone

THERE is probably no baritone engaged in more important concert and oratorio work than Harold Williams, as witness his recent triumphs in the spectacular production of "Hiawatha" and "Elijah." He has made many splendid records for Columbia, the latest of which may be counted among his most enjoyable. He sings in his resonant, robust fashion the ballads "Chorus, Gentlemen" and "Glorious Devon" on Columbia DB1564, and how refreshing they are!

### Decca Records

A PART from the two jolly and popular Grainger pieces—"Handel in the Strand" and "Mock Morris," played by The Queen's Hall Orchestra, conducted by Sir Henry Wood, on Decca K767—there is published the first recording of the Klenovsky (*alias* Sir Henry Wood) orchestral version of the well-known Bach "Tocatta and Fugue in D minor" on Decca K768. A truly sensational record, which must be heard for its musical spectacular vastness to be comprehended. Although the record is very loud, there is no distortion of the complex instrumentation.

There are no less than twelve dance records in the Decca list for this month, five by Ambrose, four by Roy Fox, one by Maurice Winnick, and two by Brian Lawrence. The titles are all up to date and are extremely well recorded.

### Decca-Polydor Records

THE principal publication of the month is a complete recording of the "Dumky Trio in E Minor," by Dvorak, for violin, violoncello, and pianoforte, played superbly by the Elly Ney Trio, a chamber-music party of European reputation. The "Dumky Trio" is peerless music that has a strong natural flavour, and is recorded on four discs. The numbers are Decca-Polydor LV6109 to 6112.

Another interesting record is the Brailowsky piano record, which Decca has been urged to make available in the Decca Polydor series. Brailowsky's playing of the 9th Weber "Perpetuum Mobile" is masterly. The number of this record is Decca-Polydor CA8204.

Finally, there is Rehkemper singing, with absolute charm, two arias from "The Magic Flute" on Decca-Polydor CA8203. It is an ideal Mozart record.

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# SHORT WAVE SECTION

## Superheterodyne Reception on Short Waves

The Advantages of the Superhet Circuit for Short-wave Working are Pointed Out, and Circuits are Given for the Construction of Converters and Double Frequency Changers  
By FRANK PRESTON

THE superheterodyne circuit is rapidly becoming just as popular for a short-wave reception as it has done for normal broadcast work, and although a superhet receiver is somewhat more complicated than one using a "straight" circuit, this is fully compensated for by the greater efficiency obtained. There are many short-wave enthusiasts who would consider it almost sacrilegious to give up the simple det.-L.F. arrangement, but even these are beginning to realise that this form of circuit must eventually be superseded. The fact is that the simplest type

amplification can be effectively carried out due to the fact that this takes place, not at the frequency of the received signals, but at a lower frequency which corresponds to the wavelengths used on the broadcast bands. Due to the effectiveness of this amplification, satisfactory reception can be carried out over unlimited distances, even when reception conditions are far from ideal.

No mention has yet been made of the great advantage of the superhet in the way of simplified operation, because the average short-wave "fan" takes a good deal of pride in his ability to manipulate the various tuning and reaction controls. Despite this, simplicity of operation is of distinct advantage when rapid tuning has to be carried out, and the fact that short-wave superhets are used by many commercial stations and by B.B.C. engineers is sufficient proof that skilled operators do not shun the simplified tuning, whilst its benefit to the average listener is undisputed.

### Improved Reproduction

There is another point which is strongly in favour of the superhet, and one which assumes greater importance as the technique of broadcasting improves; this is that the

advantage will be of tremendous importance when ultra-short-wave high-definition television comes into regular operation, and it is probable that the superhet arrangement will prove to be an absolute essential for the reception of these transmissions, when a particularly uniform response must be given to a frequency band of 1,000 kilocycles or more.

### The Pentagrid Frequency Changer

Having become fully convinced that a superhet is very desirable for short-wave reception the next point is to consider the most suitable type of circuit. Until recently it was found most convenient and simple to use an autodyne type of frequency changer—that is, to employ a single three-electrode or S.G. valve as combined first detector and oscillator, there being only a single variably-tuned circuit—but this arrangement has given way to that in which a pentagrid or similar type of valve is employed for this purpose. Fig. 1 shows an autodyne frequency-changer circuit of the usual type, and it is evident that this is nothing more or less than a compromise, since there is no real control over the intermediate frequency in the first stages. As

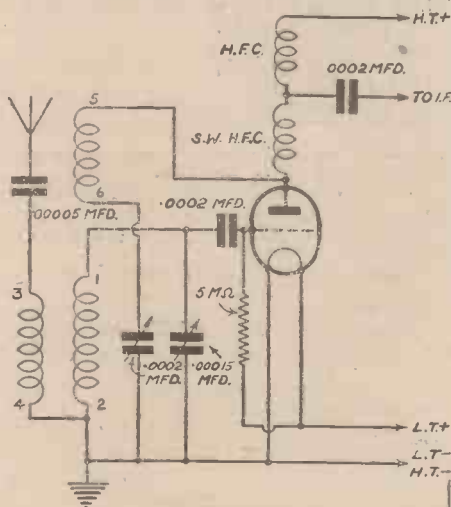


Fig. 1.—The autodyne frequency-changer circuit, which has many disadvantages not associated with other systems.

of short-waver is really very unselective, although this point is not always apparent because of the small number of stations operating on short waves in proportion to the number of channels available. The lack of selectivity is, however, bound to become more noticeable as the short-wave bands are employed to an increasing extent. Another important objection to the "straight" short-wave receiver is that high-frequency amplification is well-nigh impossible, so that the user is to a large extent dependent upon prevailing conditions.

### Greater Reliability

It is not claimed that the superhet as available to-day completely overcomes all of the difficulties mentioned, but it does at least minimise them. Due to the frequency-changing operations, selectivity is enormously improved without tuning being rendered any more difficult, and high frequency (more intermediate-frequency)

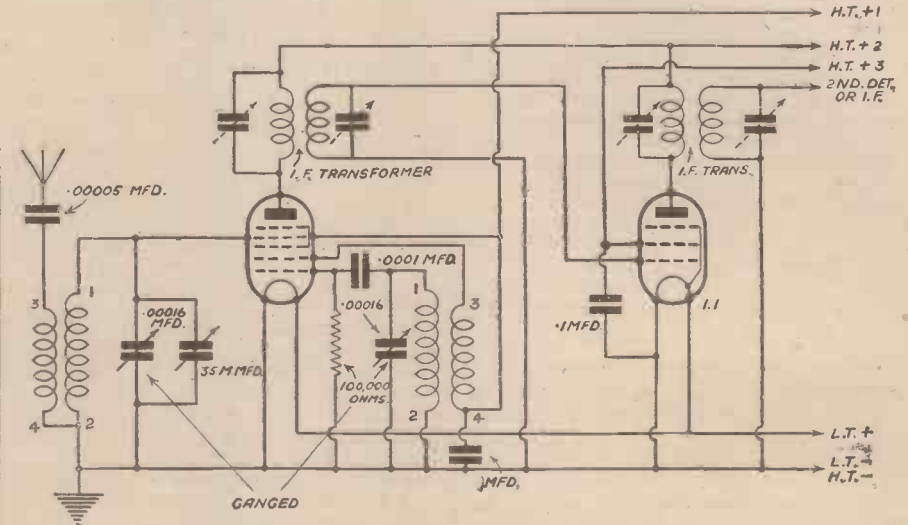


Fig. 2.—The circuit of a pentagrid frequency changer and I.F. stage for S.W. reception. The coil-terminal connections are arbitrary and are given to show the correspondence between the two coils.

quality of reproduction is nearly always much better than with a "straight" set. There are various reasons for this, one of which is that reaction, as it is normally understood, is not employed. Another is that the band-width response of the intermediate-frequency tuned circuits can be varied between wide limits. This latter

result of this, the I.F. does not remain constant, but may vary for different settings of the tuning and reaction condensers. The circuit served its purpose, but it is now being superseded, although it is still used with fair success by many listeners.

It is, however, far more satisfactory to use a pentagrid frequency changer of which



a suitable and typical circuit is shown in Fig. 2. In this case both the first detector and oscillator portions of the first valve are accurately tuned by means of two similar coils and a two-gang .00016-mfd. variable condenser. It might at first appear that the gang condenser would require to be one having specially-shaped vanes for the oscillator section, in order to maintain a constant frequency difference between the two tuned circuits over the complete tuning range. In practice this is found to be unnecessary, provided that the grid circuit of the first-detector section of the valve contains a small trimming condenser—about 35 micro-microfarads is a suitable value. With such a condenser it is an easy matter to obtain an I.F. of 465 kc/s (which is found to be most satisfactory in nearly all S.W. superhets) simply by the operation of the trimmer. Another point which in theory would appear to offer difficulty, but which in practice is not so, is in connection with the tuning of the gang condenser. It might be expected that signals could not be received unless the trimmer were accurately adjusted to provide the necessary frequency difference; in practice it is found that signals can be tuned in with perfect ease by operation of the main (gang) condenser alone, and that it is then only necessary to use the trimmer to bring the reproduction up to full strength. It will be seen from this that the S.W. superhet with pentagrid frequency changer is a really delightful type of set to handle.

**A Converter Circuit**

There will be many who do not feel justified in building a complete three or four-valve receiver for short-wave reception alone, and who would prefer to make a converter for use in conjunction with the broadcast set. This can easily be done by using the H.F. stages in the latter set in place of the I.F. valve shown. In order to do this, however, the 465-kc/s intermediate-frequency transformer should be replaced by an H.F. choke, the feed to the aerial terminal of the broadcast set being taken through a .0002-mfd. fixed condenser as shown in the skeleton circuit in Fig. 3. In this case the intermediate frequency will probably not be exactly 465 kc/s (about 600 metres) because the set will generally

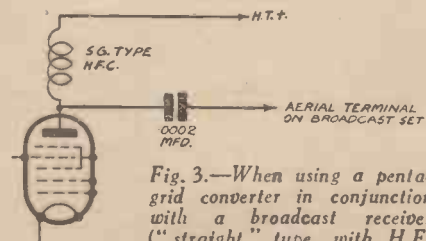


Fig. 3.—When using a pentagrid converter in conjunction with a broadcast receiver ("straight" type, with H.F. amplifier) the connections in the anode circuit of the pentagrid are as shown here.

not tune up to this on the medium waveband, nor down to it on the long waveband. This is of small importance, and equally good results may be obtained by setting the receiver to the highest wavelength provided by the medium-wave coils—probably about 500 metres, or 600 kc/s.

**The Double Superhet**

A difficulty which has often been experienced by owners of superheterodyne broadcast receivers is that of fitting a converter for short waves. This can be done by cutting the frequency changer out of circuit and replacing it by the short-wave counter-

part, but this often involves complication, besides which, the intermediate frequency employed is generally about 110 kc/s, and this is not the best for S.W. work. A more satisfactory method is to use a double frequency-changer, such as is included in a few of the 1936-model commercial all-wave instruments. To do this it is necessary to include with the S.W. unit an I.F. valve arranged as shown theoretically in Fig. 4. When this is done the received signals are first converted to a frequency of about 600 kc/s, after which they are applied to the first detector of the complete superhet receiver. Here they are dealt with as

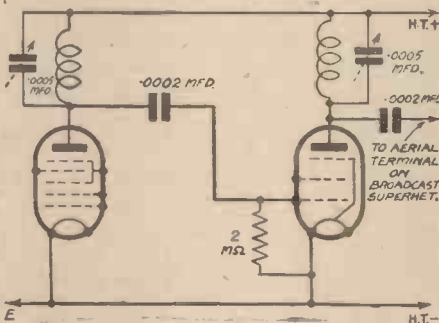


Fig. 4. This skeleton circuit shows how the arrangement shown in Fig. 2. can be modified so that the two-valve unit can be used as a converter in conjunction with a broadcast superhet receiver.

ordinary 500-metre signals and then again changed to the frequency of the I.F. stages (generally 110 or 150 kc/s). Although rather complicated, this system is ideal in that it provides a very high degree of selectivity without side-band cutting, and reduces all forms of interference to a minimum.

The circuit shown in Fig. 4 is really a "cross" between those shown in Figs. 2 and 3, but instead of using 465 kc/s I.F. transformers or H.F. chokes for intervalve coupling, a pair of single-tuned circuits are used, each of these consisting of a screened coil and a .0005-mfd. pre-set condenser adjusted to about 500 metres, or the highest wavelength provided by the medium-wave range of the broadcast set. Ordinary screened coils may be used, or the constructor may make his own by winding ninety turns of 36-gauge enamelled wire on a lin. former; each coil should, of course, be enclosed in a suitable screening can. An alternative method is to use two screened S.G.-type H.F. chokes, without pre-set condensers, but this is not so satisfactory because the I.F. circuit is then made aperiodic.

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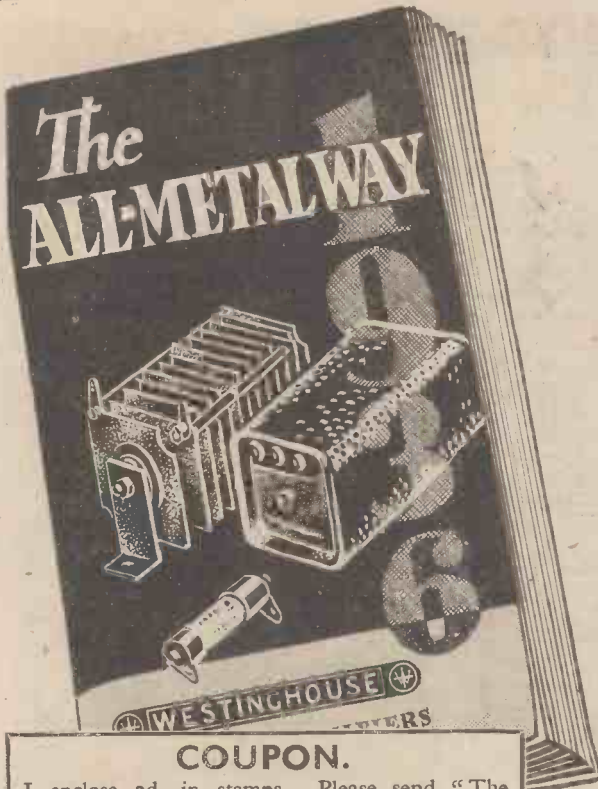
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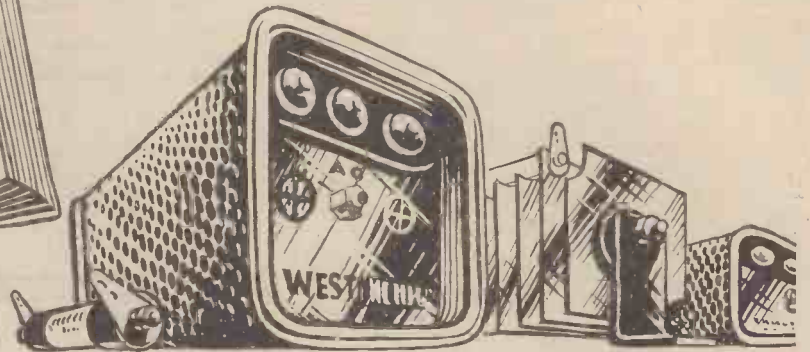
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## A PLEA FOR STANDARDISATION

FROM time to time one hears news of various industrial organisations and associations whose avowed intention it is to introduce a certain measure of standardisation to radio practice. Unfortunately very little is seen of the practical results of their deliberations. No one, of course, wishes to see standardisation applied to technical design, to circuits, for example, or to a limited range of valve types, for that would be a serious bar to progress. But there are various matters which would be all the better for a little co-operation among manufacturers in the matter of standardisation.

### Plugs and Sockets

Take plugs and sockets, for example. Specimens of most commercial receivers and components pass through my hands in the course of the year, and I am amazed by the variety of different plug and socket connections which are used. It is true that the makers thoughtfully include a set of aerial, earth, pick-up, and other plugs with their sets, but it seems to me that whenever I have a new set to test the plugs used in it are of different gauge from those which happen to be on my test leads. Thin tapered plugs, solid cylindrical plugs, split plugs of the ordinary "wander-plug" gauge, similar plugs in several larger sizes, banana plugs, plugs with two prongs, special two-pin plugs of several different gauges, all pass through my hands from time to time. Admittedly set manufacturers cannot be expected to change their habits for the sake of a few thousand service engineers. But, seriously, one would have thought that standardisation in this direction would bring about economies well worth the sacrifice of any advantage accruing from "exclusive" designs of connections.

### Small Components

Then there is the question of those small components—resistors, tubular condensers, and the like which it is now customary to group together on a small panel having an array of soldering tags arranged side by side. The usual distance between the soldering tags on these group boards is about 1½ inches, and this is a correct distance for most fixed resistances and many condensers. But making up a new set recently, I found that the various tubular condensers necessary range in length from 1½ in. to over 2½ in., with the result that the neatly arranged bank of small components I had planned is now a ragged and untidy line.

Another point which might well be taken in hand is the standardising of the sizes of holes in the fixing lugs of components. It may not be possible to standardise the distances apart, but it should surely not be necessary for constructors to maintain a stock of several sizes of bolts and screws as they must at present.

H. C.

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# LETTERS FROM READERS

The Editor does not necessarily agree with opinions expressed by his correspondents.



All letters must be accompanied by the name and address of the sender (not necessarily for publication).

## "Stand No. 9" Radiolympia

SIR,—In my rather hasty visit to "Stand No. 9," I am afraid I did not sufficiently thank your able and courteous colleague, who so kindly made clear to me the function of a heptode (pentagrid) valve in a heterodyne circuit.

His recommendation of the "BTS" triple-range coil unit and other improvements in my previous S.W. Autodyne layout are much appreciated.

I also take the opportunity to express my indebtedness to you, Sir, for your frequent help, your handbooks, and above all for your invaluable paper PRACTICAL WIRELESS—I have not yet become used to its extended title! —H. L. SULMAN (Croydon).

## Local S.W. Club Wanted

SIR,—I am interested in short-wave work and have a two-valve receiver. I shall be glad if you will tell me, through the medium of your paper, if there is a short-wave club near my district, as I should like to join one. I have been a regular reader since No. 1 issue.—W. L. MITCHELL (213, Wandsworth Road, London, S.W.8).

(Will the nearest club secretary please get in touch with Mr. Mitchell.—Ed.)

## Log of 40-metre Amateur Stations

SIR,—Having noticed in your excellent paper various logs of 40-metre amateur stations, I append my log of stations received on this band during the past month. My set is a two-valve (det.-L.F.). Hoping it may be of interest to other beginners like myself.

G5PT, G2QO, G6AU, G6GO, G2AV, G5AJ, G5KJ, G6LH, G5VD, G2NV, G5GL, G5LC, G6ZJ, G5UK, G5PK, G5ZK, G2KT, G2IL, G5OJ, G2WD, G5VS, G6DL, G5VL, G2IP, G5CY, G5OV, G5UI, G5ZA, G6WM, G5BK, G2NN, G2AO, G6QZ, G2OV, G2AX, G6KV, G2Q8, and AIKB (?) The following three Dutch stations have also been received: PAOST, PAOHR, PAOEO.—THOMAS RENNIE (Dundee).

## Schoolboy Designers

SIR,—You have of late been attacking "Schoolboy Designers." May I give my point of view. If a schoolboy studies the theory of radio carefully, and then designs a set on his theoretical knowledge, he will most likely be disappointed with his handwork when it comes to testing. But if he takes a good course of practical work he stands a good chance of coming out "on top," although his theoretical knowledge is next to nil.

I am only seventeen and have been interested in radio for four and a half years now. I have taken and read PRACTICAL WIRELESS since its first publication, and have gained most of my theoretical knowledge from it. My practical knowledge has been acquired, however, by trial and error only, and now I have a highly efficient receiving station on all bands—long, medium, short, and ultra-short. In addition, I have a long range of measuring instruments and auxiliary apparatus, and everything is home designed and built. By

the way, I use nothing but soldering in the way of making connections.

My main interests are in the short and ultra-short bands, and my short-waver is an "electron coupled" reaction detector (screen-grid reaction), pentode L.F. for 'phones, or further coupled to A.C. pentode for M.C. energised speaker. Mains unit is used for all H.T. on this set. The ultra-short set is a filament controlled super-regenerator.

A further portable short-waver consists of a Class B valve used as detector and L.F., which gives good 'phone signals. Not including amateur transmissions, all continents have been heard and nineteen countries (only eight Europeans) this year.—DONALD W. TOMLIN (Sheffield).

## Variable Directional Aerial System

SIR,—In order to avoid confusion I wish to draw attention to the fact that my recently fully-patented invention, The Variable Directional Aerial System mentioned in "Thermion's" page some weeks ago, is not in any way connected with the product of Central Equipment, Ltd., under the name Shorlon, as advertised in August 17th issue of PRACTICAL AND AMATEUR WIRELESS. I trust the publication of this letter will make the matter clear.—A. W. MANN (Middlesbrough).

## Another Short-wave Log

SIR,—Noticing the interesting amateur short-wave reports in the last few issues of PRACTICAL AND AMATEUR WIRELESS, I thought it would be interesting to other readers to have a similar report from this district. I therefore enclose a list of 40-metre and 20-metre stations received during the past three months, on the speaker, with a battery untuned H.F. pentode, triode det., L.F., and pentode output set, with a 34ft. aerial.

Forty-metre stations.—G6HJ, G2AV, G5VD, G5NX, G6US, G2AO, G5OV, G6JW, G6SR, G2IP, G5MU, G6KZ, G6CN, G5VO, G6PL, G6VD, G5ML (terrific strength), G5BK, G6XQ, G5PW, G2WD, G6YU, G2QH, G2OO, G2LU, G5CY, G5GL, G6RN, G2DK, G5ZJ, G5LC, G5KG, G2PX, G2FC, G2XC, G2IL, ON4WS, F8QX, F3AL, F3CP, F8GP, F8TF, PAODK, PAOWJ.

Twenty-metre stations.—W2AMV, W2CMJ, W2HFS, W2CQV, W1CJV, W3BHS, W1AKV, W1AJZ, W4CRE, W2DVU, W4UM, W8GLY, W4AXZ, W1AWL, W4ALZ, W1MZ, W1AK, W2CQV, W1CJV, VP6YV, CO6OM, HI7G, CT1CY, LA1G, EA7BA, F8DR.—C. T. FAIRCHILD (Brighton).

## Logged on the 20-metre Amateur Band

SIR,—I enclose herewith a log of 20-metre amateur stations received on 'phones since June 1st, 1935, the average times of listening being from 11 p.m. to 1 a.m. My receiver is an O-v-2 utilising a reactor valve to prevent spillover on DX stations.

CT1DA, CO6OM, VE2EE, W1GPE, W3MD, W8GLY, W1AUC, W1AJZ, W1ET, W3AIR, W8CPE, W1ZD, W1AGW, W5BMM, W1AF, W2BTV, W1FVO, W3CQM, W1CJV, W2AMD, W2CMJ,

W3BSH, W1SZ, W2HFS, W3AXT, W2GVN, W1KK, W2ADJ, W3PC, W3DLL, W2DUU, W2EZC, W2GG, W3BPH, HP1A, W8DLL, W3APA, W3FEU, W8IGT, W2EEN, W8HFU, W3VX, W3BIN, G6JQ, G5ML, LA1G, G5JU, G5SA, G6VF, F8DI, W1CHG, W1GED.—W. F. JENKINS (Canterbury).

## From a South African Reader

DEAR THERMION,—I thoroughly enjoy your articles, and oft times would like to don the gloves and enter into the arena, but owing to distance there would be delay in getting the stuff through in time for publication. You certainly have my fullest appreciation in your efforts to limit these jazz maniacs. Dance music is always appreciated, but the Boo-boo and Klickety-klack type is little better, if not worse, than the howls from my neighbour's oscillations on his foreign masterpiece.

Referring to the Editor's request for views on Mr. Crouch's suggested circuit in the June 15th issue. South Africa being a young country with probably only large towns available for mains supply, would it not be more advisable to employ a circuit principally battery driven, with six valves, and in the event of all mains use a seventh valve as a rectifier. The other features are just what is required, and my reason for this is that the consumption of battery power must be taken into consideration, especially when their enormous cost must be considered. "YDNAS" (Vilapery, British East Africa).

## RADIO CLUBS AND SOCIETIES

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

### GOLDERS GREEN AND HENDON RADIO SCIENTIFIC SOCIETY

IN answer to a large number of requests this Society has arranged to hold an extra 5-metre field day on September 15th, at 10.0 a.m. A hearty welcome is extended to all readers of PRACTICAL AND AMATEUR WIRELESS, who will receive full particulars from the Hon. Sec. if a stamped addressed envelope is enclosed. There are no charges.—H. Ashley Scarlett, 8, Denehurst Gardens, Hendon, N.W.4.

## CATALOGUES RECEIVED

To save readers trouble, we undertake to send on catalogues of any of our advertisers. Merely state, on a postcard, the names of the firms from whom you require catalogues, and address it to "Catalogue," PRACTICAL AND AMATEUR WIRELESS, Gee, Neufuss, Ltd., 8-11, Southampton St., Strand, London, W.C.2. Where advertisers make a charge, or require postage, this should be enclosed with applications for catalogues. No other correspondence whatsoever should be enclosed.

### WIRELESS DISCUSSION GROUPS

A NEW pamphlet, recently issued by the B.B.C., entitled "Wireless Discussion Groups—What They Are and How To Run Them," contains a valuable essay by J. H. Nicholson, Principal of University College, Hull, on "Group Listening and Discussion." In addition much helpful advice is given on how to run a listening group. The pamphlet also contains a list of B.B.C. education officers and secretaries of area councils with whom intending organisers should get in touch.

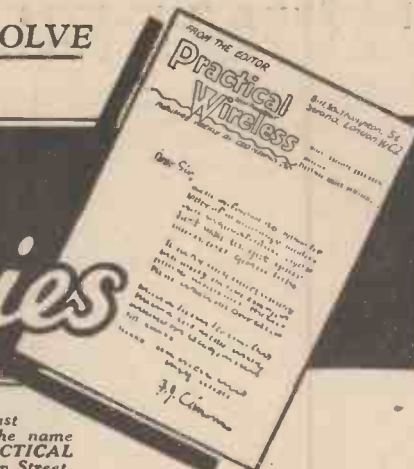
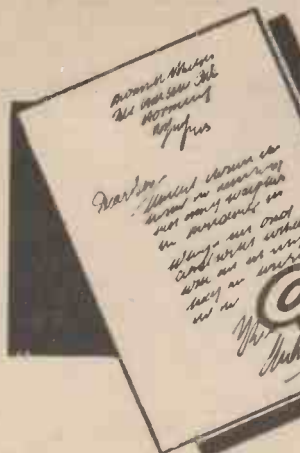
According to the B.B.C., if broadcasting has not to become an influence in standardising opinion, an imminent danger to be avoided, then critical radio listening must be encouraged. Since the listener has no immediate means of reply, the only method yet devised of encouraging critical listening is to help listeners to meet together in groups to hear talks and give them their combined critical attention.

A series of broadcast talks on controversial subjects have been arranged in such a form that they may easily become the basis of discussion in circles of interested listeners. The pamphlet is obtainable free on application to B.B.C. Publications Department, Broadcasting House, London, W.1, and from any provincial B.B.C. Office.

LET OUR TECHNICAL STAFF SOLVE YOUR PROBLEMS

Queries and Enquiries

If a postal reply is desired, a stamped addressed envelope must be enclosed. Every query and drawing which is sent must bear the name and address of the sender. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2:



SPECIAL NOTE

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. Please note also, that queries must be limited to two per reader, and all sketches and drawings which are sent to us should bear the name and address of the sender.

Using Existing Coils

"I have in my possession one set of Colvern coils, Type F1, F2, and F3. Can these coils be taken out of bandpass and used in a two H.F. circuit similar to the Fury Four Super (battery operated)?"—J. K. (Dublin),

ALTHOUGH the coils are not intended for the circuit you mention, a similar arrangement could be used. The following modifications should be made in the coil connections. The aerial should be joined, through a small pre-set condenser, to terminal 1 on coil F1 (and not to terminal 7, as at present). Terminals 6 on each of coils F1 and F2 should be joined to earth, and terminals 5 on these two coils should now be ignored. All other connections remain as at present.

Address Wanted

"I would be grateful if you could supply me with the full address of Caradio Services, some of whose components are recommended for your 1934 Crystal Set."—A. E. (Portmadoc).

MESSRS. CARADIO SERVICES, LTD., may be found at 28, Stockwell Road, London, S.W.9, and at 59, St. Oswald's Street, Old Swan, Liverpool, 13.

A Faulty Component

"I enclose a diagram which I would like you to examine. I have built the set with the components supplied, but can't get a sound so far. I am not very clear about the connection from the H.F. choke, which is marked with an arrow. Is this to be connected to H.T.1? I do not know the makers' address, or I should have written to them."—J. D. (Glasgow).

THE circuit is quite in order and should function if all components are in working order. Failure to obtain any

signals at all indicates that a valve or one of the components is defective—presuming, of course, that the wiring is correctly carried out and there are no short circuits. Examine the screening cans and make certain they are not touching the wires to the coil terminals. The lead from the choke, which is shown as an arrow, is intended to represent a battery lead, and this should be plugged into the H.T. battery at about the 100-volt point. This point is H.T.2, and you will see that H.T.3 is joined to the L.F. transformer. The lead from the L.S. terminal is H.T.4, and there will thus be four plugs in the H.T. battery.

Converter or Adapter

"I have the Fury Four Super and wish to receive short-wave stations. Must I use a short-wave converter with this receiver, or will the adapter do?"—G. T. (Barnet).

WE do not know the reason for your query—there may be a wish on your part to avoid the extra consumption, or you may not wish to have the extra tuning adjustments. In such cases, of course, an adapter could be used, and this would be plugged into the detector stage, thus cutting out the two H.F. valves. To avoid the L.T. drain these valves could be removed from their holders. All tuning would then be carried out on the adapter. As there are two efficient H.F. stages, however, a converter would give much better results than the adapter, and is to be preferred with this particular set.

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By F. J. CAMM

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Resistance Temperature

"I have a mains set and have noticed recently that one of the resistances gets very hot. The performance of late has fallen off, and I wonder whether the temperature of the resistance has indicated that there is a fault there. Does the resistance vary as it gets hotter? If so, in what direction does the variation take place?"—L. P. (Teddington).

THE heat of the resistance, if it is such that you can only just touch it, indicates a fault. No manufacturer inserts a resistance which would have such a small margin, and at the most a resistance

should only just be warm to the touch. In general, the composition type of resistance decreases in value as it gets hotter, and thus the applied voltage to the valve or other component fed by the resistance increases. This will result in damage to the component or valve if the rise is above the safe value. In most cases, however, the decrease in temperature is only small, and the indication in your case is more likely to be that the component or valve is faulty and is passing a higher current than normal, thus heating the resistance, and you should examine that part of the circuit rather than the resistance. If the latter is a decoupling component, there is every likelihood of the by-pass condenser having broken down and thus producing a short-circuit across the H.T. supply.

American Valve Type

"I have just obtained an American valve which appears to be Type 42. Can you give me any details concerning the kind of valve this is and its use, please?"—G. N. (Broxbourne).

THE valve in question is a Pentode of the indirectly-heated A.C. type. The heater is rated at 6.3 volts and the anode voltage is given as 275 max. Grid-bias is 16.5 volts and the normal anode current is 34 ma. The undistorted output is 3 watts.

Mutual Conductance

"I have noticed the term 'mutual conductance' on valve data; and also the term 'slope.' Both of these are given as a figure followed by ma/V. They appear to be the same, and I should like to know exactly what they mean and their importance in valve data."—G. H. (Douglas, I.O.M.).

THE two terms are the same, and the figure represents the change of anode current for each volt applied to the grid, the anode voltage remaining constant. Thus, if a valve is described as having a slope (or mutual conductance) of 5 ma/V, this may be expressed as 5 milliamps per volt, and means that for every volt applied to the grid the anode current will vary 5 milliamps. From this you will see that it gives the slope, or, in other words, delineates the well-known characteristic curves, of a valve, and thus enables one to select a valve for a particular purpose—i.e., rectification, signal-handling capacity, etc. An article on this subject appears in this issue on page 704.

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

**Miscellaneous Advertisements**

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. Unless otherwise stated, all items are clearance, second-hand, or surplus lines, and radio components advertised at below list price do not carry manufacturers' guarantee. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," 8, Southampton Street, Strand, London.

**PREMIER SUPPLY STORES**

**A** NNOUNCE a City Branch at 165 and 165a, Fleet Street, E.C.4 (next door to Anderson's Hotel), for the convenience of callers; post orders and callers to High Street, Clapham.

**O** FFER the following Manufacturers' Unused Surplus goods at a Fraction of the Original Cost: all goods guaranteed perfect; carriage paid over 5/-, under 5/- postage 6d. extra; L.F.S. and abroad, carriage extra; orders under 5/- cannot be sent C.O.D.; please send 1/4d. stamp for large new illustrated catalogue, also August bargain supplement.

**S** PECIAL Bargains for callers at our Clapham Branch where Summer Sale is now taking place.

**W** ORLD Famous Continental Valve Manufacturer; mains types, 4/6 each, H.L., L., power; high and low magnification, screen grid; variable Mu screen grid; 3, 3, and 4 watt A.C. output, directly heated pentodes; V.H.P., D.D.T. Diode Tetrodes, 250 volt 60 m.a. full wave rectifiers; A.C., D.C. types, 20 volts, 0.18 amp. filaments; screen grid; variable Mu screen grid; H., H.L., power and pentodes.

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**2-VOLT H.F., L.F., 2/3**; power, low consumption power, super power, 2/9; screened grid, variable mu screened grid, 3- or 4-pin pentodes.

**T** HE following American Types, 4/6; 250, 210, 245, 47, 48, 24, 35, 51, 57, 58, 55, 37, 80, 6A7, 2A7, 27, 77, 2A5, 281. All other types, 0/6.

**T.H. Moving Coil Speakers**, matched pairs, 8in. 1,500 ohms, 7,500 ohms (1,500 speaker as choke 7,500 speaker in parallel with H.T. supply), with output transformer for pentode, 15/6 per pair; A.C. kit for pair, 12/6.

**M.C. Multi-ratio output transformers**, 2/6; 2-1 or 1-1 output transformers, 2/6; microphone transformers, 50 and 100-1, 2/6; 3 henry chokes, 2/6; 100 henry chokes, 2/6.

**L** ARGE Selection of Pedestal, table and radiogram cabinets at a fraction of original cost.

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**E** LIMINATOR kits, condensers, resistances and diagrams, 120v. 20 m.a. 20/-; Trickle charger, 8/- extra, 150v. 30 m.a. with 4v. 2-4 amp; C.T., L.T., 25/-; trickle charger, 6/6 extra; 250v. 60-milliamps, with 4v. 3-5 amps., C.T., L.T., 30/-; 300v. 60 m.a. with 4 volts 3-5 amps., 37/6; 200v. 50 m.a., with 4v. 3-5 amps. L.T., 27/6.

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**T** HE following Lines 6d. Each or 5/- per dozen: 4- or 5-pin baseboard or 4, 5-, 6-, or 7-pin chassis mounting valve holders, American valve holders, 1 watt resistances, wire end, every value; tubular wire end condensers, 1,500 volt, every value up to

(Continued at top of column three)

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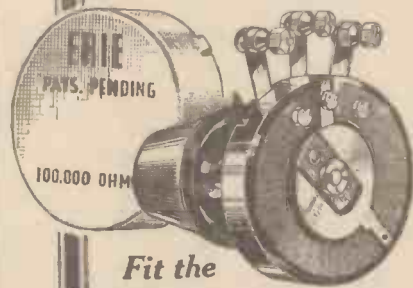
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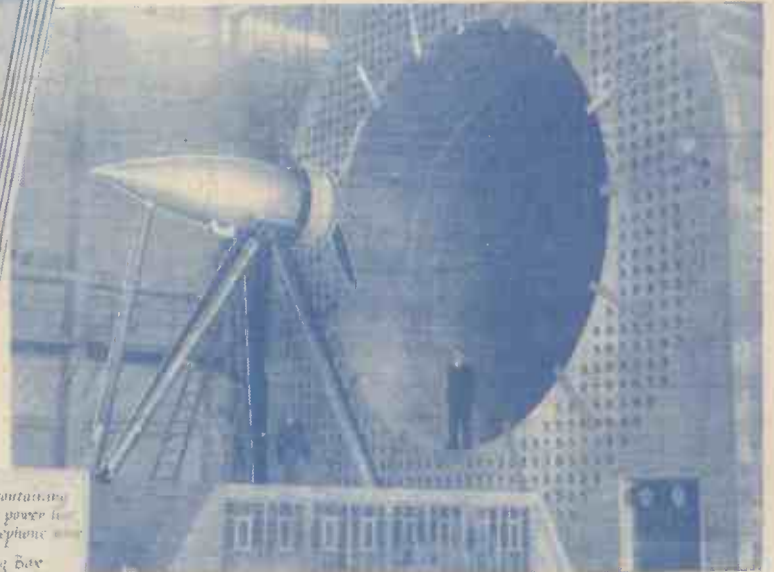
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**PRACTICAL AND AMATEUR WIRELESS**, 31/8/35.

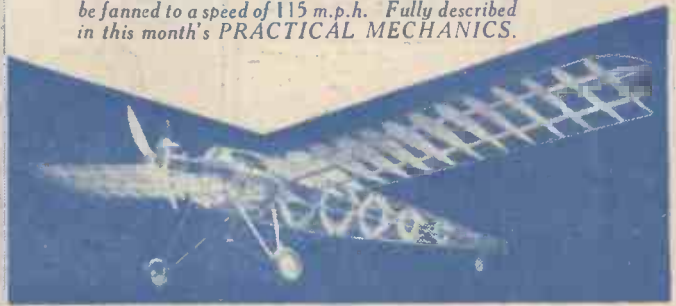
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In the . . .

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