

An Experiment of U.S.W. Receiver.

Practical and Amateur Wireless, March 18th, 1939.

# AN EXPERIMENTAL U.S.W. RECEIVER— See Page 5

# Practical and Amateur Wireless

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Edited by F.J. CAMM

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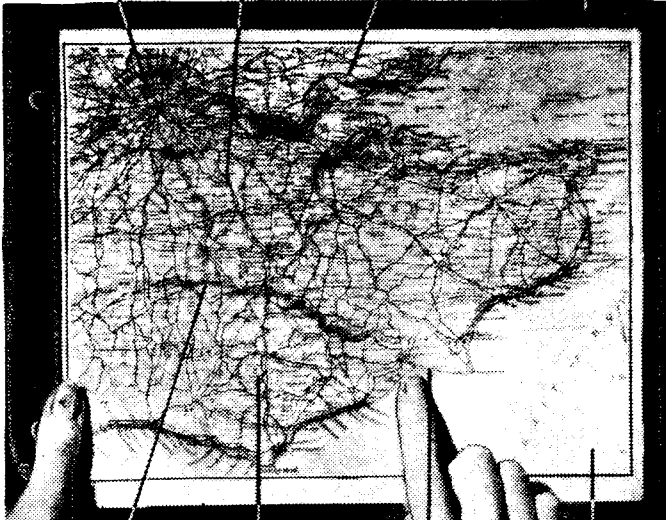
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# THOSE PUZZLING PENTODES— See Page 4



## Practical

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## Wireless



*Edited by F. J. CAMM*

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

Vol. XIV. No. 339. March 18th, 1939.

## ROUND *the* WORLD *of* WIRELESS

### A Low-price All-waver

WE have been repeatedly requested to design an all-wave set which would be not only efficient but cheap to build. It is generally found that cutting down initial cost results in a reduction in the standard of performance, but there are occasions when economy may be effected without introducing this drawback. In the 50s. All-wave Three, which is described on page 12 of this issue, we have managed to retain a high standard and yet reduce the cost of components to under £2 10s. This has been done, as will be seen, not by omitting components or making false economies, but by using certain types of component which are low in price and still efficient in performance. It has been our general practice, for instance, to specify resistors of the 1-watt type in our receivers, because these offer certain margins of safety which are often needed. In many parts of a simple battery receiver, however, the wattage rating is not greater than 1/2 watt and resistors of this type are now available at only 3d. each. Accordingly we have specified these, and in similar directions have cut down the cost. As we have already pointed out, however, the results obtained from this receiver are fully up to the standard set by PRACTICAL AND AMATEUR WIRELESS receivers, and the set may be built with confidence.

### Australian U.S.W. Transmissions

IT is announced that the Postmaster-General's departments in Victoria and Tasmania are shortly to introduce telephony transmissions on 7.5 metres. This is the result of extensive experiments which have been carried out recently to endeavour to arrive at a satisfactory and reliable system of communication between Tasmania and the mainland.

### Obituary

WE regret to announce the death of the founder of the well-known firm of Hellesens and inventor of the Hellesens dry cell—Consul-General Valdemar Ludvigsen. He was 77 years of age, and perfected the special dry cell as far back as 1892.

### Film Tax

AT the present time the B.B.C. pays 5d. per foot import duty on all film-recorded programmes—a number of which

are now incorporated in present-day programmes. This is equivalent to the duty on imported talkie films used for public exhibition in this country, and the B.B.C. are making representations with a view to obtaining a reduction in this tax.

### Variety Entente

COINCIDING with the visit to London of Monsieur Lebrun, on Monday next, the B.B.C. plans to broadcast to British listeners an all-French Star Cabaret—to be produced in all probability in the French

### International Rugby Football

THE match on Saturday between Scotland and England at Murrayfield, in the Calcutta Cup Rugby contest, will be described for National listeners by H. B. T. Wakelam. Scotland not only won at Twickenham last season, which was their first victory there since 1926, but they also triumphed over Wales and Ireland. As both Scotland and England are equal in the series of matches played, with twenty-five wins each, this should also add to the enthusiasm and excitement of the occasion.

### New Norwegian Call-sign

A NEW call-sign has been allotted to amateur transmitters in Norway, and this is for portable transmitters—as distinct from fixed stations. The existing call is LA, and now portable apparatus will be distinguished by the letters LB. Make a note in your log-book.

### Sir Thomas Beecham

SIR THOMAS will pay his first visit to the Manchester Studio on March 24th, when he will conduct the B.B.C. Northern Orchestra, led by Alfred Barker.

### Last Hallé Concert This Season

THE Hallé Pension Fund concert, which marks the last Hallé concert of the season, will take place on March 25th, at the Free Trade Hall, Manchester, and Sir Thomas Beecham will also conduct this. The first part of the concert will be broadcast in the Northern programme.

### Australian Economy Valves

CONSIDERABLE interest has been aroused in Australia by the introduction of special 1.4 volt valves and components designed for use with them. Midgest loudspeakers of high sensitivity, special dry cells for the filament circuit, and special small H.T. batteries are stated to have revolutionised the design of portables in that country.

### Film Guide

BUCKLEY HARGREAVES will again be the B.B.C. film critic next quarter. As a guide to everything that is going on in the world of celluloid he has proved highly popular with listeners, who should be careful to note that from April 10th onwards his talks will take place on Mondays, instead of on Sundays as previously.

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capital. Archie Campbell recently paid a flying visit to France to make the necessary preliminary arrangements for the programme.

### Busy Day for O.B. Squad

ON March 22nd the Northern Outside Broadcast Department will be kept busy giving a commentary on the Lincolnshire Handicap in the afternoon; a relay from the Savoy Theatre at Scunthorpe in the evening; the final edition of "Northern Notions," also relayed in the evening, together with a relay from the New Hippodrome, Manchester.

# ROUND the WORLD of WIRELESS (Continued)

## The New High-power Radio Paris

THE new 450-kW transmitter, which is testing on 1,648 metres, is not expected to take over its regular broadcast services until May, when the wavelength will probably be altered to 1,639 metres.

## Marconi Station for Finland

WE understand that Marconi's Wireless Telegraph Company has secured the contract from Finland for the supply and erection of a 50-kW short-wave broad-

## INTERESTING and TOPICAL NEWS and NOTES

of radio versus old-stagers of radio. Personalities are headed by Eric Maschwitz and include, in addition, Howard Marshall, George Allison, H. B. T. Wakelam, and Mr. Middleton. Opposed to them will be Mary O'Farrell, Philip Wade, Carleton

## Radiolympia, 1939

THE dates of this year's Radiolympia Exhibition have now been fixed. The show will be held at Olympia from Wednesday, August 23rd, until Saturday, September 2nd, inclusive.

## "Cabarette"

"CABARETTE" on March 16th will include White and Woodman, in "original songs at the piano," and Ruby Taylor and Frances Keyte, "four hands and two pianos." The programme will be presented by Leslie Bridgmont.

## "Stagshaw Searchlight"

WITH the broadcast to be given in the Northern and Stagshaw programmes on March 15th, "Stagshaw Searchlight," the North-East's popular news-magazine, will reach its twenty-first birthday. The "Searchlight" first shone when the Stagshaw transmitter (in Northumberland, and serving Northumberland, Durham, North Yorkshire, and parts of Westmorland and Cumberland) was opened in the autumn of 1937, and it "spots" interesting people and odd happenings in the area covered by the transmitter.

## Sport in the Midlands

IN the weekly survey of Midland sport on March 18th, E. A. Eden will give an eye-witness account of the First League match between Aston Villa and Stoke City; there will be reports of Notts County v. Mansfield Town and Northampton Town v. Walsall; and Dick Wheildon, the Moseley Club professional and member of the Selection Committee for Ryder Cup teams, will give a talk on Midland golf.



The Mills Brothers, who are internationally known on screen, air, and records, photographed on the liner "Aquitania" during their voyage to Europe. The "Aquitania" docked at Southampton recently.

casting station to be installed at Pori, near the Gulf of Bothnia. The station is to be completed in time for the Olympic Games which will be held in Finland in 1940.

## The World's Listeners

THE International Broadcasting Union has compiled an interesting list of the wireless licence figures of the principal countries of the world on December 31st last. The following is an extract:

Germany (including Austria)	11,503,019
Great Britain .. .. .	8,908,900
France .. .. .	4,705,859
Japan (September) .. .. .	3,850,044
Poland .. .. .	1,016,473
Czecho-Slovakia .. .. .	771,647
Denmark .. .. .	762,711
Switzerland .. .. .	548,533
Norway .. .. .	364,548
Finland .. .. .	293,790
Turkey .. .. .	46,244

## Noises and Voices, No. 2

FIRST experiment of Neil Munro to test listeners' knowledge of typical broadcast noises and voices proved highly successful. He has set a stiffer exam. for March 19th, but the pupils in the studio should have no difficulty in finding the answers. The teams consist of personalities

Hobbs, Laidman Browne, and Norman Shelley. F. H. Grisewood will be Master of Sound. This broadcast will be given in the Regional programme.

## "Getting a House"

MORE about the business of house-hunting and the planning of new homes may be heard by Northern listeners when March 21st brings the second of the three conversations about "Getting a House." The programme will consist of a conversation between amateurs and experts. F. Leslie Halliday, an architect, has arranged it.

## "Unborn To-morrow"

J. A. PEMBERTON'S fantasy "Unborn To-morrow," which was broadcast in the Midland programme last May, is being revived on March 15th, when Regional as well as Midland listeners will hear it. The scene is a pleasant wood on a hot summer's day. There, in a dream, the middle-aged man is haunted by the ambitions he had formed for himself at various times of his life, when he had wished to be a tram conductor, an engine-driver, an author, an industrial magnate, and Prime Minister. The producer is Anthony McDonald.

# SOLVE THIS!

## PROBLEM No. 339

Kennedy had a three-valve short-wave set in which 4-pin valves were used in the aerial and detector stages. The circuit was the H.F., Detector and Power combination. In the anode circuit of the H.F. valve he had a standard short-wave choke connected to the high-potential end of the grid winding, using the other winding on the 4-pin coil for reaction in the usual way. He decided that selectivity would be improved if he used a 6-pin coil so as to obtain a transformer effect, and accordingly changed the coil-holders in both positions and wired the aerial and earth to the additional winding of the first coil, and connected the primary of the second coil between anode and earth, retaining the usual connections for grid and reaction windings. When switched on, however, he failed to obtain signals. Why was this? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 339 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, March 20th, 1939.

## Solution to Problem No. 338

It was obvious from the tests that the trouble was in Jason's loudspeaker, and the actual fault was a partial short-circuit in the windings of the speaker transformer. The following three readers successfully solved Problem No. 337 and books have accordingly been forwarded to them: J. H. Prior, 4, St. Petroc Villas, Saltash, Cornwall. Chic Loan, 190, Strone Road, Forest Gate, E.7. J. Wright, 22, Carrington Avenue, Hounslow, Middlesex.

# A Remote-control Push-button Tuner

How to Build a Push-button Unit to Control a Receiver from any Part of the House - - By W. J. Delaney

SINCE the introduction of push-button mechanisms on the English market, we have published several articles on the method of using them in existing receivers. In our issue, dated October 1st, 1938, we described a method of making up a remote-control tuner incorporating this method of tuning, and a number of readers have asked for constructional details of a tuner built on these lines. The main difficulty which they seem to meet is in the best method of obtaining the voltage supply sources. It should therefore be emphasised that to obtain maximum benefit from this form of remote control it is essential to adopt mains supplies. When these are available it enables one to build a tuner which is not only compact but which may be moved from one part of the house to another—in fact, wherever there is an extension listening point.

It has already been explained that the remote-control tuner operates as a superhet converter, tuning all signals to a given frequency at which they are passed into an existing receiver. This means that a triode-hexode, triode-pentode, or a simple heptode must be used, and that the aerial must always be joined to the remote control unit. Queries have been raised regarding the effect of a long lead from the tuner to the receiver. Tests which we have carried out show that this lead does not make a great deal of difference. At least, when made longer than 20ft., there was a dropping off in volume, but tuning was entirely unaffected. The loss of volume was easily compensated for by a suitable adjustment of the volume control, setting that on the receiver to a maximum position, and thereafter controlling volume by means of the control on the remote unit.

### General Design

The circuit originally specified is repeated in Fig. 1, but any type of frequency-changer, as already mentioned, may be employed. To overcome the difficulty of housing a mains transformer a good scheme is to use one of the American valves, for which a line-cord may easily be obtained in this country, and then, by means of a simple half-wave rectifier following standard American practice, the unit may be made very much smaller. The circuit called for in this case is shown in Fig. 2. The unit is preferably built, in the interests of compactness, round the Bulgin type of push-button unit,

which is available in various types and with various coloured buttons. These push-button units are obtainable in 6-way or 8-way assemblies and with 3-pt. on/off or 3-pt. plus 3-pt. on/off. The exact type to use will depend upon the type of circuit which is employed—that is, whether only two tuned circuits are incorporated or whether band-pass or a signal H.F. stage is included to introduce an additional tuned circuit. In any case the units cost 8s. 6d. each for the 6-way and 10s. 6d. each for the 8-way. Pre-sets of reliable make should be used for the tuning, and

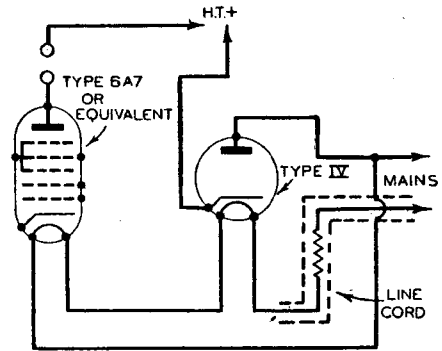


Fig 2.—How to wire the heater circuit.

to note whether or not interference is experienced at any particular setting. If so, then the tuning of the broadcast receiver should be modified until a setting is found at which all signals required on the push-button unit are received clear of interference. A very careful note should then be kept of the receiver dial setting, as in future, when the unit is to be used the dial must be set to that indication. There are

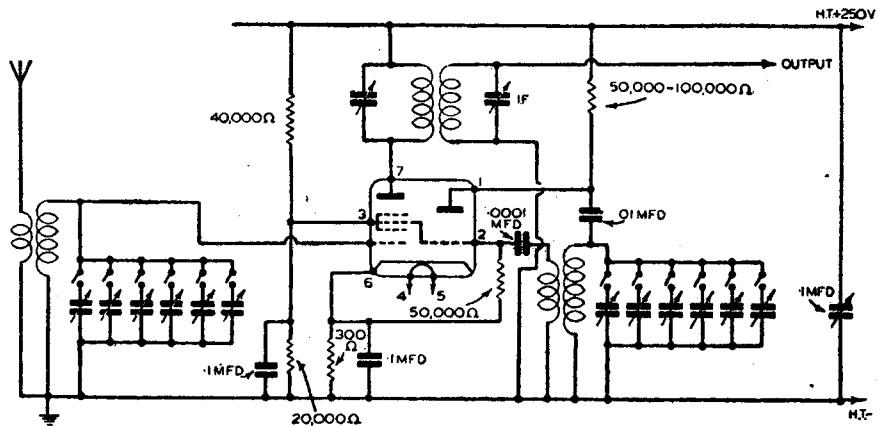


Fig. 1.—General arrangement of the circuit for a push-button tuner unit.

some care is necessary to select those which have a maximum capacity very nearly equal to that which is needed for the various stations. That is to say, for tuning the London National a lower maximum component should be used than that for tuning the North Regional. This will help to ensure that the condensers will not vary due to vibration—a point which is likely to be experienced if the condenser has to be left nearly unscrewed. The wiring and lay-out of the tuner unit should follow standard design, arranging the aerial and oscillator coils (if those of the unscreened type are used) in such a manner that interaction cannot take place. Preferably they should be mounted on each side of a metal panel on the lines adopted in the tuner for the Push-Button 4 receivers. The trimmers should be mounted right up to the individual coils and wiring kept neat and short.

two important precautions which must be observed when using this type of unit. Firstly, the lead from the unit to the receiver must be screened to avoid direct pick-up—especially where the lead is taken into another part of the house. Secondly, the aerial lead, which also will have to be taken to the remote-control unit wherever this is situated, must also be screened. In both cases the screening must be complete or interaction will upset tuning and completely ruin the performance. This means that a pair of screened leads will have to be taken to all distant listening points, or extension speaker points, and the mistake should not be made of running them together. Although screened, there is always the possibility of H.F. getting back to the set through the output circuit wiring, or of leakage of signals taking place through the earth circuit, and therefore it is desirable to take the additional wiring via another route, although for convenience it may be terminated near the extension terminals or sockets.

### Connecting the Unit

In use the tuner is joined direct to the aerial terminal of the receiver—which may be of any type, provided that it has at least one H.F. stage. It will work equally well with a straight receiver as with a superhet. Transfer the aerial and earth leads to the tuner unit and adjust the controls on the receiver to a point near the top of the long-wave band. Now adjust the condensers on the push-button unit until the desired stations are properly received, taking care

If you are interested in experimenting with this particular type of tuner you can modify the I.F. transformer, by ignoring the secondary winding and using in its place a smaller winding, either overwound on the primary or inserted between the primary and secondary windings. The exact method will depend upon the type of component which is being used, and the number of turns will best be found by experiment.

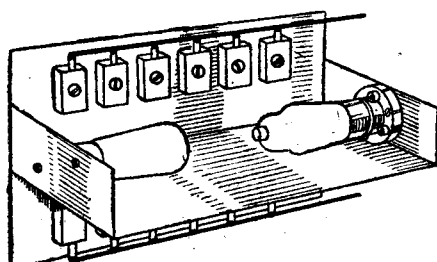


Fig. 3.—Suggested layout of components for the remote tuner.

# THOSE PUZZLING PENTODES

Although the Pentode Valve is no longer a Novelty, there are Many Constructors who Still Experience Difficulty in Understanding the Design, Operation, Application and Connections of the Many Types Now Available - - By L. O. SPARKS

IT is not surprising that the beginner gets confused and rather desperate when he reads or hears about different types of circuits embodying one or more of the following valves: Screen-grids, H.F. pentodes ("straight" or "variable- $\mu$ "), L.F. pentodes, tetrodes and/or double-diode pentodes.

His difficulties are not reduced when, searching for enlightenment, he studies and compares circuits, diagrams and, much to his amazement, finds circuits which are, apparently, identical in all respects except that one uses a screen-grid in the H.F. stage, and an L.F. pentode in the output, while the other specifies an H.F. pentode and a tetrode. No wonder that the Query Service Department has to answer many despairing cries of "Which shall I use?" Even when this help has been rendered, it does not mean that everything is plain sailing for the user, as there is always the question of using a suitable valveholder and knowing the correct connections. As the holders vary from those with four sockets to those of the latest octal type having eight, and as some valve manufacturers print the diagram of connections when the holder is viewed from underneath, and others adopt the opposite method, it is obvious that some little thought must be given to the matter. This article is intended to help towards a better understanding of the valves concerned.

## The Screen-grid

This, as indicated in Fig. 1, has four electrodes, namely, filament (or cathode in the case of mains types), control grid, a screening-grid and, lastly, an anode, and,

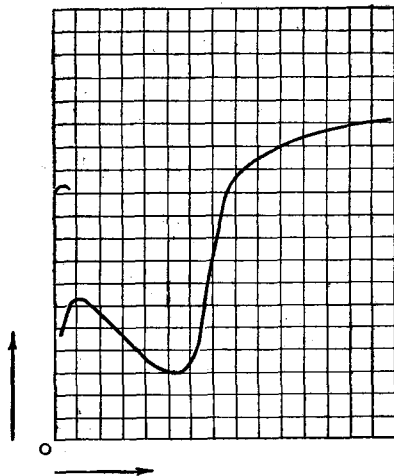


Fig. 2.—Characteristic anode curve of the S.G. valve.

therefore, comes within the tetrode range of valves.

In construction, it is nothing more than a triode valve with an additional screen or grid of fine mesh inserted between the control grid and the anode. This, of course, necessitates another connection, so it has now become common to provide a terminal at the top of the bulb of the valve for the anode.

The object of the screen is to help reduce the inter-electrode capacity of the valve and minimise the possibility of instability due to that effect. Without going into technical matters too deeply, the following might help to make the function of an S.G. valve more clear. If a milliammeter is placed in the anode circuit and, with the screen connected to a positive source of

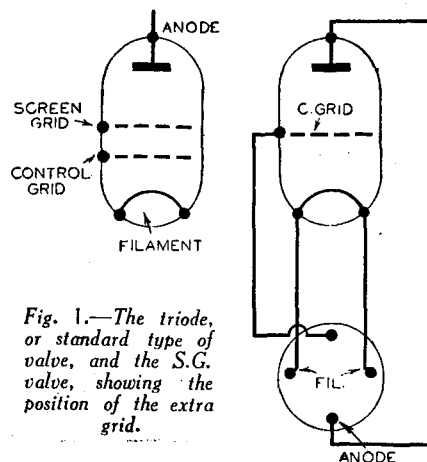


Fig. 1.—The triode, or standard type of valve, and the S.G. valve, showing the position of the extra grid.

high tension, it will be found that as the anode voltage is slowly increased the current value will also increase until suddenly it will fall rapidly, giving what is known technically as the "characteristic negative resistance dip of the tetrode." After the fall, the current will start to rise again as the anode voltage is still further increased until it reaches another point where it remains reasonably constant. The whole procedure is shown by the curve, Fig. 2. The reason for the peculiar behaviour of the anode current is interesting, and should be fully understood, as it is so closely related to all tetrodes and pentodes.

When the anode H.T. voltage is slowly increased from zero, the electrons emitted by the filament or cathode are drawn through the screen to the anode and constitute the anode current. There comes a value of the anode H.T., however, when the electrons are attracted to the anode at such a speed that, in non-technical language, a certain number of them bounce off and fly back to the screen. If by some phenomenon more electrons bounce off than those actually arriving at the anode, the resultant effect will be a fall in anode current, but, by increasing the H.T. still further the available electrons are given more inducement to go to the anode and a slight increase in current is obtained.

When the anode voltage is well above that of the screening grid, an exceptionally high impedance is obtained and, if the other circuit conditions are suitable, a very high amplification factor will be secured. This, combined with the increase in stability due to the reduction of the inter-electrode capacity of the valve, by virtue of the screening-grid forming an electrostatic shield between anode and control grid, allows a much higher efficiency to be

obtained than with an ordinary three electrode valve.

For future reference, it should be remembered that the bouncing off electrons mentioned above form what is known in the text books as "secondary emission."

Because mention has been made that the screen-grid valve is a tetrode, it must not be thought that it is suitable for use in the output of a receiver which specifies a tetrode. So far as the number of electrodes are concerned, both valves are identical, but, owing to the class of work they are called upon to perform being very different, the actual construction of the electrodes, i.e. the gauge of the mesh of the grid and screen, are modified to suit each particular case.

## The Pentode

If we take a tetrode and insert still another grid, only in this instance one of a coarse mesh, we have a pentode. This sounds very simple; actually, however, this additional grid which is placed between the screening-grid and the anode, Fig. 3, has to be most accurately located with respect to the anode, while the gauge of the mesh also has to receive serious consideration.

The name given to this fifth electrode is "suppressor-grid," and it is usual for it to be connected internally to the filament or cathode, although with the introduction of the multi-pin bases, it is now brought out to a separate pin in certain types.

What is the object of the suppressor-grid? Remembering what has been said about "secondary emission," it will be appreciated that if the bouncing off electrons from the anode could be stopped from getting to the screening-grid, the negative resistance dip of the tetrode or, in other words, the sudden fall in anode current, would be smoothed out if not completely removed.

That, then, is what the suppressor-grid is really intended to do. The mesh used for the grid is sufficiently coarse that it does not offer any resistance to the high-speed electrons from the filament, but it is sufficient to cause the bouncing off electrons

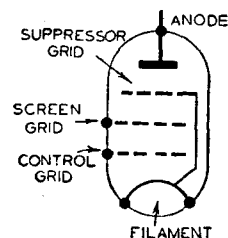


Fig. 3.—The pentode valve, showing how the extra grid—the suppressor—is added.

to think twice and decide to go back to the anode rather than through to the screening-grid.

This may sound rather confusing, but think it over with the diagram of the valve in front of you, and remember that the suppressor-grid is invariably connected to a low-potential part of the circuit, i.e. earth or cathode.

The original pentode was, of course, produced solely for low-frequency work, usually in the output stage.





## SHORT-WAVE SECTION

(Continued from previous page)

suitable H.F. choke is important. The writer used one of the well-known and efficient Eddystone type, which is of honey-comb construction, and entirely free from resonance peaks below and above the specified wavelengths.

### Component Layout

Fig. 2 shows the component layout and general baseboard construction. Eddy-stone condenser mounting brackets are used and Raymart tuning condensers. In order to mount the latter the fixing nuts will require to be reversed, as mentioned in a previous article, i.e., thinner nut to the back in order to obtain sufficient purchase on the condenser bush. Baseboard and panel sizes will be governed by the physical dimensions of the various components used, and it is advisable to keep them down to reasonable proportions, but to avoid cramping. The valve and coil holders respectively, should be placed as near as possible to the tuning condensers, in order that wiring may be kept as short and direct as possible, in the interests of efficiency.

### Coil Data

It is assumed that standard commercial coils will be used for wavelengths above 10 metres, but in Fig. 3 the general construction and winding data are given for the 10-metre coil of the valve-base type.

The original coil from which this data is taken tuned in the 10-metre band at 50 degrees on the tuning condenser scale.

Owing to circuit differences some little experiment may be necessary to strike this band, but the data given will ensure that the band will be found between 5 and 50 degrees or so.

To increase the number of turns on the grid coil will in most instances put the tuning in the minimum position above 10 metres. There are some who favour 5-metre coils wound on standard coil formers or valve bases, but the writer recommends the self-supporting type coil. This type can be made in a form which allows them to be used in conjunction with the standard 4-pin coil base.

Fig. 3 shows the method of construction.

This consists of a cut-down valve base with the centre drilled out between the pins, and saw cuts made as shown at Fig. 4, all of which reduce the high-frequency losses to a minimum, and increase the leakage paths.

With reference to the 5-metre band,

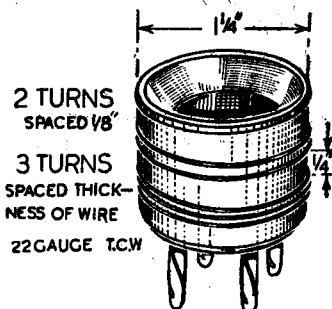


Fig. 3.—Details of construction of a 10-metre coil of the valve-base type.

and apart from circuit differences, it is difficult to locate this band with certainty during the initial tests, even though coils are made to given data, and used in conjunction with the recommended tuning capacity.

There is, however, a very helpful method which may be adopted in order to gain

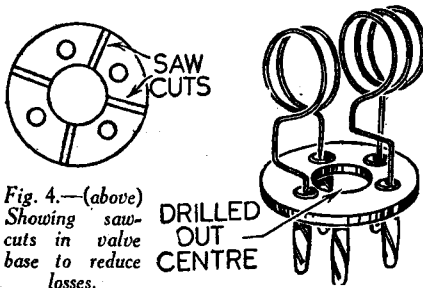


Fig. 4.—(above) Showing saw-cuts in valve base to reduce losses.

Fig. 5.—Details of twin self-supporting coils, and plug-in base.

an approximate idea where actual 5 metre transmissions are not receivable.

### Inductive Coupling

An 8ft. 3ins. length of 16-gauge copper wire is looped to one end and suspended so that the loop is inductively coupled to the grid coil. Thus, following the principle of the absorption meter, the receiver will cease to oscillate completely, or a considerable reduction in oscillation will be noticeable when it is tuned in resonance to the loop rod.

With reference to the self-supporting coils, as shown at Fig. 5, the experimenter is advised to make a series of twin coil combinations as complete units, with soldered connections to coils and base.

By this means various combinations can be tried, in conjunction with the loop rod, until the 5-metre band is located, and the calibration point noted for future reference.

### Coil Combinations

The following are suggested coil combinations:

Internal diameter  $\frac{3}{4}$  in., 18-gauge wire.

Two turns grid—three turns reaction.

Three turns grid—four turns reaction.

Four turns grid—five turns reaction.

Five turns grid—five turns reaction.

Six turns grid—six turns reaction.

Space twice the thickness of the wire.

A series of coils as outlined will cover the 5-metre, 7-metre, 10-metre and 11-metre bands.

There is an increasing number of stations operating on these bands, and in some cases relaying American main station programmes, and transmitting test transmissions. In addition, modulated carriers may at times be heard, although no call signs or announcements are made. All these are worth listening for, and suggest experimental transmitters which may eventually use 'phone or broadcast at some future date.

In addition, there are, of course, the amateur 'phone and C.W. on the 10-metre band, and in some locations amateur 5-metre 'phone is to be heard.

A receiver of the type described in this article, and built in experimental form, will assist the beginner, and others, to grasp the fundamental requirements of ultra-short-wave reception and construction at low cost.

## Leaves from a Short-wave Log

### Trujillo City Again Logged

BROADCASTS from HIZ, Ciudad Trujillo (Dominican Republic), on 47.5 m. (6.31 mc/s), *La Voz de los Muchachos*, are again well heard. The call is coupled to Broadcasting Nacional, and the interval signal consists of three chimes struck every 15 minutes. Address: Secretaria de Estado de Comunicaciones y Obras Publicas, Ciudad Trujillo, or to Broadcasting Nacional, HIZ, Calle Duarte, 68, in that city.

### Two More Ultra-short Wavers

LISTENERS report logging broadcasts from W3XEX, relaying WTAR, Norfolk (Virginia), U.S.A., between G.M.T. 13.00-18.00 on 11.51 m. (26.05 mc/s). Address: WTAR Radio Corporation, Bank of Commerce Building, Norfolk (Va.). W6XKG, relaying KGFJ, Los Angeles (California), U.S.A., works on 11.56 m. (25.95 mc/s). Address: Ben S. McGlashan, 1417, South Figueroa, Los Angeles (Cal.).

### More Broadcasts from China

IN addition to the transmissions made by XGOY, Chunking (China), on 31.56 m. (9.5 mc/s), between G.M.T. 20.00-22.00 (English news at G.M.T. 21.00), XGRV, in the same city, works on 26.32 m. (11.4 mc/s) twice daily, namely, from G.M.T. 06.00-06.30, and again from G.M.T. 13.00-13.30.

### Concerts from French Liner Normandie

IT is reported that the Mutual Broadcasting System of New York (U.S.A.) has made arrangements to broadcast twice-weekly concerts relayed from the French transatlantic liner *Normandie* (FNSK) during her forthcoming cruise to South American ports (?). These transmissions would be made through WOR, Newark, New Jersey, and the allied medium-wave transmitters, and probably also through W2XJI, on 11.4 m. (26.3 mc/s), and another short-wave transmitter on a higher frequency.

### The Logging of Bolivar

YV6RB, on 45.84 m. (6.545 mc/s) 200 watts, was recently made in the early hours of the morning. The station announces itself as *Emisora YV6RB, La Voz de la Ciudad (City) Bolivar, Ecos del Orinoco, en Venezuela*. Three bell chimes are used as an interval signal. Programmes are of the usual South American type, and are broadcast daily from G.M.T. 23.00-02.30 or 03.00.

### Italian Menus for British Housewives

ROME (Prato Smeraldo), Italy, broadcasts every third Friday in the month recipes for the preparation of popular Italian dishes at G.M.T. 00.30 on 31.13 m. (9.64 mc/s); occasionally this transmission is relayed by the new 50-kilowatt station 12R09, on 31.02 m. (9.67 mc/s).

### Spanish Government War News Bulletins

LISTENERS who desire to hear news bulletins in the English language should turn to EAR, Madrid on 31.65 m. (9.48 mc/s) at G.M.T. 01.30 daily; also to EAQ, Madrid on 30.43 m. (9.86 mc/s) between G.M.T. 00.30-01.30. The call is: *Aqui La Voz de la Libertad* (The Voice of Liberty). Address: P.O. Box, 782, Madrid (Spain).



# ON YOUR WAVELENGTH



By *Thermion*

## Television in the News

I SEE that one of our film companies is proposing to tie-up its cinemas with a chain of cinevision or tele-cine. apparatus. It intends to do this as a protest to what it conceives to be the throttling influence of the Government control of television. The spokesman for the company quite rightly says that we are far ahead of all other countries, and that if we encourage television here we shall be able to obtain large orders from abroad for television apparatus, as well as from the home market, and prevent America stealing a march on us as she did in the film trade. It is very necessary to get in first. Delay now may mean that America can take advantage of our experience and take command of our markets. The position regarding television cinemas is a somewhat curious one. It would seem that the pictures must be transmitted over the land-line, and therefore the co-operation of the Postmaster-General would need to be obtained. The pictures cannot be transmitted through the ether and then picked up and dispatched over the land-line locally, for all powers of transmission through the ether are vested in the Postmaster-General. The film companies think that the B.B.C. is not acting with the celerity that it should, but the B.B.C. here has my sympathy. I am quite sure that it is anxious to develop television, for it knows that television is inevitable. Last year it spent nearly half a million pounds on television alone. That sum, however, is inadequate, but it cannot afford to spend more. I suggest, therefore, that the Government should not take several millions a year in income tax from the B.B.C. but allow the latter to use it for the development of television. This is, indeed, an obvious step, for it will enable the B.B.C. to increase their television expenditure without passing on any cost to the licence holder.

Otherwise the money can only be found by increasing the licence fee, and I am sure that would be an unpopular move with the public. We have got to face the fact that within a few years television will be in a more important position than ordinary sound programmes, and the time to

lay the foundations in the proper way is now. The expense has got to be faced, otherwise once again America will step in and collect the rewards which are due to us from a market which this country has pioneered. There can be no doubt that America is keenly watching television events.

The success of the recent television broadcast of the Boon-Danahar fight in certain London cinemas has led to the suggestion that eventually all cinemas will be able to give television broadcasts as part of their programme. The position is that Gaumont-British, associated with Baird Television, has equipped two London cinemas with special big-screen television equipment, and are hoping that future big events (the Boat Race, Cup Final, etc.) may be relayed in the cinemas without opposition by the B.B.C. At the moment, however, there is no suggestion that the B.B.C. will or can give this permission. If they find that they are unable to prevent cinema relays of this type, Gaumont-British will probably fit the necessary receiving equipment at all their cinemas in range of the television transmitter and install suitable projection apparatus.

If permission to relay the programmes is withheld, however, there is nothing to prevent the film company from installing a film-television transmitter or standard television installation at a central address and wiring up all of their cinemas with special cable so that they could transmit their own television programmes. This would be expensive, but if the public interest warranted it, no doubt the expense would be justified.

If permission is given, of course, the equipping of cinemas in the Gaumont or any similar chain could be carried out all over the country so that eventually full advantage could be

taken of further television stations which might be erected by the B.B.C.

## A Handbook on Patents

K. T. HARDMAN tells me that he is the author of a handbook on the subject of patents having the title of "Advice to Inventors." It is published at 2s. per copy, and it has proved of considerable service to many inventors. In recognition of the useful work which PRACTICAL AND AMATEUR WIRELESS has done in connection with patents, he makes an offer confined entirely to his fellow readers of this journal. The offer is this: If any PRACTICAL AND AMATEUR WIRELESS reader sends him a 6d. P.O. or six penny stamps he will send them a copy of the 2s. handbook, and he assures me that a perusal of it may easily save inventors a lot of money, no matter whether they are only thinking of or have already embarked on this "Tempestuous Ocean." He asks that when they have read it they will pass it on. There are no advertisements in the book, and he is not out to make money over it. He has been through the mill and has found the grinding process costly and painful. His object is to help others to avoid what he has suffered.

## The Old Hands Club

MR. C. H. HOPWOOD, of Calstock, Cornwall, writes as follows:

"Like yourself, I have been at the game for many, many years—and like the idea of an old hands club. I enclose a page out of my diary—as far back as 1923 did I urge the education people that wireless would be good for schools. And the receiver went through the performance without 'an itch,' as the caretaker said. Next day I burnt out 6 V.24's, and you know the awful price they were!

"If you are ever in Cornwall, let me know the day and hour, and I will show you odd things—all is grist to the mill, I know, for you people.

"With regard to the 'snobbishness' of the amateurs, the station 2DAY—a good call-sign—was designed and sent up to Professor Appleton and passed as O.K. It is not just in a room but a perfectly screened building specially erected with about

£2,000 of apparatus in it, 900 feet above sea-level, without any interference. I wrote to several nearby sections—Torquay, Exeter, Plymouth, and did not even have the courtesy of a reply: and really I was not too keen to have people messing about as I am doing work both for the Air Ministry and experiments on fading, as suggested by Professor Appleton."

### Registered Dealers

**A**T a recent meeting of the Radio Manufacturers Association it was proposed to issue regulations concerning retail distribution. They propose to compile a registered list of dealers, or in other words a white list. Under this scheme the manufacturers will refuse to sell sets to retailers not on the list, and will not supply television apparatus to any retailers not on the list in the television area. The retailer on his part undertakes not to stock, advertise, or display for sale or rental, sets other than those supplied by the manufacturers who are parties to the agreement. No obligation is imposed on a retailer to handle or display goods of any particular manufacturer, nor is there any obligation on a particular manufacturer to supply a particular retailer. Retailers qualifying under the definition will be invited to apply for inclusion in the first registered list. The definition will be the standard upon which retailers' names will eventually be included or rejected from the list.

### Definition of a Retailer

**T**HE expression "radio retailer" shall mean a firm, person, or company, of good financial standing having shop or showroom premises, rated as business premises, open to the public during ordinary local business shopping hours, trading on his, their, or its own account, as a dealer or dealers in radio receiving sets or radio gramophones, who continuously maintains a reasonable stock, and resells the same to users only at manufacturers' fixed retail prices, and is prepared within reasonable limits to service the same.

You will observe here that this definition does not take into consideration the sale of components. I think this should be included.

### A Peep at the B.B.C.'s Television Station

**T**O the men and women whose daily work lies within the organisation of the B.B.C.'s Television Station, the business of giving millions of people the opportunity of seeing as well as hearing by radio comes as naturally as accounting to an accountant.

## Notes from the Test Bench

### Volume Control Connection

**T**HE standard type of volume control has three terminals, the centre one usually being joined to the arm or wiping contact of the control and the two outside terminals being connected to the ends of the resistance element. A receiver was recently sent in for test because the control worked "backwards." That is to say, when set at what should have been the minimum position the signals were loud and as the control was turned in a clockwise direction signals faded out. The only modification which was required was to reverse the connections to the two outside terminals. In most circuits when viewing the control from the back, the left-hand terminal may be regarded as the low-potential end and should be joined to earth, G.B., or an equivalent position, according to the place taken by the volume control in the circuit.

### Decoupling

**I**T has often been stated that the values of decoupling resistance and condenser are bound up with one another, and generally it is found that if decoupling is ineffective an increase in the value of either the resistance or condenser will effect a cure. A case was recently found, however, where increasing the value of either did not stop instability. Eventually, a resistance was joined in series with the decoupling resistance and a further condenser joined between the junction of the two resistances and earth, and although the total values of condensers and resistances was not so great as the substitutes which had previously been tried, they prevented the trouble. The circuit was, in other words, double decoupled and for some unknown reason this prevented trouble.

### Speaker Matching

**C**ONSTRUCTORS often find it difficult to obtain correct matching when endeavouring to use existing speakers and valves. It should be remembered that in any case of doubt the formula for matching transformers is quite simple and is as follows:

$$\text{Ratio} = \sqrt{\frac{\text{valve load in ohms}}{\text{speaker impedance.}}}$$

The speaker impedance may be the impedance of the speech coil or of the transformer fitted to it and is also in ohms. The answer is the ratio to 1, or in other words, if the answer from the above calculation came to 20 it would indicate that a matching transformer having a ratio of 20 to 1 would be required for correct matching of the speaker and valve. The valve makers always give the loading of the valve on the data sheets accompanying output or L.F. valves.

Let your imagination take you on a fleeting visit to this extraordinary workshop.

The lift that takes you to the top of the Eastern tower, upon which straddles the mast carrying sound and vision aerials, stops outside the fifth-floor door of a room where every programme is planned and organised—the office, den and conference room of Cecil Madden, Television Programme Organiser. It was he who, in August, 1936, produced the first programme.

To him comes the unending stream of ideas, suggestions, requests from the sixteen producers, and it is part of his complicated job to co-ordinate them, till the jigsaw layout of a week's programmes is complete. Plans for studio productions and outside broadcasts are drafted weeks ahead, rehearsals arranged, casts booked, engineers' shifts so planned that the technicians present at rehearsals are also on duty for the transmission. . . .

### Productions Dept.

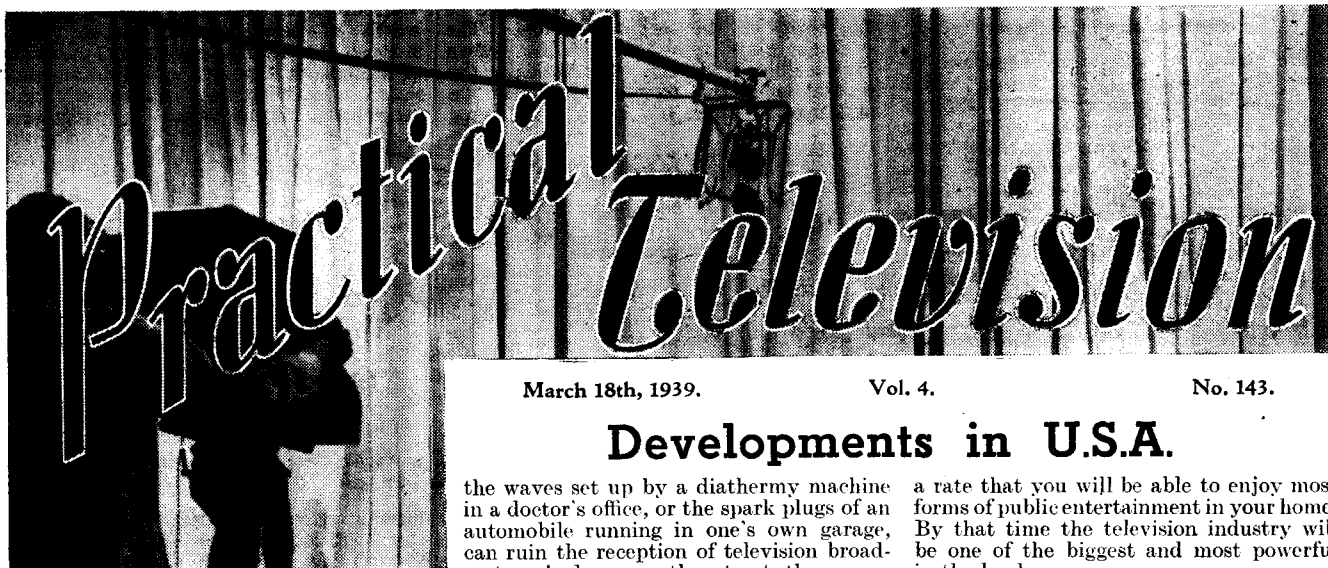
**T**HREE floors below, you come upon the office of D. H. Munro, who, as Television Productions Manager, controls the four main branches—and their eighty employees—of the Productions Department—outside broadcasts; design—this includes the construction and hire of sets and properties; make-up and wardrobe; and studios.

"We are, in practice, the link between the engineering and artistic sides of every production," he says. "You can imagine how vital it is that the people responsible for props., lighting, cameras and sound should collaborate closely with the producer—especially as six or seven shows are in rehearsal every day.

"The floors of both studios have to be cleared after the last show each night, so that there shall be no delay in building new sets and fixing up the lighting next day. Lighting, as you may guess, is of great importance; it is different from that used in film studios and the theatre—something between the two. In films, remember, a close-up of the stars can be taken fifteen times, if necessary, in order to get the best effect. In television. . . ."

Mr. Munro snapped his fingers and smiled.

"In television it has to be right first time. Every day the make-up people get a chart from the engineers on camera sensitivity; you can't guarantee that all the cameras—seven are regularly in use—will give the same degree of sensitivity. It varies from day to day."



March 18th, 1939.

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## Developments in U.S.A.

**A**N interesting sidelight on the position of television in America is given by an article recently published in *Life*. The following are the main details as set out in that article, and will, we feel sure, interest our readers. The article states that regular television broadcasts are to be inaugurated by National Broadcasting Company on April 30th in conjunction with the opening of the New York World's Fair. This means the decade's most revolutionary invention is at last ready to emerge from the laboratory and make its commercial debut in America.

R.C.A. officials know that the images to be seen are good and that the receiving sets, selling from \$200 to \$1,000, will perform satisfactorily. Beyond that they know nothing. Unlike most inventions, which start on a small experimental scale, television will make its appearance as a full-grown business proposition. In addition to the tens of millions of dollars already sunk in research by promoters, each television station will have to spend at least \$250,000 for transmitting equipment, about ten times more than a radio station on programmes.

If the television consumer market were large enough, such expenditures might warrant the expectation of sizable profits. Unfortunately, however, television is, so far, doomed to small areas and hence small markets, because at present, transmitters can broadcast their waves a distance of only 50 miles. As a result, Metropolitan New York with its 10,000,000 inhabitants will rank as the No. 1 television area. Only other cities to receive television this year will be Philadelphia, Los Angeles and Schenectady. Ultimately all centres of over 100,000 inhabitants may be covered. But at best television in its present state will reach only 6 per cent. of the land area of the U.S., in which live 50 per cent. of its population. Only seven stations will be able to broadcast simultaneously from one city without interference.

Large communications companies are trying to retain their proprietary interest in this new invention. But television is still anybody's game because any new development can wreck the present facilities. And the air which carries the television impulses cannot be bought. The scramble for permission to broadcast on certain ultra-short-wave bands has been frantic. But even the winners in this fight have no sense of security so long as

the waves set up by a diathermy machine in a doctor's office, or the spark plugs of an automobile running in one's own garage, can ruin the reception of television broadcasts. And across the street the owner of a receiver may be perfectly situated to catch broadcasts from several stations while you are getting no images at all on an identical set, or double images caused by waves reflected by nearby walls.

Television is a mystery even to its inventors. The tiny electrons into which a picture is transformed for television transmission are most unruly things, and the electro-magnetic waves that ferry television images across space behave most unexpectedly. Thus, contrary to all known rules, a picture televised in London was picked up recently by an experimental receiver on Long Island. Developed far

a rate that you will be able to enjoy most forms of public entertainment in your home. By that time the television industry will be one of the biggest and most powerful in the land.

### Position in England

England has had television for two years and has made a fair technical success of it. It has, however, sold only 10,000 sets, has one Government-controlled station. Most other European Governments own and operate all television transmitters, use them for propaganda.

U.S. television is promoted by private interests. If it becomes the boom of the 1940's, hundreds of companies are going to pop up, demanding their share of the public air. But ultra-short-wave broadcasting bands in the air are as limited as



*In this country the field of outside television broadcasts is steadily increasing. The above illustration shows a recent relay of instructions being given to members of the Civil Air Guard at Hanworth aerodrome.*

beyond the field of television, electrons are now replacing light waves to make possible infinitely more powerful microscopes and telescopes.

That the U.S. is eagerly awaiting television is shown by the recent decrease in sales of expensive radio sets in cities. If all goes well, some 25,000 television receiving sets may be sold in 1939. Whether television consumers will be satisfied with programmes consisting mainly of newsreels, one-act plays, fashion shows and interviews is a question that no one can answer. Only safe guess that experts can make is that in ten years the science of television will have progressed at such

are lanes on a highway. To the Federal Communications Commission belongs the terrific job of allocating these lanes fairly.

Only other hope of increasing the width of the television highway lies in the brains of such scientists as R.C.A.'s electron optics research group, headed by the brilliant Russian émigré, Vladimir Zworykin. Announcement recently of the development of the rhumbatron by Stanford University physicists brought this hope closer to realisation. The rhumbatron is a tube which makes electrons dance the rhumba, sending out waves even shorter than those used at present and thus giving many more lanes to the television highway.



## PRACTICAL TELEVISION

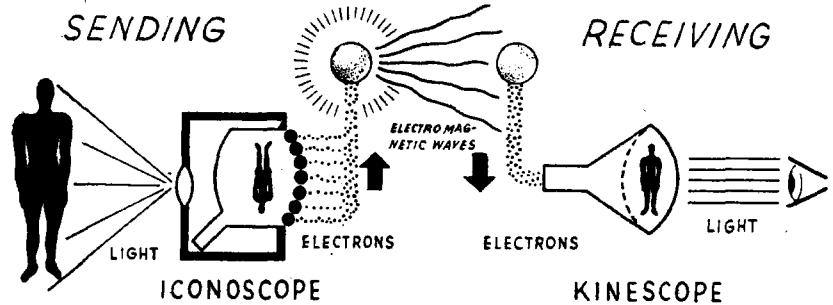
(Continued from previous page)

Simultaneously, R.C.A. engineers are developing a radio relay system which promises to connect telecasting stations into networks, making it possible to see in Chicago events televised from New York. These stations would be 15 or 20 miles apart. Their transmitters would automatically relay the waves carrying the signals and would require no attendants.

Television is a headache to its inventors because it uses three different mediums in order to bring an event into your sitting-room. The light from the object is focused by a lens on a plate, composed of hundreds of tiny photo-electric cells, in the Iconoscope (the "ike" which corresponds to the "mike" of radio). Every time light hits the front of a cell it creates a tiny electric charge at the back. These charges, released one by one, transform the image into a flow of electrons. The electrons, when broadcast from the antenna, are transformed into electromagnetic waves. These are picked up by any antenna within 50 miles, transformed once again into a flow of electrons, which are then sprayed across the back of the receiving tube, stimulating

its photo-electric cells to give out light in the form of the original image. The electron spray moves across the screen 13,000 times a second. Theoretically the process is similar to picking up all the buildings in Chicago one by one, flying

York City. In them were 12 men, \$100,000 worth of television equipment. They stopped at a nearby restaurant, where one of the trucks disgorged a television Iconoscope, a microphone, dozens of lights, projectors and six men. The remaining



This interesting diagram, reproduced from "Life," shows the three arts which are incorporated in television—kinetics, electrics, and optics.

them 50 miles and putting them down again in exactly the same order.

### An Hour's Programme Costs \$2,000

On January 15th, two ten-ton trucks rolled out of the R.C.A. Building in New

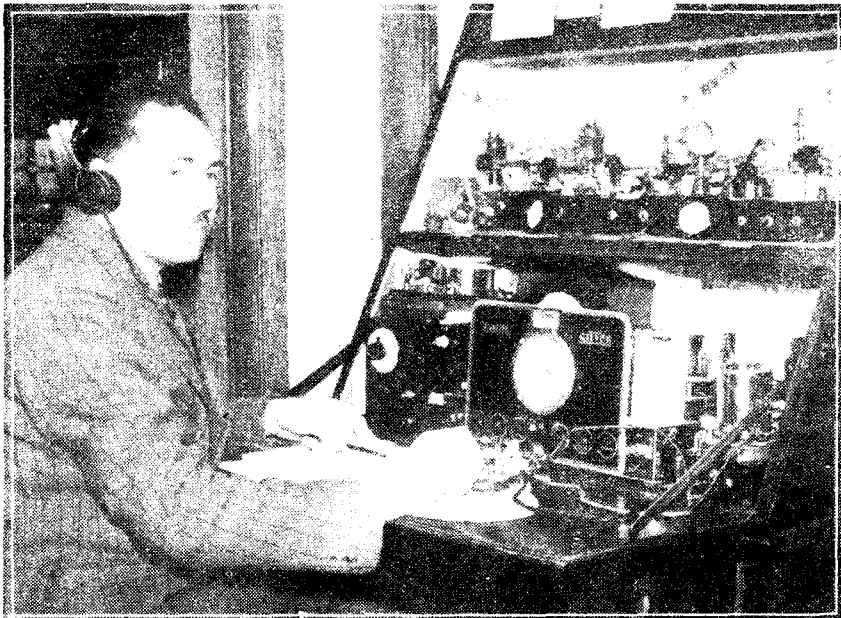
men operated the truck which was to broadcast a floor show—the first pick-up to be made outside television studios but inside a room. After three hours of preparation the show went on and was very successful.

# TELEVIEWS

## Television and Hospitals

IN this country steps have been taken to install television receiving sets in many of the hospitals within the service range of signals. This has proved a wonderful boon to patients in the various wards, for it has enabled them to keep in touch with entertainment in a way that tends to expedite recovery. It has been left to America to apply television in quite another manner so far as hospitals are concerned. In New York an experimental television camera, with associated equipment, has been installed in one of the operating theatres of a large hospital. This is for the

purpose of enabling medical students to study surgery in a closer manner than is possible when they are seated in a gallery. The lighting conditions are certainly admirable for securing a good picture, but unless the camera and operator are positioned in an unobtrusive spot it would surely cause distraction to the doctors and nursing staff, whose attention at surgical operations should be given entirely to the patient. Whether the experiment will prove successful remains to be seen, but it is doubtful if anything of a similar character would be tolerated in an English hospital.



Mr. E. Robins, a Cardiff radio amateur, while talking to another radio amateur, Mr. Eric Green, of Johnsonville, New Zealand, learned that Mr. Green had served in the Welsh Fusiliers during the War, and was anxious to trace some of his old comrades. Mr. Robins was able to find the men in Wales, and put them in touch with his fellow radio-enthusiast in New Zealand. Our illustration shows Mr. Robins operating his transmitting apparatus.

## An Investigation Committee

IN view of the recent success achieved in three London cinemas when televised boxing match pictures were shown to a public audience, the film industry exhibitors are to make a very close investigation of the whole position. The fact is not lost sight of that ultimately there is a possibility of television revolutionising the whole cinema industry in a way comparable with that which occurred when the talking film made its début. The London branch of the C.E.A. is to press the General Council for a special committee to be appointed which will keep a watch on the developments, and make any necessary recommendations that may be thought necessary to meet the situation. Apparently, one aspect of the problem with which exhibitors are concerned is the renewal of contracts for talking film equipment, because if cinema television made very rapid progress present film apparatus would become obsolete.

## Another Problem

This takes into account the possibility that cinema programmes of the future may be presented not via film prints, but through the medium of rediffused signals from a central source. If this was attempted by any radio link a new problem arises in connection with the prevention of home television receivers making use of the radiated signals prepared expressly for cinemas. It is difficult to conceive that, if any rediffusion plan is finally adopted in the future, a radio link will be employed because of ether congestion, but there is certainly no technical reason why the cinema programmes could not be relayed over land lines. First cost would be heavy because of the special cables required, but once this has been met the service should be satisfactory with less chance of breakdown. Whether the home viewer and the cinema will have separate services is still a matter for conjecture, but it seems certain that the whole situation will have to be clarified by Parliament in the near future. Both the B.B.C. and the cinema interests have something to offer the other side, and it should not unduly tax a committee of experts to arrive at a solution satisfactory to all who rely on the entertainment industry as a whole for their livelihood.

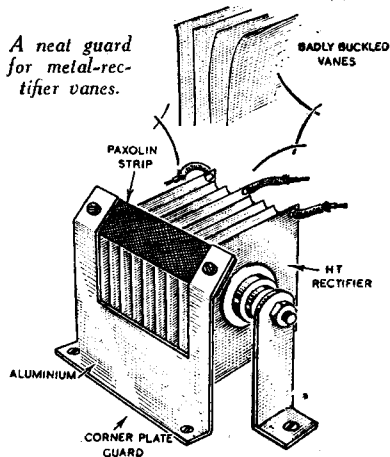
A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

**A Neat Metal Rectifier Vane Guard**  
 OWING to the position of an H.T. metal rectifier incorporated in some of my test equipment, I have once or twice inadvertently caught my sleeve on the plates or knocked them, with the result



that the end corner plate has become rather badly buckled. To obviate future accidents of this nature, I have adopted the simple dodge illustrated, and have found that I shall not now have to go to the trouble of finding a suitable new position for the apparatus in question. The assembly simply comprises an aluminium mount of 18 S.W.G. to which is fitted a strip of paxolin by cheese-headed 6 BA bolts and nuts. The finished guard is carefully positioned, as shown, so that there will be no possibility of fouling with the vanes, whilst should there occur any further jarring, the paxolin strip will prevent a short-circuit.—C. G. BARNET (Stroud).

**A Portable Receiver Fitment**

THIS fitment to a portable receiver provides a means of getting the set in the correct position for the reception of any receivable station. It can be seen from the accompanying diagram that the apparatus consists of a disc on which the station names are marked, and which is kept pointing in a constant direction by means of magnets fixed to its underside so that once the right direction for any station is found and marked on the card, it can instantly be found again.

The main body of the device was made from some pieces of an old clock. The brass barrel of the clock was cut off except for about an inch, and was pressed into a hole which had been cut in the top of the cabinet to fit it.

The markings were cut out of thin cardboard and blackened with Indian ink, and then glued on to the glass face "A." The position indicator B was made of black carpet thread.

An ordinary wire nail was sharpened to a point, cut off, and soldered in the centre

**THAT DODGE OF YOURS!**

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

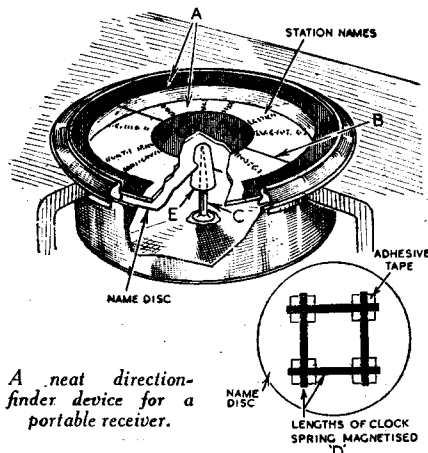
**SPECIAL NOTICE**

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

of the back or lid of the clock to form a pivot "C" for the dial.

The dial itself was made of stiff white card, and the magnets "D" were pieces of clock spring rubbed on another magnet. The magnets were held on with pieces of adhesive tape.

The glass bearing "E" was taken from a toy, and was pressed into a hole made



in the centre of the card, and secured by a spot of glue.

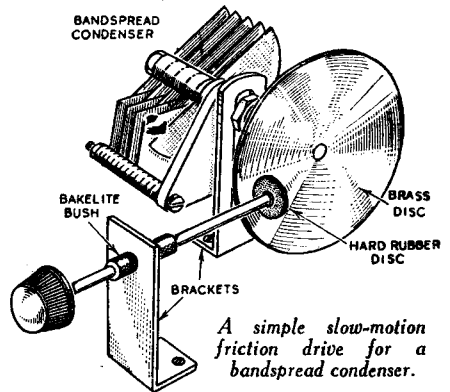
The dial was divided into two sections for medium and long waves, and was graduated by getting the set in line with a well-known station, and then using an atlas, to find the position of the others. Certain small adjustments usually had to be made by listening, and rotating the set through a few degrees.—J. SEARS (Potters Bar).

**A Novel Slow-motion Drive**

THIS simple but effective slow-motion drive for a bandspread condenser is constructed as follows:

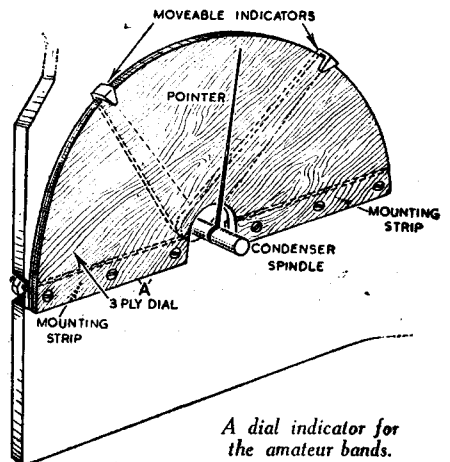
A 6in. diameter brass disc is soldered to the condenser shaft, as shown. The tuning knob is then fixed to an 1/8in. shaft, which

slides through a piece of bakelite tubing mounted on the panel. To the end of this shaft a 1/8in. diameter hard rubber disc is cemented, which presses against the side of the disc and turns it by friction. By pulling out the knob the bandspread may be increased.—W. ALLEN (Dublin).



**A Dial for Amateur Bands**

WHEN listening to amateurs I found it difficult to remember the readings on the bandspread dial, so I made the dial illustrated here. After one indicator is set at the station calling, the station replying can be searched for and marked with the second indicator; it is now an easy matter to tune in the two transmissions quickly while they are working without having to remember what the readings were on the dial. The 3-ply dial "A" is screwed by its lower edge to the panel. By adding two strips of 1/8in. wide by 1/8in. thick plywood underneath the screws between the dial and the panel the dial stands off 1/8in. from the panel of set. Two strips of brass are used for the indicator which are 1/8in. wide at one end, and 3/8in. at the other, with a 1/8in. hole at the wider end to fit loosely on the condenser spindle, or extension.—W. MANSON (Shetland).



IN introducing this receiver we have, as explained in last week's issue, endeavoured to bring the all-wave type of receiver into the low-price class so that every constructor can take advantage of the modern type of circuit. The standard "S.G., Detector, L.F." combination is employed, and in the H.F. stage an H.F. pentode is used, with a tetrode in the output stage. In the circuit there are six groups of three dots, these representing, in effect, six single-pole change-over switches. They are all combined on the Bulgin S.208 switch unit and

# F. J. CAMM'S 50/-

Preliminary Construction  
New Easy-to-Build This

### Coil Arrangement

It will be noted that an H.F. transformer arrangement is provided in the aerial circuit for medium and long waves, and the H.F. choke takes the place of a tuned circuit on short waves. Between H.F. and detector stages a tuned anode coupling is provided. An important point to be noted is that certain leads are screened, and this includes the re-

to ensure perfect stability at all points on the dial. One other point of interest in the circuit is the inclusion of a fixed resistance across the L.F. transformer to provide a measure of tone compensation.

An important point for many constructors will be the inclusion of a single H.T. battery lead, avoiding all difficulties in the way of providing tappings and ensuring equal discharge of the battery. The potentiometer, R2, provides exact screen voltage for the H.F. stage and controls sensitivity.

### Constructional Work

So much for the description of the receiver. As we have already announced we have dispensed in this case with the metal or metallised chassis and in place of it have used a plain wooden arrangement which you can obtain ready made and drilled from Messrs. Peto-Scott or can construct for yourself. The overall size of the chassis is 10in. by 8in. with 2in. runners. The top of the chassis should be made from 3/8in. or similar plywood, and the two side runners of similar material. At the rear of the chassis is a 1/2in. ply runner, but at the front no runner is needed, as the panel takes the place of this. The panel is also of 1/4in. ply, but

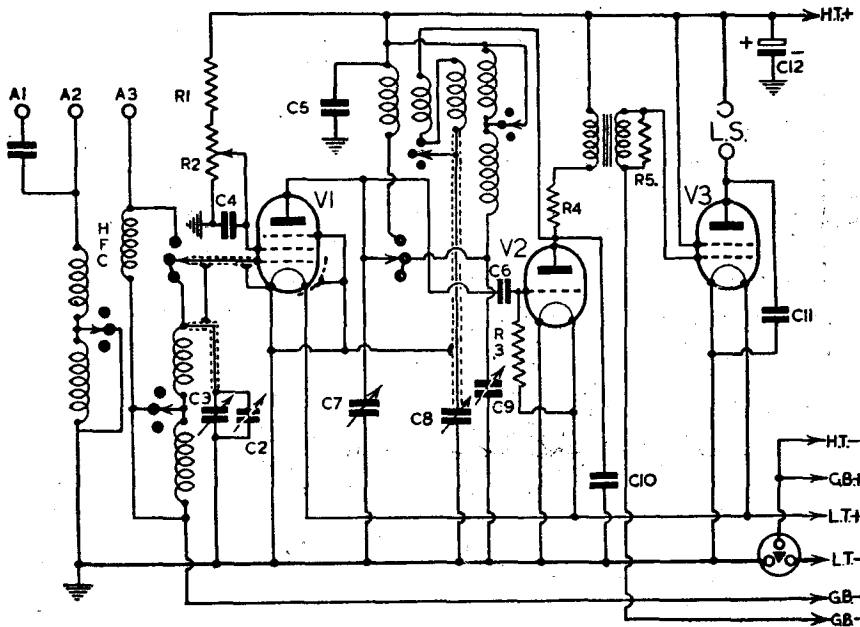


Fig. 1.—Theoretical circuit of the 50/- All-wave Three.

carry out switching for the three wavebands. It will be noted that in two of these switches two of the contacts are inter-connected—for medium and long waves—the switching for medium waves being effected by a separate section. As mentioned last week, this particular switch has been adopted so that economy could be effected and this has necessitated the use of a transfer aerial lead for short waves, the terminal for this purpose being marked A3. The switch must, of course, be operated at the same time. As the switch is wired the positions given provide long waves when turned as far as possible in an anti-clockwise direction, and short waves when turned to maximum in a clockwise direction. In the theoretical diagram reproduced on this page the contacts are all wired so that they give the same positions, namely, short waves at the top point, medium waves in the centre and long waves at the lower point.

action lead to the reaction condenser. This particular lead is often found to provide most trouble and especially in an all-wave receiver it is desirable

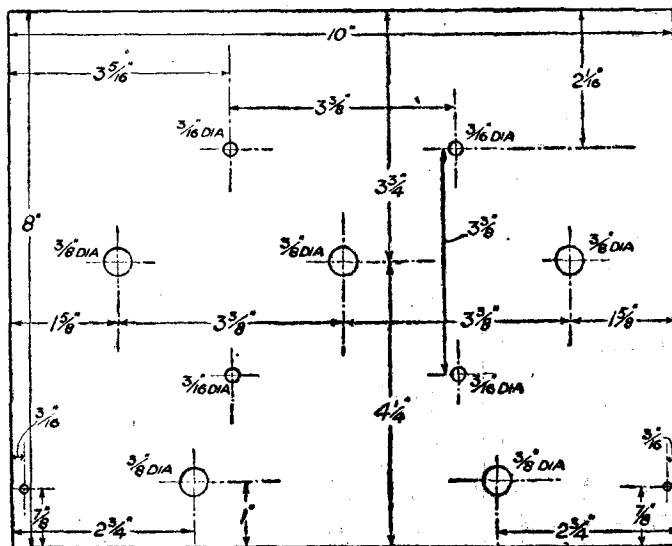


Fig. 2.—Drilling details for the panel.

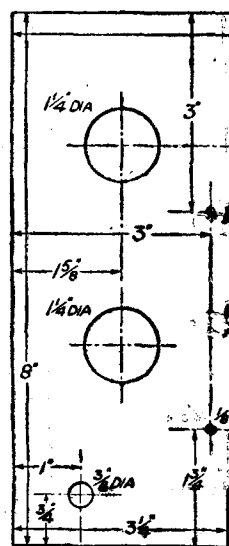
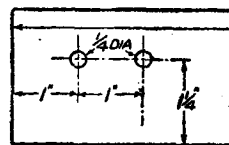


Fig. 3.—Drilling



# ALL-WAVE THREE

## Constructional Details for this Three-valve All-waver

thicker material could be used if you are prepared to cut away the top two or three layers in order to permit the lock-nuts for the panel-mounting components to bed down on to the threads. This difficulty is overcome, and the slow-motion drive easier to assemble, when the  $\frac{1}{4}$  in. material is used.

### Drilling Chassis and Panel

At the rear of the chassis six holes are needed for the connecting sockets, as shown in Fig. 3, these holes being cut to accommodate the Clix sockets which are specified. On top of the chassis, holes, as shown also in Fig. 3, should be drilled, noting also that a piece has to be cut away from the front of the chassis to accommodate the driving drum of the condenser. If you are making the chassis yourself, it will be better to cut this piece away and drill the holes before mounting the runners. The panel should be drilled to the details shown in Fig. 2, being very careful regarding the centre hole and the four surrounding it. These are for the attachment of the dial and pointer, and if not accurately placed the pointer will bind

at the centre of the dial or on the sides of the hole in the panel. The small holes at the sides towards the bottom are for screwing the panel to the side runners and should be carefully made to avoid the ply surface splitting. As the panel is held in position

the panel. Push the bolts through and lock the dial in position, making quite certain that the nuts are tight, as they are not easily accessible after the panel is placed into position. The panel may now be placed on one side. Fit the sockets on the rear chassis runner, and proceed to mount the condenser. This is not a difficult task, but it must be done accurately to ensure that the cord drive will act efficiently

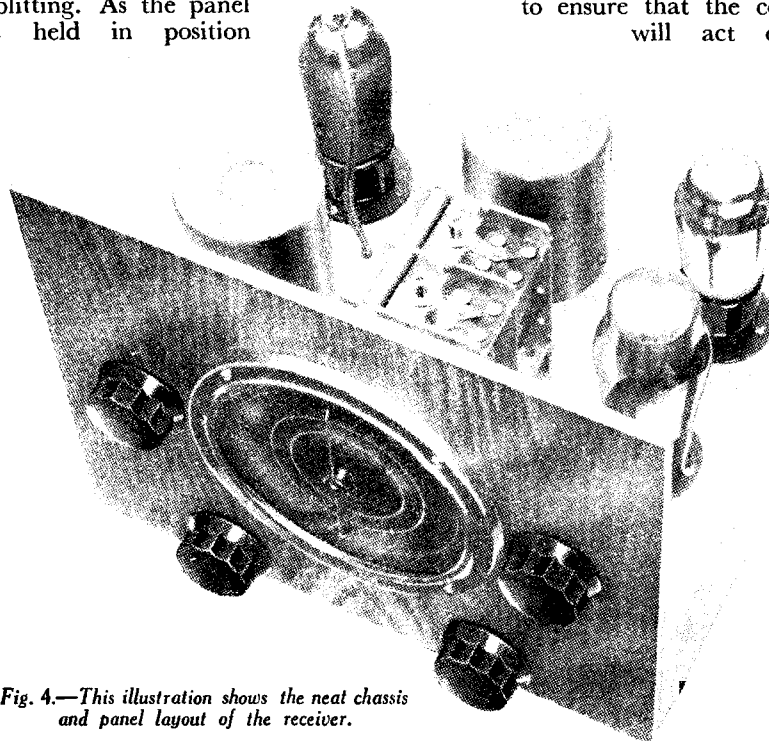


Fig. 4.—This illustration shows the neat chassis and panel layout of the receiver.

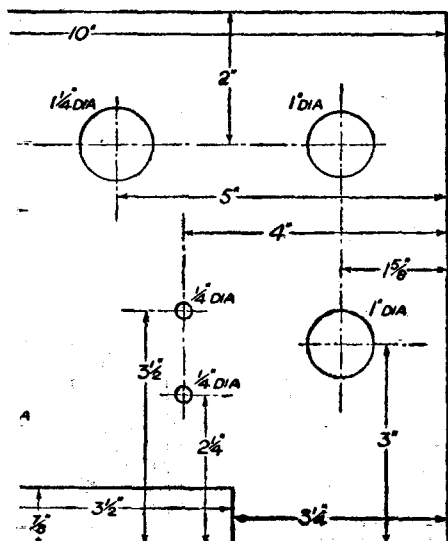
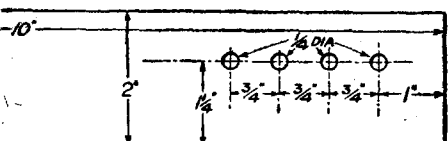
by these two screws alone rigidity is essential. When all holes have been made the front and rear surfaces should be cleaned up with sandpaper and the receiver is ready for assembly.

### Assembling the Condenser

Mount the switch, reaction condenser and volume control on the panel and lock the nuts firmly. Next place the pointer through the paper dial, place this beneath the large washers and place the escutcheon on

without risk of slipping off the drum. The best procedure is to lock the driving mechanism to a component-mounting bracket, or a similar bracket made from stout brass or aluminium, and place the pulley portion over the front of the drive spindle. The front is that which carries the smaller section spindle. The pulley groove should be at the rear. Now place the driving drum on the condenser spindle and push the drum on to the projecting spindle of the

(Continued on next page)



details for the chassis and rear runner.

### SPECIFICATION FOR F. J. CAMM'S 50/- ALL-WAVE THREE

- One set of coils—broadcast, short-wave—and special S.W. chokes (Peto-Scott), 10s. 6d.
- One .00043 mfd. two-gang condenser (C3 and C7) (New Times Sales), 4s. 6d.
- One slow-motion drive assembly, including scale, escutcheon, etc. (Peto-Scott), 5s. 6d.
- One plain wooden chassis with 3 runners (Peto-Scott).
- One multi-point switch, type S.208 (Bulgin), 3s. 9d.
- One reaction condenser, type C.V.19 (C8) (Bulgin), 2s. 6d.
- Two trimmers, type S.W. 99 (C2 and C9) (Bulgin), 9d.
- Six fixed condensers: two .0001 mfd., type P.C.301 (C1 and C6); one .0002 mfd., type P.C. 302 (C10); one .005 mfd., type P.C. 205 (C11); two .1 mfd., type P.C. P1 (C4 and C5) (Bulgin), 3s. 3 1/2d.

- One L.F. transformer, L.F.58 (Bulgin), 4s. 3d.
- One 8 mfd. electrolytic condenser, type 3017 (C12) (Dubilier), 2s.
- Four fixed resistors: one 25,000 ohm 1 watt (R1); one 2,000 ohm 1/2 watt (R4); one 250,000 ohm 1/2 watt (R5); one 2 megohms 1/2 watt (R3) (Erie), 1s. 3d.
- One volume control with D.P. switch (R2) (Erie), 4s. 6d.
- One 4-pin, one 5-pin and one 7-pin chassis-type valveholder (Clix), 1s. 8d.
- Six type 8 sockets (Clix), 6d.
- One component-mounting bracket (B.T.S.) 4d. (See text).
- Six No. 5 master plugs (Clix), 9d.
- Connecting wire, flex, one length screened sleeving, screws, etc.
- One V.P.215, one D.210 and one Y.220 valve (Hivac).
- One 120-volt H.T. battery.
- One 2-volt L.T. accumulator.
- One W.B. Stentorian Junior loudspeaker.

F. J. CAMM'S 50/- ALL-WAVE THREE

(Continued from previous page)

pointer, preventing this from being pushed forward by pressing the centre through the celluloid window. When the condenser and pointer spindle meet, the condenser may be stood on the chassis and placed so that the drum is clear of the rear surface of the panel and so that the pointer just clears the surface of the dial. When satisfied that the position is correct mark the holes through the mounting feet and pierce these ready for holding-down screws. Round-head brass screws should be used here. Before locking the condenser make quite certain that you have only allowed sufficient clearance at the rear of the panel to enable the drive to be mounted, and for this purpose stand the mounting bracket at the side of the drum with the spindle

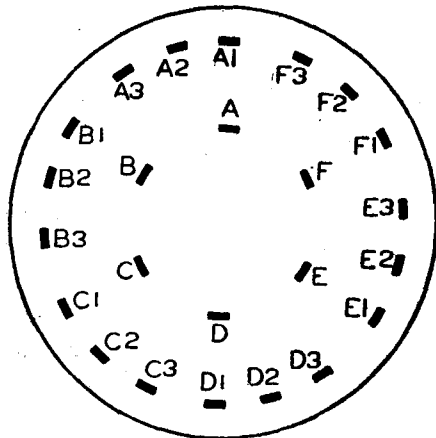
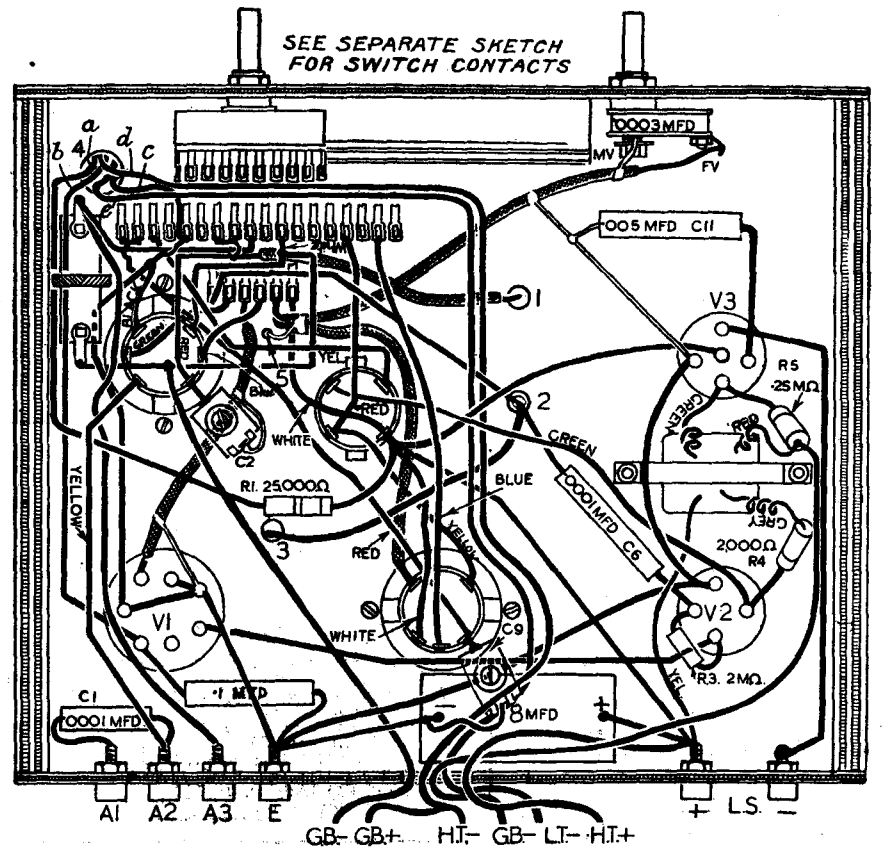
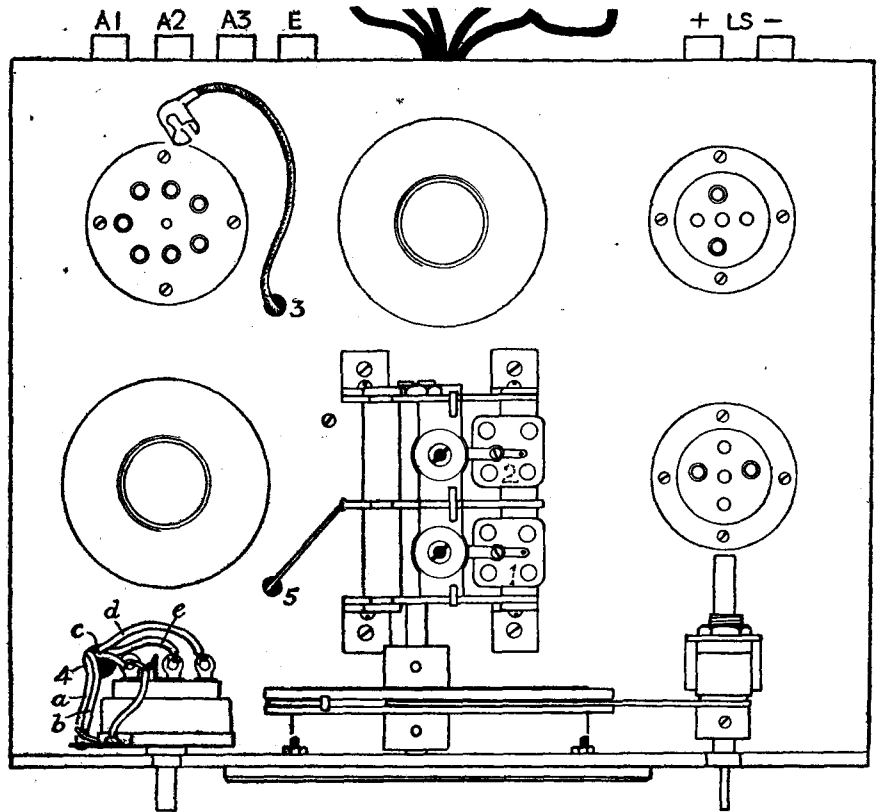


Fig. 5.—This diagram shows the relationship of the switch contacts, which must be rigidly adhered to in order to ensure accurate wave-change switching.

projecting through the panel. There should be sufficient spindle projecting on the front of the panel to accommodate the control knob, and the pulley groove on the drive should be in line with the groove on the drum. If this is satisfactorily done the mounting bracket may also be screwed down. The driving cord should be slipped over the large drum and small drive, the hooks on the ends anchored in the small holes in the drum, and the cord bedded down in the pulley grooves. Make certain that the cord is properly locked by turning the slow-motion control. Run the pointer to a horizontal position and push the condenser vanes "all in." Now lock the two screws which anchor the pointer and spindle of the condenser to the driving drum and the remainder of the constructional work may be proceeded with. A wiring diagram showing the position of the remaining components and all connections is given on this page.

WIRING DIAGRAM OF F. J. CAMM'S 50/- ALL-WAVE THREE



# TELEVISION FEATURES

## "SECONDS OUT"

**HARRY MIZLER** will be seen in an exhibition boxing bout in "Seconds Out," a sports programme to be staged in the Alexandra Palace studios on the evening of March 18th with demonstrations of boxing, fencing and catch-as-catch-can wrestling.

An interesting device for registering hits will be shown in the fencing demonstration. A spring contact at the top of each foil will be connected by wire through the fencer's sleeve to an electrical recording instrument which rings a bell and lights a lamp whenever a hit is obtained on any part of the opponent's body. By an ingenious arrangement, however, no hit is recorded if the foil only strikes the opponent's hand guard. Men and women fencers will demonstrate various types of fencing with the foil, a small practice weapon; the épée or duelling sword, and the sabre, which is a much heavier weapon. During the "duels" a commentary will be given by C. L. de Beaumont.

The programme will conclude with a catch-as-catch-can encounter between Leo le Febvre and Bob Lengden.

## "DANCE WITHOUT MUSIC"

**JACK SHEPPARD**, eighteenth-century gangster, is the "hero" of "Dance Without Music," a play written specially for television by Mervyn Mills, which viewers will see in the evening programme on March 23rd. The title is thieves' slang for hanging, and the play will set forth some of Jack Sheppard's daring escapes from Newgate Gaol.

Denis Johnston, the producer, will bring to life in the television studio a famous picture by Sir James Thornhill showing Sheppard posing unwillingly for his portrait in his cell.

## "THE EDGE OF THE WORLD"

"THE EDGE OF THE WORLD," a British feature film, will occupy the whole of the afternoon television programme on April 1st. Produced by Joe Rock, this film was photographed on the island of Foula, on the edge of the Shetland Isles, and is probably one of the few entertainment films, distinct from documentary, made without the help of artificial lights and studios. If fine photography can help, "The Edge of the World" should be a good film for the home screen.

The simple story is concerned with a colony of island folk faced by famine, but clinging to the home that has been theirs for generations. It has, therefore, an actual basis of fact, recalling the evacuation of the isle of St. Kilda some years ago.

The principal players are Neill MacGinnis, Belle Chrystall, Eric Berry and John Laurie, all of whom lived on the island for six months during the filming.

## "PILGRIM'S PROGRESS"

**BUNYAN'S "Pilgrim's Progress"** will be seen in a television version on the evening of Good Friday (April 7th) and again on Easter Sunday in the afternoon. Apart from its religious significance, the "Pilgrim's Progress" makes an exciting narrative, with scope for ambitious spectacular effects. H. D. C. Pepler is arranging the masque, and the accompanying music will be selected from Peter Warlock's arrangements of the works of Dowland, the seventeenth-century composer. Stephen Thomas will produce "The Pilgrim's Progress" for television.

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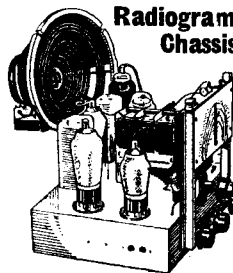
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N.T.S. Kit 1 comprises all components, but less valves and includes specified Peto-Scott chassis, panel, coils, and choke, etc., specified N.T.S. gang condenser, all wire, flex, screws, etc. Yours for 4/6 down and 12 monthly payments of 4/6. **CASH 50/- C.O.D.**

**KIT "2" CASH £3.4.0 or 5/6 down** balance in 12 monthly payments of 5/6. As Kit "1" but includes set of 3 British recommended valves.

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Specified N.T.S. 2-gang condenser. . . . . 4/6  
Set of 7 tubular and electrolytic condensers, specified values. . . . . 3/9  
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## Radiogram Chassis 5/- down OR £4.17.6 CASH C.O.D. List Value £8. 18. 6

- 7-stage s.het. circuit.
- All waves 18-2,000 metres.
- Station-name dial.
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- 3 Watts output.
- Fully guaranteed.

This 1939 model provides wonderful selectivity and quality reproduction on radio and grammo. Size 11 1/2" x 8 1/2" h. 8 1/2" deep. Complete with all valves and knobs. A.C. mains 200/250 v., 40-100 cycles. Yours for 5/- down and 18 monthly payments of 6/3. Or with matched moving-coil speaker, 28/5/0 cash or C.O.D. or 5/- down and 18 monthly payments of 7/11.

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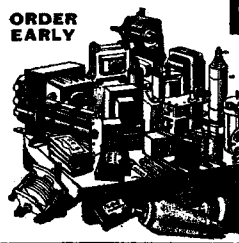
Complete with 3 valveholders, and post free. An investment for every set owner and constructor. 3 matched, brand new world-famous 2-volt battery-type valves, comprising 2 S.G. H.F.'s and 1 Output Pentode, packed in original cartons. Three different valve types indispensable for modern constructor's circuits (available on request) using any number of valves, invaluable also for replacement purposes. Ordered to you at a fraction of manufacturing cost—a real scoop in N.T.S. bargains. Order now while supplies hold out!

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The price is right—the time is right. Ideal for indoor and outdoor Public Address work. Efficient 4-valve Push-Pull circuit giving 7 watts undistorted output. Wide sound range. Built on steel chassis ready for fixing and use. List value £5/5/0. **BARGAIN 70/-** or 5/- down and 12 monthly payments of 6/3. **MICROPHONE.** Professional Telescopic floorstand T.C. type, amazingly sensitive, with lead. **BARGAIN 42/-**, or 2/6 down and 10 monthly payments of 4/6.

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**WORLD S.G.A.** As 3-valver but with Pre H.F. S.G., Det. S.G. audio and Pentode output. All components supplied extra to 3-Valve version including station-name dial. 4 valves given FREE. Cash or C.O.D., 42/- or 2/6 down and 12 monthly payments of 3/9. **WHILE THEY LAST.** Complete set of 10 coils for 9-2,000 metres, list 27/-. **BARGAIN 17/6**, or add 1/6 to deposit and payments.

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**3-Valve BANDSPREAD.** Amazingly efficient 3-valve Pentode output model. All-world phone and loudspeaker reception. Complete kit with FREE VALVES. List value 87/6. **BARGAIN 42/-** or 2/6 down and 12 monthly payments of 3/9.  
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**1-VALVE SHORT-WAVER.** A marvellous single valve receiver providing wide-world short-wave results on 12/94 metres. As a special introductory offer to beginners this kit is available with all coils, pair of lightweight phones and free matched valve. List value 55/-. **BARGAIN 21/7/6** or 2/6 down and 11 monthly payments of 2/6.

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# IMPORTANT BROADCASTS OF THE WEEK

**NATIONAL (261.1 m. and 1,500 m.)**  
Wednesday, March 15th.—First concert performance in England of Mathis the Painter; opera in Seven Tableaux by Paul Hindemith.  
Thursday, March 16th.—Rheinberger: an organ recital in commemoration of the centenary of the composer's birth, from St. Mark's, North Audley Street.  
Friday, March 17th.—Life Begins at Sixty (A Boarding House Saga), written and remembered by C. Denier Warren.  
Saturday, March 18th.—Scotland v. Ireland: a commentary on the International Rugby Union Football match, from Murrayfield (by courtesy of the Scottish Rugby Union).

**REGIONAL (342.1 m.)**  
Wednesday, March 15th.—Unborn Tomorrow, a short play for broadcasting by J. Alex Pemberton.  
Thursday, March 16th.—The Hallé Society's Concert from the Free Trade Hall, Manchester.  
Friday, March 17th.—Women, Women, Women! an argument in Bumbleton by T. Thompson.  
Saturday, March 18th.—Romney Marsh, feature programme.

**MIDLAND (297.2 m.)**  
Wednesday, March 15th.—Unborn Tomorrow, a short play for broadcasting by J. Alex Pemberton.  
Thursday, March 16th.—Please Teacher, a musical comedy.  
Friday, March 17th.—Orchestral programme.  
Saturday, March 18th.—The Microphone at Large: The Langtons.

**WEST OF ENGLAND (285.7 m.)**  
Wednesday, March 15th.—Dance Cabaret from the Royal Bath Hotel Ballroom, Bournemouth.  
Thursday, March 16th.—Carnival of Animals: choral and instrumental programme.

Friday, March 17th.—The Bournemouth Festival, from the Pavilion, Bournemouth.  
Saturday, March 18th.—Orchestral programme, from the Colston Hall, Bristol.  
**NORTHERN (449.1 m.)**  
Wednesday, March 15th.—Stagshaw Searchlight registers its 21st Target.  
Thursday, March 16th.—The Hallé Society's Concert, from the Free Trade Hall, Manchester.  
Friday, March 17th.—Women, Women, Women! an argument in Bumbleton by T. Thompson.  
Saturday, March 18th.—Slices of Life, a talk.

**WELSH (373.1 m.)**  
Wednesday, March 15th.—Wouldn't a perfect man be a perfect nuisance? The Briton Ferry (Glamorgan) Debating Society.  
Thursday, March 16th.—Wales versus Scotland: A General Knowledge Bee.  
Friday, March 17th.—The Cwmcaern (Monmouthshire) and District Musical Society.  
Saturday, March 18th.—Singing Festival from the Boys' Club, Bargoed.

**SCOTTISH (391.1 m.)**  
Wednesday, March 15th.—Canty Cantrips, a comedy musical production.  
Thursday, March 16th.—Wales versus Scotland: A General Knowledge Bee.  
Friday, March 17th.—Band programme.  
Saturday, March 18th.—Choral programme, from the Usher Hall, Edinburgh.

**NORTHERN IRELAND (307.1 m.)**  
Wednesday, March 15th.—Variety from the Royal Hippodrome, Belfast.  
Thursday, March 16th.—Tales of the Uncanny—6, La Belle Dame—reading.  
Friday, March 17th.—St. Patrick's Day, a play by Sheridan.  
Saturday, March 18th.—Table Tennis: A commentary on the International Match, Ireland v. Wales, from the Wellington Hall, Belfast.

## TELEVISION THE BOAT RACE

FOR the first time in the history of the University Boat Race many thousands of people will, on April 1st next, see both the start and finish, two television mobile units being in operation. Cameras on a balcony on the Surrey side at Putney will show the crews paddling to the starting-point just before 10.30 a.m., and it is hoped, by means of powerful telephoto lenses, to follow the crews till they round the bend at Craven Steps. John Snagge's running commentary on the National wavelength will keep viewers in touch with the race till the boats reach Barnes Bridge, where they will be picked up by television cameras on the roof of Mortlake Brewery and "held" till the finish, three or four minutes later.

The finish of the University Boat Race was televised for the first time last year, and the occasion was memorable in that the transmission was nearly wrecked by a workman who accidentally cut a telephone cable with his pick. For a time the transmitter at Alexandra Palace was cut off from all telephonic communication with

the television staff at Mortlake, and recourse was had to hand signals and scribbled messages held up before the television camera.

## CAREERS IN AVIATION

THE editor of Flying tells me that, driven to desperation by shoals of inquiries from readers wishing to take up Aviation as a profession, and not knowing how to set about it, he has decided to publish a series of strictly practical articles covering the whole range of this subject.

These articles are now appearing in Flying, and it is intended that they shall continue for six or seven weeks; in fact, until everything worth printing about the subject has been printed.

But all that is not intended to persuade readers altogether from writing for information about a Job in the Air. In fact, the editor is inviting inquiries for prompt answering by post. No reader can ask more than that, can he?

## FLASHES OF FACT

WHEN certain materials are heated they emit a stream of electrons. Use is made of this phenomenon in all types of valves used for wireless circuits. The filament or cathode is heated, and the electrons emitted are attracted to another electrode, known as the *anode*, which is always maintained at a positive potential by means of an applied high-tension. The current thus caused flows from the filament to the anode, the circuit being complete via the source of H.T., the negative of which is connected to the filament or cathode circuit.

IN the strict sense of the word, electricity is not made. It is possible, however, by imposing stresses and strains on matter, to cause the roaming electrons (see last week's issue) to drift along so that they constitute an electric current.

If the electrons drift or flow in one direction only, the current is said to be of a *direct current* (D.C.) nature. When the strains

imposed on the matter are such that they cause the electrons to flow *backwards* and *forwards*, then the current is known as *alternating current* (A.C.). Both D.C. and A.C. are present in radio apparatus.

DIRECT currents will only flow in a circuit consisting of a complete conducting path. Alternating currents will flow from one circuit to another even if the conducting path is broken, provided certain conditions exist. This difference must be remembered.

THE *farad*, which is the Unit of Capacity, is much too large for radio work, therefore, use is made of the *microfarad*, which is equal to 1,000,000th of a farad. As a matter of fact, the microfarad is still too large for many parts of a radio circuit so it becomes necessary to split these into small decimal parts. For short-wave work, when very small capacities are required, even these minute parts of a microfarad are far greater than that necessary for such designs so, once again, it has to be divided into 1,000,000ths,

and these are known as *micro-microfarads*. To convert micro-microfarads to microfarads it is only a matter of moving the decimal place six places to the left.

WITH an all-wave receiver, using a station or frequency marked dial, it is sometimes difficult to get the dial pointer to register accurately on the short waves. Matters can often be improved by *carefully* adjusting the *split* vanes which are fitted each side of the moving sections.

NEVER drill a chassis or panel until you have tried all the components in the positions they are to occupy and noted where their fixing bolts will be. Failure to do this often results in the layout being ruined.

WHEN tinning the ends of valveholder pins always slip a used matchstick in the socket, otherwise it is possible for the solder to run into it and prevent the valve pins from entering. Don't make wires so taut that they impose a strain on the sockets.

# Mr. CAMM'S ALL-WAVE 3-ORDER NOW YOUR PILOT KIT

**ALL-WAVE THREE KIT "A" CASH 50/- C.O.D.**  
or yours for 4/6 down, and 12 monthly payments of 4/6.

Kit "A" comprises all parts for building Mr. Camm's wonder economy receiver and includes specified Peto-Scott drive assembly, coils, choke, drilled chassis and panel, specified switch and gang condenser. Wire, flex, screws, etc., but less valves, batteries and speaker.

3 specified valves, cash or C.O.D. 21/9, or add 1/9 to Kit "A" deposit and 1/11 to monthly payments.

**YOU CAN ORDER ANY PARTS SEPARATELY—SEE LIST and BELOW**

Post paid on orders of 10/-.

- Peto-Scott specified set of Coils and Choke, 10/6.
- Peto-Scott specified Drive Assembly with calibrated station-name scale, 5/6.
- Peto-Scott specified Drilled wood chassis and panel, 5/-.
- Speaker. Recommended matched moving-coil type, 21/-.

## A Peto-Scott 1939 CHASSIS is an INVESTMENT

You cannot help saving on your new radio purchase providing you decide NOW a Peto-Scott modern 1939 replacement chassis. You get an up-to-date hand-tuning or press-button model at a fraction of a complete receiver shop price and you are insured against any possible valve troubles because they are included in the 12 months guarantee. An investment without a doubt.

### BATTERY ALL-WAVE S.G.3

MODEL 901. Powerful All-wave 3-valve S.G. circuit with Harries distortionless output pentode. Station-named dial. Wave-range 18-2100 metres. Balanced broadcast and screened short-wave coils. Volume control. Very low H.T. consumption. Size 11 1/2" wide, 9 1/2" deep, 9 1/2" high. Complete with 3 British valves and knobs. VALUE 5 gns.

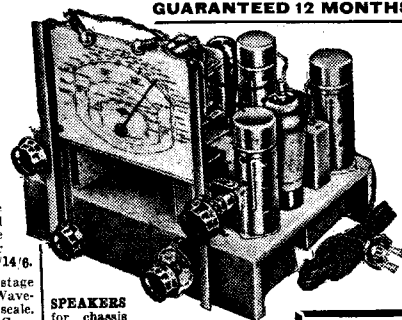
**We Save You £1 : 12 : 6 £3 : 12 : 6**

OUR PRICE. Cash or C.O.D., 7/6 or 5/- down and 12 monthly payments of 6/2. See speaker offer.

ALL-WAVE 7-Stage 5 HET Battery Model 903. Modern 4-valve circuit arrangement. 18-2,000 metres. Pentode output, sensitive and selective. Hand-tuning and 6-station press-button tuning. Complete with 4 valves. Normal list value, 7 gns. OUR PRICE, £5/12/6, or 6/9 down, and 18 monthly payments of 6/10. We Save You £1/14/6.

ALL-WAVE 8-Stage 5 HET A.C. Model 909. This advanced 8-stage 6-valve chassis represents wonderful value for the connoisseur. Wave-range 10-2,000 metres. A.V.C. Station and metre calibrated scale. 6-station press-button tuning. Pick-up sockets, 3 watts output. Complete with 6 valves. Normal list value £10/10/6. OUR PRICE, £7/19/6, or 9/9 down and 18 monthly payments of 9/9. We Save You £2/10/6.

ALL-WAVE MODEL 909 M.T. (Illustrated). Exactly as Model 909, but for those who prefer hand tuning only. List value £9/19/6. Our price £6/19/6 or 8/9 down and 18 monthly payments of 6/9. We save you £3. ALL MODELS EMPLOY DIAL ILLUSTRATED.



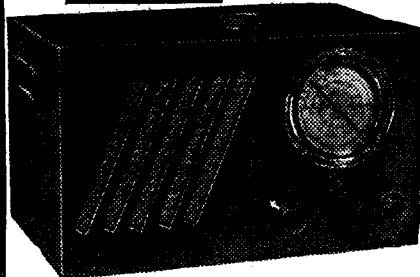
#### SPEAKERS

for chassis 901, 903, 21/- extra, or same deposit but add 1/5 to monthly payments (add 2/- to payments for 901 chassis). Speaker for 909 and 909 M.T. chassis 27/6 extra, or same deposit, but add 1/10 to monthly payments.

**5/- DOWN**

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## Efficient SHORT-WAVE WORK demands a TROPHY



### 4 models to choose from ALL at a great saving

**TROPHY 3.** Illustrated on left. Short-wave beginner or old hand, you'll find the Trophy 3 the most amazingly sensitive set you've ever handled. Wave range 6-500 metres, using self-locating coils. Calibrated scale. Built-in speaker. Phone jack. Valves included in usual 12 months' guarantee. Battery and A.C. Supplied with coils for 12-52 metres. The best value in short-wave gear obtainable anywhere.

#### BATTERY

Yours immediately for 7/- down and 18 monthly payments of 7/- (less batteries).

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#### A.C. MODEL

for 200,250 volt supplies. Yours immediately for 7/8 down and 18 monthly payments of 7/9.

**CASH £6.60 C.O.D.**

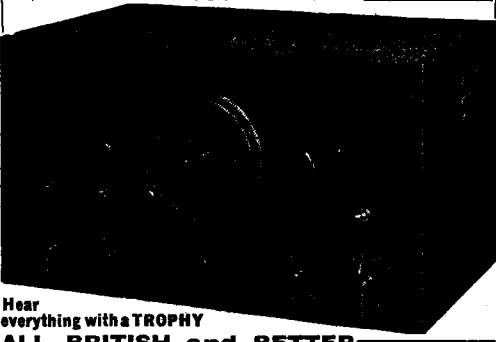
Available with all coils for 6-550 metres at extra cost only of 16/9, or add 1/- to deposit and payments.

**TROPHY 5** This 5-valve junior A.C. communication type is confidently recommended for serious short-wave work. Bandsread tuning on continuous wave-range of 10-550 metres. A.V.C. and B.F.O. switching. Built-in speaker and phone jack. A world-beater in performance and price. Cash or C.O.D. £9, or 10/9 deposit brings immediate delivery, balance in 18 monthly payments of 10/9. Not illustrated.

**10/9 MONTHLY**

**TROPHY 8** The set your dream about once you've sampled the real thrills of short-wave listening. 8-valve A.C. communication type for use with separate P.M. speaker. Wave-range 7-550 metres. R.F. on 11 bands, [A.V.C., B.F.O., Stand-by switch, Pitch control, continuous bandsreading—all these features plus a marvellous performance at a sensational low price. 12 gns. cash or C.O.D. or 15/6 down and 18 monthly payments of 15/6.

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**METERS.** Genuine Weston model 254. Central zero 1 to 15 amps, pol. mag. dead beat. Flush panel, 2 1/2 in. dial, nickel or black. Sale price 5/6. Mounted in solid mahog., 2 in. sq. 9/-, Hoyt CZ mov. coil milliammeters, 25-0-25 m.a., 10/-, Weston 5, 30 and 50 m.a. mov. coil milliammeters, 17/6. Turner 100 m.a. panel with shunt switch, 18/6. Switchboard Meters, all sizes and ranges.

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**A.R.P. HELPS.**—Portable Field Telephone Stations in leather case, 35/-. Unbreakable cable, 55/- per mile. **SIGNAL LAMPS,** Lucas day and night portable, 43/10/-, Aldis, C.A.V. ditto, 43/5/-, Army type D11 double headlamps, pocket type, 2/6 pair. Big Mains Alarm Bells, D.C. and A.C. Mains Motor Blowers, D.C., 55/-, A.C. 65/-.

**ELECTRIC PUMPS,** for A.C. or D.C., 12 v. to 220 v. Centrifugal all-bronze pump, throws 120 gals. per hour. 6ft. for Dug-outs, 67/6. Larger pumps for cesspools, etc., 25/7/6.

**AIR COMPRESSORS** for Spraying, Cleaning, Inflation, etc. Foot operated, 87/6. Electric, No. 1 size, 25/15/-, No. 2, Twin-cyl., 47/10/-. Refrig. Compressors, 35/-.

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The **A.C. NITNDAY** will keep your battery fit without attention. Model N/60, 100/250 volts A.C. and D.C. 6/8 volts 1 amp., 15/-, Model N/68, 100/250 volts to D.C. 6/8 volts 1 amp., 25/-, Model N/66, 100/250 volts to D.C., 6/8 volts 2 amps., 35/-, Model N/D12, 100/250 volts to 12 volts 1 amp., 38/-, Ditto, 12 volts 2 amps., with 6-volt tap, 55/-, 5 amp., 24/10/-.

**D.C. GENERATORS,** 120 watt 12.8, 6 volts 10 amp., with vee pulley, 35/-, 1 kw. 12/16 volts 30 amps., with vee pulley, 45/-, Shunt wound—110 volts 1 amp., 15/-; 200 volts 1 amp., 17/6; 200 volts 11 amp., 28/-.

**WINDMILL GENERATORS,** totally enclosed, ball-bearing, start charging at 300 revs., 6 to 12 volt, 8 amps., 35/-, 25 amps., 45/-.

**AS NEW E.D.C. ROTARY CONVERTERS.**—For A.C. Receivers, on D.C. 230 v. A.C. output. In silence cabinet, with filter. All sizes in stock from 50 watts to suit for televisions of 450 watts.

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**MOTORS FOR A.C. MAINS.** Midget 31/6, 220 volts 10/6, 1/60 H.P. with pulley, Type 50, 1,500 revs., 18/6. Encl. Induction 1/10 H.P. Motors, 2,500 revs., 35/-, Self-starting, 1/2 H.P., 1,425 revs., 55/-, etc., etc. **D.C. Mains Motors,** 1/40 H.P., 110 v., 12/6; 220 v. series, Type 1, 15/6, 1,750 revs., 15/-, Ditto, G.E.C., 230 v., 2,000 revs., 16/-, Croydon 1/12 H.P., 110 v., 18/-; 220 v. shunt, 1,700 revs., 22/6.

**SPARK COILS.** For test work, 1 in., 1 1/2 in., and 1 in. gap, eq. type, for 6-volt battery, 10/6.

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**H.T. TRANSFORMERS,** open type, 220 volts to 3,000 volts, 20/-, 5,000 v., 21/-, 7,000 v., 32/6, 12,000 v., 35/-, Trans. and Rectifier for Cathode Tube D.C. 2 m.a. at 2,000 v., 40/-, Steel-clad, 200 watts, 50 cycles, 10,000 v., 40/-, 400 watts, 4,000 volts, 60/-, 220 volts 200-300 v. 60 m.a., 74v., 24/-, 51 v., 14 a., 18/-, E.H.I. Mains Rectifier Transformers 120 volts 20 m.a. output, 8/6, H.M.V. Transformers, any A.C. Mains input, 350-0-250 volts 80 m.a., 4 volts 2 amps., and 4 volts 3 amps., 2/6.

**TRICKLE TRANSFORMERS.** 200/240 v. to 3 v., and 8 v. 1 a., 5/6 Mains 110/220 v. to 50 v. 30 m.a., and 4 v. 1 a. and 4 v. 3 a., 4/6.

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**LOW COST SOUND RECORDING.** Blanks now 3/3 per dozen. Electric FEIGH set has ball-bearing centre gear box and geared traverse rod. Set with Tracking Gear, Pick-up and Tone-arm fitted diamond, 37/6. Tracker gear only, less Pick-up and Tone-arm, is 21/6. Diamond Cutter Needles fit all pick-ups, 7/6. 6 in. Blank Discs, 3/3 per dozen. Complete Acoustic Sets de Luxe, 13/-; No. 2, 10/6; Junior Type, 5/6 each. Complete.

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## Bias Measurements

A POINT which often puzzles listeners is the measurement of the bias voltages applied to either battery or mains receivers. In the case of ordinary battery bias the actual indication on the tapping on the battery should be sufficient, and the battery should last an appreciable time, provided that it is used for L.F. work only. There is no current drain and therefore, if any test is called for it should only be necessary to check the total voltage of the battery with the usual voltmeter. In the case of automatic bias, however, doubts have been expressed from time to time as to whether the battery can be

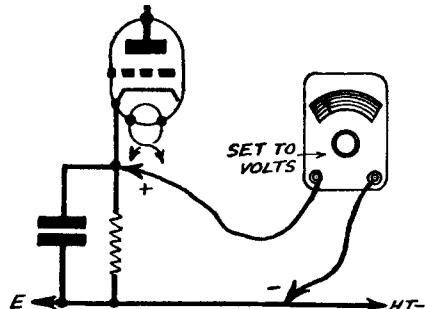
transformer type the aerial may, of course, be joined to either the primary or the secondary, but in the latter case it should be remembered that the winding will be larger than when the coil is designed primarily as a simple grid coil and thus will not tune to so low a minimum as when the primary is in circuit.

## Eliminating and Tracing Hum

WHEN using mains apparatus it is often found that if headphones are being worn, the background of hum may prevent a weak distant station from being heard. In such a case, the first step is to find what is causing the hum, and this means that the stage in which it occurs must be located. The best way of doing this is to short-circuit the grid of the output valve direct to earth. If, when this is done, the hum decreases, it indicates that the hum is coming from an earlier stage, and thus the next stage should be similarly short-circuited. If the hum remains constant when one grid is shorted it will indicate that the hum originates in that stage and it should not take long then to find the cause, testing by-pass condensers, decoupling components and applying the usual tests for interaction of L.F. feed-back.

## A Safety Hint

IN A.C.-D.C. receivers it is often found that the series connected rectifying valve becomes damaged due to failure of the smoothing condensers. Tests which have been carried out show that this is primarily due to the set being switched off when the incoming A.C. supply is at a particular point in its cycle. Although it is therefore a hundred-to-one chance that this will occur, the risk is present and the usual method of preventing the surge-trouble should therefore be taken. For the benefit of those who are not familiar with the arrangement it should be mentioned that it consists merely of the insertion of a low-value resistance in series with the valve and smoothing choke, connecting the smoothing condenser on the set side of the resistance. This will then take care of any surge which arises, provided that a resistance with a suitable wattage rating is employed.

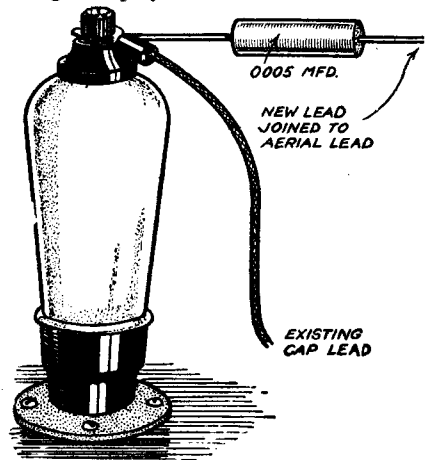


Measuring bias voltage in an indirectly-heated valve circuit.

measured. It is, of course, no different in principle from the use of a battery, and thus a voltmeter across the biasing resistor will show the bias which is being applied to the valve and this applies to automatic bias obtained in a battery set and to that used with indirectly-heated valves. The only point to remember when measuring the voltage in these cases is that the meter must be connected the right way round—the positive terminal of the meter being placed on the cathode and the negative on the earth line. The cathode is, in other words, positive with respect to the grid (which is, of course, returned to the earth line.) The measurement of voltage in this way checks the efficiency of the components used in the bias circuit, and by measuring the anode current at the same time the accuracy of the resistance value may also be checked.

## Cutting Out H.F. Stage

SOME members are using receivers employing an H.F. stage for long-distance work, but find that when receiving the local on the same set the H.F. stage is not needed. Similarly, when the efficiency of an H.F. stage is in doubt, it is desirable to cut out the stage. The simplest way of carrying out this modification is merely to remove the aerial lead from the aerial terminal and connect it, through a fixed condenser, to the anode of the H.F. valve. This connects the aerial, in effect, to the detector grid coil, and although it may be joined to the anode and lead as shown in the accompanying illustration it may be desirable to disconnect the existing anode wire and join the aerial to the lead only. The H.F. valve may then be removed from its socket to effect filament current economy, or for replacement purposes. If the detector coil is of the



How to cut out an H.F. stage for test or economy purposes.



# Radio Clubs and Societies

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

## THE CROYDON RADIO SOCIETY

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

MR. DE GRUCHY, of Messrs. Everett Edgecumbe, gave a very informative talk on "Radio Servicing Instruments" to members of the Croydon Radio Society in St. Peter's Hall, Ledbury Road, South Croydon, on Tuesday, February 28th. His account was most interesting in his detailed description of moving-coil, moving-iron, and electrostatic instruments, explaining their uses and comparative merits. Numerous circuits and component values were given, showing how an accurate current meter may be used for determining a wide range of voltages and capacities. Very closely followed was Mr. De Gruchy's method of testing electrolytic condensers, field strength measurement, and the application of the decibel scale.

He was also able to give members useful hints for obtaining the best from their own equipment, and concluded by describing the many difficulties that might be encountered, due to increasingly high standard demanded of high-grade measuring instruments. He stressed the care and ingenuity displayed by the manufacturer in overcoming these difficulties. Next Tuesday, March 21st, Mr. G. Parr, of the Edison Swan Electric Co., Ltd., will deal with "Electro Encephalography." The demonstration will be on very novel lines and PRACTICAL AND AMATEUR WIRELESS readers are invited to join members in what should prove a very interesting evening.

## THE EXETER AND DISTRICT WIRELESS SOCIETY

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

ON Monday, February 27th, members of this society were conducted over the Exeter Telephone Exchange.

This visit had been kindly arranged by the Postmaster, and members visited the manual room, and were also shown the radio gear, by which it is possible to use twelve frequencies on one pair of wires. Automatic apparatus was also shown, and many keen questions were put, and answered very lucidly.

All those interested should get in touch with the secretary at the above address.

## INTERNATIONAL SHORT-WAVE CLUB (LONDON).

**Headquarters:** R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8.  
**European and Colonial Representative:** Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

A VERY interested audience listened to a lecture on "Amateur Transmitting" given by Mr. E. J. Pickard (G6VA) at the meeting of the International Short-Wave Club (London Chapter) given at the R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8, on the evening of Friday, March 3rd. Mr. Pickard described a number of circuits using tetrodes and pentodes, and with illustrations on the blackboard he showed how simple it was to build up a cheap but efficient radio transmitter. Afterwards, some modern commercial transmitters were shown to the members. Readers residing in the district are invited to attend the Friday evening meetings which commence at 8.30 p.m. Morse instruction is given before each meeting.

The International Short-Wave Club will hold its Sixth Annual Dinner and Dance at Maison Lyons, Shaftesbury Avenue, W.1, on Saturday, April 15th. The function will be attended by radio amateurs and short-wave listeners, together with representatives of broadcasting organisations, and the radio manufacturers, etc. Tickets are 7s. each. Readers of PRACTICAL AND AMATEUR WIRELESS are invited to attend. Early application for tickets is essential.

## SHEPPEY AMATEUR RADIO CLUB

**Headquarters:** 160 Invicta Road, Sheerness, Isle of Sheppey.  
**Hon. Sec.:** F. G. Maynard (2CVM), 160, Invicta Road, Sheerness, Isle of Sheppey.  
**Meetings:** Thursdays at 7.30 p.m.

THE above radio club held a reorganisation meeting on Thursday, March 2nd, for the year 1939-40, and it was well supported. Election of officers took place, and Mr. F. H. Lane (G3GW) was elected chairman; with Mr. F. G. Maynard as hon. sec., and Mr. S.

Ainge as hon. treas. respectively. Subscriptions, etc., were discussed, and put to the vote, and it was decided to create and maintain a definite programme for the year. The construction of a club receiver of the superhet class was agreed upon, and application is to be made to the authorities for an artificial aerial licence for the use of the club, when it is hoped the Theory and Practice of Transmitting can be gone into. Field days, DX contests, morse classes and club facilities were discussed, and it is hoped membership will be increased, to embrace all interested in amateur radio on the island. For further particulars please apply to the hon. sec. at the above address.

## KILMARNOCK AND DISTRICT SHORT-WAVE SOCIETY

**Headquarters:** Wardneck Receiving Station, Glasgow Road, Kilmarnock.  
**Hon. Sec.:** R. Mitchell, 2FSD, 151, Bonnyton Road, Kilmarnock.

THE above society has commenced with a membership of 25 members, included in which are two full calls and three A.As. The object of the society will be to further the knowledge in short-wave receiving and transmitting in the district. A morse class will also be started, to be in two sections, beginners and advanced. Meetings will be on Tuesdays, Thursdays, 8-10.30 p.m.; Sundays, 2.30 p.m. onwards; and subscriptions are 6s. annually and 6d. per week for senior members, and 2s. 6d. annually and 3d. weekly for junior members (16-18). Anyone genuinely interested will be welcomed at above headquarters.

## EASTBOURNE AND DISTRICT RADIO SOCIETY

**Hon. Sec.:** T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

AT the meeting held on Tuesday, February 28th, Mr. J. H. Ayre (G3AT) gave a lecture entitled "Five-metre Amateur Communication." First of all he described the theory of radiation and its accompanying phenomena. He mentioned that commercial radio stations do not use low wavelengths, such as 5 metres, because of the erratic conditions that occur. The different types of transmitting circuits were also explained, The Ultra Audion, Hatley, etc., receiving circuits were also studied together with circuits which could be used for transmitting or receiving by the turn of a switch. Lastly, he dealt with aerials suitable for these low wavelengths. Full particulars of membership can be had from the hon. secretary at the above address.



After fifteen years in the radio trade Mr. R. H. Nunn has resigned from Regentone.

Mr. T. A. Macauley, managing director of Scottish Securities Corporation, has been elected a director of A. C. Cossor, Ltd.

Mr. N. H. Blundell, after eight years' association with the editorial and technical staffs of "The Trader," has resigned to join the Radio Manufacturers Association as assistant to the secretary, Mr. R. P. Browne.

Mr. Montagu Norman, Governor of the Bank of England, will broadcast, on March 16th, the fifth talk in the B.B.C. Empire series, "The City of London." Owing to Mr. Montagu Norman's prominent position, his intimate knowledge of the Bank and the wide interest taken in his subject, his talk will also be radiated to British listeners in the National programme. This will be Mr. Norman's first broadcast

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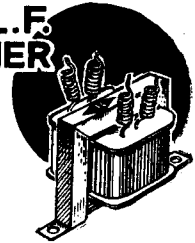
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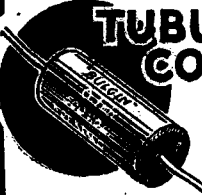
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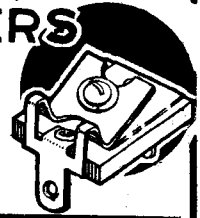
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 List No. F/P.C. 205, .005  $\mu$ F., 6d. each.  
 List No. F/P.C.P.1, .1  $\mu$ F., 10d. each.

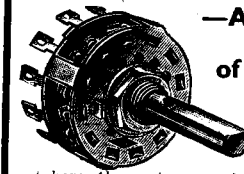
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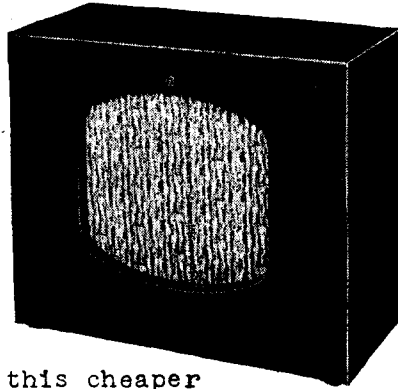
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## TRADE NOTES

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### Cossor Double-beam Oscillograph

A NEW type of oscillograph is announced by Cossor, and this provides a double beam giving simultaneous indication of two independent variables. The cathode-ray tube which is used has a diameter of 4 1/2 in. and a screening electrode placed within the Y deflector plate zone splits the focused beam. Each Y plate thus affects independently a half of the beam. The two traces, though electrically in phase, are then spacially 180° out of phase. The X deflector plate is common to both beams. The time base which is fitted covers a frequency range from 5 c.p.s. to about 200,000, and the flyback is automatically blacked-out at high repetition frequencies. The synchronisation is positive and a trigger control provides a means of controlling flyback. All of the usual controls are fitted, and the price is £25.

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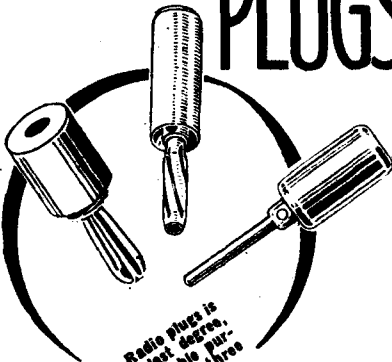


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#### APPENDIX

Symbols; Abbreviations; R Code; Dielectric Constants; Wavelength Frequency Conversion Table; Coil Winding Tables; Wire and Sheet Metal Gauges; Copper Wire Data; Metric Equivalents; Useful Formulae.

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# LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

## That Elusive Friendly Spirit!

SIR,—I am deeply interested in the correspondence regarding the lack of friendly spirit shown by wireless amateurs.

A short while ago I wrote to the secretary of a radio club whose proceedings were reported in your columns. I received a very nice letter from him assuring me of a warm welcome if I came to the next meeting of the society. I attended the meeting hoping to establish friendly contact with people who were interested in all forms of radio. But the warm welcome was sadly lacking! I was introduced to no one, and no member evinced the slightest interest in me. I felt I was intruding!

I believe I am a reasonably social person. My job depends largely on my ability to establish friendly relations with people who come from every class, and I think I have been successful in doing this. I am not particularly pushing or boastful (at least, I hope I'm not!), but I felt I could neither give nor gain benefit by becoming a member of this society.

Surely, every radio society committee should appoint some member, whose job is to devote time to making new members really welcome; to find out what he is interested in, and to show him where he could be of benefit to the society.

I am an old hand at this wireless game, of the "2 Emma Toc, Writtle" days, and would greatly welcome an "Old Timers' Society," such as proposed in your journal recently. But please don't go back before 1921 as the limit for membership, for that was the date when I constructed my first crystal set, with "spider" wound coils, well soaked in paraffin wax, the whole mounted on a large drawing-board!

I cannot believe such a society could fail to show the spirit of friendliness of the radio amateur of the early 1920's.—"OLD TIMER" (Tenterden).

## Midget 1.5 Valves: Correspondent Wanted

SIR,—I thank you and your paper for publishing my letter about a five-valve superhet, and am also very grateful to all the readers who have commented on my suggestion. Another suggestion which I think would meet with the approval of your readers would be the production of British midget valves, such as are on the market at present, with 1.5 volt filaments which could then be used with British cells of the 1.5 variety. Many of these types of valves have appeared on the American market, but I have not seen any over here in this country. With the summer months before us a series of this type of valves would be very welcome to most amateurs, as it would dispense with the carrying of heavy L.T. batteries when these valves were used in small sets. I am very interested in short-wave work in all its phases, and also in transmitting, and I would be very pleased

if any of your readers would care to get in touch with me with a view to correspondence on the subject.—C. HEYNE (King's College, Taunton, Somerset.)

## A 14-Mc/s Log from Somerset

SIR,—Readers may be interested in the following log of stations heard on 14 mc/s during the last three weeks. Reception was with phones, using a 1-v-1 T.R.F. receiver, battery driven, and a  $\frac{1}{2}$  doublet aerial. Readability and signal strengths are in brackets, and all reception on phone except for the ZLs and CR7. VU2CQ (55), 2SA (56), VK6MU (56), 6FL (55), 3TL (55), 3KX (56), 2OP (55), 2AGU (56), 3BM (57), 4JP (56), 5CS (44), VK7CM (55), VP9G (56), VP3AA (56), VS7GJ (57), XZ2PB (56), HH2B (58), W6MZD (55), ITH (56), IKQ (56), CQS (56), CO2RD (56), 2WM (56), PKIRI (55), 4KS (56), KAILB (57), 1CS (56), 1ME (57), 1JP (56), ZS1BX (55), 2AZ (57), 4H (55), 5Q (56), 6AJ (56), CR7AB (56), ZL1KR (55) and 4FW (56).—FRED J. LUCAS (Taunton).



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# LATEST PATENT NEWS

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**ALTERNATING CURRENT MOTORS.**—General Electric Co., Ltd., Peters, W. H., Hunter, S. G., and Chubb, A. A. No. 494026.

The direction of rotation of motor 37, for driving a radio tuning device, is governed by the actuation of relay A or B (Fig. 1) through a starter device shown in Fig. 2,

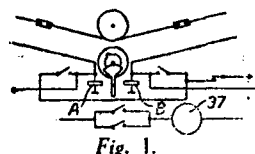


Fig. 1.

in which 1 and 2 are the stator and rotor of the motor proper, the shaft 3 of which carries a disc 4 having a projection 5 and a spring-loaded stud 10 which bears against the inner side of a pivoted stop lever 6. This lever is swung about its pivot by members 11, 12 operated by relays A or B respectively, and when so operated to either extremity, one or another of the projections 8 or 9 lies in the path of the cam 5. The

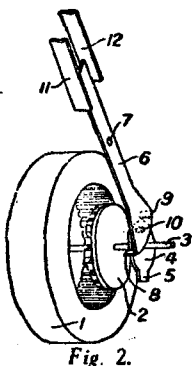


Fig. 2.

motor may initially rotate in either direction, but in the position shown clockwise rotation is prevented. The motor then rotates anti-clockwise and the frictional contact of the stud 10 then moves lever 6 to the mid-position so that both projections 8, 9 are clear of the cam 5. Specification 433298 is referred to in the first Provisional Specification.

**LOUDSPEAKERS.**—Murphy Radio, Ltd., and Brayshaw, G. S. No. 494,696.

A loudspeaker has a disc 3 (Fig. 3) of sound-absorbing material disposed on the axis of, and in front of, the diaphragm 2 and of such a size that it limits the transmission of the high-frequency vibrations which are

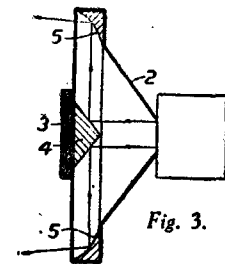


Fig. 3.

concentrated along the axis. A conical reflector 4, having a diameter approximately one half that of the disc 3, reflects the axially-directed vibrations to a curved reflector 5 surrounding the periphery of the diaphragm.

**INDUCTANCES.**—Lorenz Akt.-Ges., C. No. 494467.

A variable inductance comprising relatively movable windings, 1, 2 (Fig. 4) is provided with a short circuited winding 4 arranged substantially perpendicular to one of the windings 1, 2. The winding 4 may be formed of copper sheet and may be secured to either the fixed winding 1 or the movable winding 2. Two short circuited windings may be provided, one being secured to the winding 1 perpendicular thereto and the other being similarly associated with the winding 2.

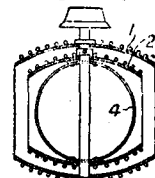


Fig. 4.

## AERIAL IMPEDANCE MATCHING

WITH the steady increase in the number of people who are arranging for the installation of television receivers in their homes, the technical importance of the aerial and feeder equipment is becoming more fully recognised. Radio reception has suffered considerably in the past from the inefficient, unsightly aerials which were put up to serve as signal collectors, and too often has a set been blamed for inferior results which could be laid at the door of the aerial and lead-in. With television, however, especially when far distant from the transmitting station, the whole problem has to be tackled in a satisfactory manner if good picture quality is to be guaranteed. In every case the reception site is surveyed by a qualified service engineer who advises the set owner as to the best position for the aerial itself.

### Special Arrangements

A variety of circumstances will govern the final choice, and among these are the absence of screening by trees or buildings, freedom from the radiated fields of any electrical source of interference both domestic and commercial, ease of erection and the keeping of the length of feeder cable down to the barest minimum compatible with all prevailing circumstances. At present, most of the aerials are mounted exterior to the house, and a rigid vertical structure reveals to all the neighbours that a television set is in operation in the immediate locality. Care must be taken to ensure that the feeder cable chosen is of good quality or the signal will suffer many decibels loss in its passage from the dipole aerial to the set itself. Another important point to study is in relation to satisfactory matching of the impedances of the aerial, feeder, and set input circuits. If the ohmic values at these three points show any wide divergence, then the picture will suffer and phase distortion become evident by the showing of multiple images, instead of a clear-cut sharply defined picture edge. The feeder plugs and sockets may be soldered efficiently, otherwise this can produce mismatching as well as erratic signal strength. If attenuator pads have to be included to cut down signal strength, then the correct value resistances must be used, or here again impedance matching will suffer, and phase distortion once more make its presence felt. By eliminating any possible trouble at this point it will give the set a better chance to show its capabilities, and reduce service calls.

## NEW PATENTS

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

### Latest Patent Applications.

- 5055.—Agate, C. S.—Tuning-controls for radio-receivers. February 16.  
5757.—Baird Television Ltd., and Anderson, E. G. O.—Electronic scanning devices for use in colour television systems. Feb. 21.  
5277.—Baird Television, Ltd., and Baird, J. L.—Stereoscopic projection. Feb. 17.  
5565.—Baird Television, Ltd., and Maitland, C. E.—Radio receivers. February 20.  
5278.—Berger, J.—Projector with rotary coloured screens attached to radio reception apparatus. February 17.  
5331.—Blue, A. H., and Wood, R. D.—Radio circuits. February 17.  
5261.—Cole, Ltd., E. K., and Kemp, R.—Press-button tuned receivers. February 17.  
5738.—Farnsworth Television, Inc.—Radio frequency multipactor amplifier. February 21.  
5526.—Kear, F. G.—Radio transmitting systems. February 20.  
5325.—Kolster-Brandes, Ltd., and Beatty, W. A.—Wave transmission systems involving volume range compressions, etc. February 17.  
5323.—Kolster-Brandes, Ltd., and Smyth, C. N.—Cathode-ray tubes. February 17.  
5141.—Murphy Radio, Ltd., Connelly, F. C., and Adamthwaite, F.—Pre-set tuning means for radio receivers. February 16.  
5233.—Rudkin, E. P.—Wireless receiving systems. February 17.

5652.—Shevlin, J. T. (Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten).—Variable inductance tuning arrangements. February 20.

5484.—Telephone Manufacturing Co., Ltd., and Whitehead, C. C.—High-frequency thermionic valve systems. February 18.

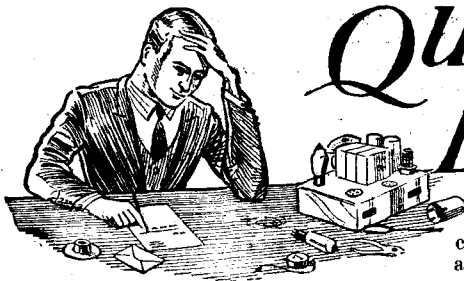
5465.—Telephone Manufacturing Co., Ltd., and Whitehead, C. C.—Short-wave tuning systems. February 18.

### Specifications Published.

- 500,873.—Pye, Ltd., Butler, C. E. M., and Root, E. V.—Adjusting means for radio receivers and the like.  
500,876.—Cackett, F. W. (Telefunken Ges. für Drahtlose Telegraphie).—Television signal receivers and the like.  
500,978.—Fernseh Akt.-Ges.—Television and like systems and apparatus therefor.  
500,809.—General Electric Co., Ltd., and Poperwell, F.—Television receiving apparatus.  
500,818.—British Thomson-Houston Co., Ltd.—Automatic selectivity control arrangements for radio receivers.  
500,991.—Radioakt.-Ges. D. S. Loewe.—Low-frequency correction of television amplifiers. (Cognate Application, 31289/37).  
500,828.—British Thomson-Houston Co., Ltd.—Radio receiving apparatus.  
500,762.—Schwarzwald, A.—Contrivance for use in conjunction with wireless or television receiving sets.  
500,776.—Michaelis, E.—Cathode-ray tubes, especially for television. (Divided out of 491,050).

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





# QUERIES and ENQUIRIES

## I.F. Transformer Connections

"I recently had two I.F. transformers given to me, and these have apparently been dismantled from a commercial set as they have no name and no reference numbers or letters on the bases. Coloured leads are attached to the bottom, and on one there are only four leads whilst on the other there are six. On the first the leads are coloured red, green, black and blue, and on the other they are the same with the addition of two leads coloured yellow and brown. Is there a standard colour code, and how do I connect these components?"—D. W. (Slaitwhite).

THERE is a colour code adopted in America for these particular components, but it is not general in this country. It would appear that your components follow American practice and the code is as follows: Blue—Anode; Red—H.T.; Green—grid; Black—earth or G.B. The transformer with six connections is apparently a variable-selectivity component, and the only component which we know with two leads coloured yellow and brown is of the type requiring a change-over switch across these two and to earth, and this provides a sharp and a flat tuning position by varying the peak effect of the transformer.

## S.P.C.O. Switch

"I am trying to build a set recently given in your pages, and in this is a switch marked S.P.C.O. I ordered the parts, and the only component I cannot identify is a toggle switch, Bulgin type S.81. This has two contacts at each end, and I am afraid I cannot see how to use this in the circuit diagram, as the connections are not very clear on my copy. Could you please help me in this case by explaining simply in words as I cannot yet properly understand theoretical diagrams?"—T. E. R. (E.17).

THE letters S.P.C.O. stand for single-pole change-over, and the switch you have obtained is the correct type. If you connect a meter and voltage source to the contacts you will find that the pair at each end are shorted as the toggle is operated, and, therefore, to convert it for the circuit in question all that is needed is to connect together the contacts on one side (that is, at opposite ends). This pair of bridged contacts is then regarded as the arm of the change-over switch and the remaining two points are for connection to the appropriate parts of the circuit.

## Field Replacement

"In one of your back numbers I read that an energised loudspeaker field could be replaced by a special type of choke. I had a speaker of this type and discarded it, using in its place an ordinary L.F. choke with a D.C. resistance of about 500 ohms in series with a 2,000-ohm wire-wound resistance. This seems to work quite well, and I wonder if it is actually necessary to use the special type of choke mentioned by you. What improvement would I get by replacing my ordinary choke and resistance by the special choke?"—J. R. T. (Margate).

THE special field replacement choke is wound to a very high inductance, comparable with a standard-speaker field, and has a suitable resistance and current carrying capacity. In a powerful multi-valve receiver, of the type which generally includes an energised speaker, an ordinary L.F. choke might not provide sufficient smoothing, as the inductance drops with increase of current and high-current chokes are generally of low inductance, unless specially made. Your arrangement is, of course, quite in order for a small set where the current is not very great, and provided that there is no hum you can leave your present arrangement as it is.

## Television Reception

"Would you please send me a circuit of a wireless set which receives between 5 and

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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.

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

10 metres? Would you also let me know as much as possible about 'scanning disc' television as I am very interested in it? The set should be a two-valver, battery. As cheap as possible. I want it for receiving Alexandra Palace, 15 or 16 miles away."—R. L. (Bromley, Kent).

AS you are interested in the present television signals we would remind you that a scanning disc is not suitable for the purpose. If, therefore, you are thinking of building the set to pick up the vision signals you are doomed to disappointment, and a more powerful set capable of feeding a cathode-ray tube must be used. You can, of course, receive the sound signals on a standard simple short-wave receiver, and if this is all you need we would refer you to the article in our issue dated December 5th, 1936.

## A.C. Milliammeter

"I have a good meter reading 1 milliamp and it is of the moving-coil type. I wish to use this for reading A.C. currents up to 50 mA, and should like to know how I can do this. I believe I shall have to rectify the supply first, but it is this which I am not clear about."—J. E. S. (Dulwich).

IF you connect the meter across a special metal rectifier of the 1 mA type, and then connect the A.C. supply to the remaining two terminals on the rectifier the meter will give you a current reading which is 11

per cent. higher than the meter full-scale indication. You can construct shunts to multiply the range in the usual way, remembering always that the reading is increased by the above-mentioned amount.

## Wavelength Measurements

"I am a beginner and am now taking a very keen interest in radio. There is one point which is puzzling me at the moment, and that is wavelengths in metres. Are these metres the same as the French linear measurement, and if so what is the relation between them and the signals? Perhaps you could explain this puzzling point."—S. R. (Cambridge).

A METRE in linear measure is 1.0933 yards. The radiations from a transmitting aerial are in the form of waves, having the same form as waves in water. The measurement from the top or crest of one wave to the next is the wavelength and is measured in metres. The number of waves per second is the frequency, and owing to the rapidity of the oscillations this is measured in kilocycles per second. The latter measurement is actually preferable as it enables one to understand the character of various transmissions better than when wavelengths are used. For instance, short waves are of higher frequency, and consequently we are able to design apparatus better when knowing that very high frequencies are to be dealt with than when thinking in terms of short wavelengths. It is becoming increasingly popular to give frequencies of stations, and eventually wavelengths in metres may be dropped—at least in technical works.

## Top Caps

"I have just replaced a valve in my set and am confronted with the fact that the previous valve had the anode joined to that point, and now apparently the grid is taken to this terminal. Is there no standard for this particular cap, and how can one tell which electrode is joined to the cap?"—H. I. C. (Leeds).

UNFORTUNATELY there is no standard, and some types of valve have the grid, some the anode, and in others the diode joined to the top cap. You cannot tell by inspection what electrode is joined to the cap and must, therefore, consult the makers or their instructional data sheet regarding the valve. There are even triodes in which the grid is taken to the top cap, and care is, therefore, necessary when replacing valves with top caps.

## Noise Suppression

"In reading a specification of a set recently I saw the term 'noise suppression' mentioned. Could you explain in simple terms what this is and why it is used in some sets and not in others?"—J. R. (Frinton).

THE term is really an abbreviation of inter-channel noise suppression, and is applied to sets in which a very high degree of H.F. amplification is employed where special circuits are incorporated to act against the A.V.C. circuit. To enable fading to be counteracted automatic volume control circuits increase the gain of H.F. or R.F. stages, and when a signal fades there is a risk of the background noise rising as the gain of the H.F. valves is increased by the A.V.C. circuits acting on the fading signal. A noise-suppression circuit prevents this, and consequently it is only needed with a powerful receiver employing A.V.C.

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*Handwritten notes and signatures at the bottom of the page.*

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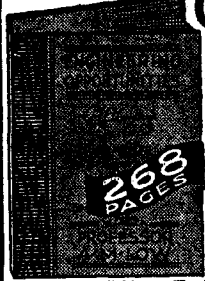
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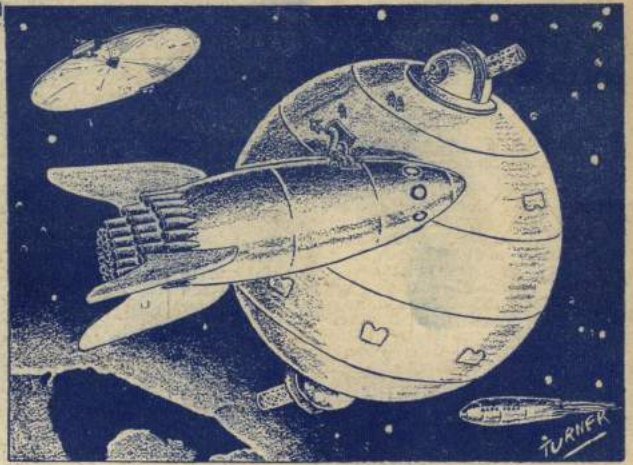
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