RADIO IN THE SERVICES—See page 23.

A NEWNES PUBLICATION

Practical Wireless and PRACTICAL TELEVISION

3D.

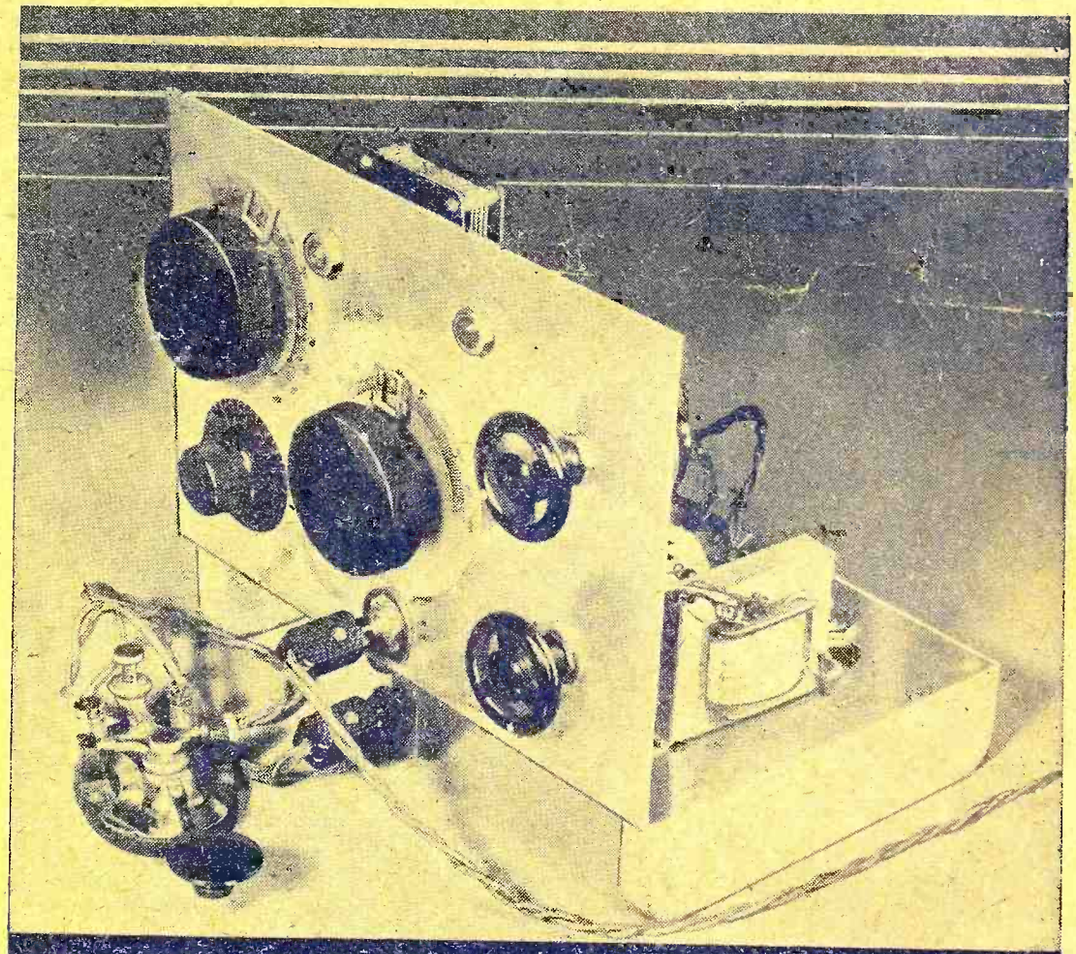
Edited by F. J. CAMM

Vol. 16. No. 392.

EVERY WEDNESDAY

Mar. 23rd, 1940.

Contents



Combined Oscillator and Receiver

Practical and Wireless
★ PRACTICAL TELEVISION ★
EVERY WEDNESDAY
Vol. XVI. No. 392. Mar. 23rd, 1940.
EDITED BY F. J. CAMM
Staff : W. J. DELANEY, FRANK PRESTON, H. J. BARTON CHAPPLE, B.Sc.

ROUND THE WORLD OF WIRELESS

Morse Practice

MANY amateurs are now taking up morse practice with a view to obtaining a post in the Services as wireless operator. A simple oscillator may be built up for morse practice, but many listeners also wish to tune in commercial stations so that they can obtain actual practice at varying speeds. Thus a good short-wave set is also a necessary adjunct to morse practice. To avoid the trouble of having two separate units it is possible to make up a combined oscillator and receiver, and in this issue we give constructional details of such a unit. It must be emphasised that this is not a transmitter and does not radiate signals in any way. When the switches are operated it becomes a simple single-valve receiver of standard short-wave design. In the alternative position, certain parts of the circuit are cut out and others are connected so that it becomes a standard L.F. oscillator, and so that varying pitches may be obtained a tone-control device has been included. In this way familiarity with various notes will be obtained, and the practice is thereby improved as the user does not become familiar with one tone.

Latest Australian Broadcast Schedules

VLR, Melbourne, now uses the following wavelengths and call-signs :

Call-signs : Before 5.15 p.m., VLR3. After 5.30 p.m., VLR.

Wavelengths : Before 5.15 p.m., 25.25 metres. After 5.30 p.m., 31.32 metres.

Power : 2 kilowatts.

Frequencies : Before 5.15 p.m., 11,850 kilocycles. After 5.30 p.m., 9,580 kilocycles.

Location : Lyndhurst, near Melbourne.

All mail matter should be addressed to : Australian Broadcasting Commission, Short Wave Section, Box 1686, G.P.O., Melbourne, Australia. Cables and telegrams : "Abcom," Melbourne.

The Red Cross

THE Midland Region provides for the Home Service on Good Friday a feature programme about the history, growth and development of the Red Cross. Everybody knows of the movement, but few could tell how it originated and exactly under what conditions it works. Actually the inspiration for founding it came from a Swiss banker, M. Henri Dunant, who had this splendid humanitarian idea of non-combatant volunteers, under an international emblem, working for the care of the wounded. The Geneva flag was chosen, and it was under the Geneva Convention of 1864 that the terms of service were laid down. The international character of the movement will be stressed in the programme. An account will also be given of the British Red Cross Society and its activities up to date. The producer will be Robin Whitworth.

"The Colonel's Been Murdered at Last"

"THE Colonel's Been Murdered at Last," to be broadcast on March 23rd, is a skit on the usual detective thriller, written in a somewhat facetious vein. The leading figure, Colonel Wyndham Baggerley-Chatteris, is the perfect club bore, and unlike most club bores, he gets his deserts. He gets them, however, in a distinctly novel way, and which many sufferers from those tellers of interminable stories of what happened in '02 would probably like to emulate. The play will be produced by John Cheatle, to whose care most radio thrillers are now entrusted.

Cinema Organ from Glasgow

GERALD SHAW, the Scottish cinema organist, will play on March 23rd at the organ of the Paramount Theatre, Glasgow. His programmes are notable for their light touch and the original way in which his items are arranged.

Lulu Belle and Scotty, ballad stars of WLW, Cincinnati, will soon be seen here in a picture entitled "The Village Barn Dance," the second picture they will have made this year. The WLW stars will be seen with a supporting cast that includes Don Wilson, announcer on the Jack Benny programme ; Vera Vague (Barbara Jo Allen), radio chatterbox, and the Kidoodlers, NBC harmony group. Lulu Belle and Scotty are accompanied by Linda Lou, their young daughter.

Editorial and Advertisement Offices :
"Practical Wireless," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. 'Phone : Temple Bar 4363.
Telegrams : Newnes, Rand, London.
Registered at the G.P.O. as a newspaper and for transmission by Canadian Magazine Post.

Royal Marines Band

THE Band of H.M. Royal Marines, Plymouth Division (by permission of Brigadier R. C. A. Glunicke, A.D.C.), conductor, Major F. J. Ricketts, will broadcast on March 23rd in the Home Service and Forces programmes. Their broadcast will begin with the March fantasia, "Colonel Bogey on Parade," by Kenneth Alford, which, as is generally known, is a pen-name for Major Ricketts. He wrote the famous march at Fort George, Inverness-shire, in 1913. In addition to military marches, Major Ricketts has composed much popular music, and his arrangements for military bands range from symphonies and overtures to popular numbers. For 19 years he was conductor of the Band of the Argyll and Sutherland Highlanders; in 1930 he was transferred to Plymouth.

Other items in the programme will include Rimsky-Korsakov's "The Flight of the Bumble Bee" and a selection from "The Fleet's Lit Up."

Reading a Theoretical Diagram

This Article Will Help the Beginner to Overcome the Difficulties Experienced in Early Stages - - - By L. O. SPARKS

THE average beginner can get along quite well with his first constructional effort, when he is working to one of the full-size blueprints produced by PRACTICAL WIRELESS. The trouble only begins when the time comes to carry out some modifications, or when it is desired to try another circuit, and he finds that the only help he can get is in the form of a theoretical diagram. He finds himself in much the same position as would an inexperienced person when faced with the problem of reading a well-detailed map. He is unable to interpret the various signs or symbols into something tangible which he could, no doubt, recognise by its shape or markings.

Shorthand of Radio

We all pass through this rather troublesome period, but if it is approached from the right angle, the deciphering of what is so often termed the shorthand of radio can become quite fascinating. Unfortunately, however, the reaction to the theoretical diagram obstacle is not the same in all cases. With some beginners I have met, the hold-up to their progress produced an attitude of defeatism, and no attempt was made to master the situation. Needless to say, such so-called enthusiasts did not carry on with the good work and, consequently, lost one of the finest hobbies going. Luckily for radio, there are the others who, when they come up against a problem or obstacle, become all the more determined to solve or overcome it. With the diagrams, for instance, they make comparisons between the theoretical circuits and their wiring plans, and by the process of tracing the wiring and applying a little sound reasoning they are eventually able to understand the symbols. If this procedure is adopted, there is no reason why every beginner should not master theoretical diagrams and soon find himself in the position of being able to draw his own circuits.

Perhaps a word or two of advice would not be amiss at this point. There is no quick cut to success. It is very much like learning the Morse Code, except one is aural and the other visual identification; practice and more practice is the only way to impress the various symbols on one's mind, and until these can be retained and recognised or drawn from memory, the beginner must keep on with the practice.

Theoretical Diagrams

Unfortunately, the above advice is not in itself sufficient to enable one to reach the desired goal. A complete knowledge of the symbols certainly allows the beginner to read a diagram, see what components are employed and how they are connected, but unless a fair knowledge of the elementary fundamentals of radio are also present, the process cannot be reversed. To draw a theoretical diagram of, say, a simple three-valve receiver, one must know how and why certain components are necessary, the parts of the circuits they must occupy, and a general idea of the essential connections.

If the would-be radio constructor has not yet acquired such knowledge, then in his own interests it would be advisable for him to start reading and digesting a reliable text-book on the subject. In this direction it is well worth while sending to the offices of PRACTICAL WIRELESS for the small booklet which gives full details of the various radio text-books edited by the Editor of that journal. Steady, diligent reading, plus a certain amount of practical constructional or experimental work, will soon enable one to build up a very useful knowledge of radio, and once a good foundation has been made, it is surprising how rapid progress can be if keen interest is shown in the subject.

Reading the Signs

On page 28 are given sufficient conventional signs for the beginner to start with, and by using these in conjunction with the theoretical diagram of a simple valve receiver it should be possible for a rough practical wiring chart to be drawn. This suggestion is, of course, for practice purposes only, as it helps one to link up the symbols with their actual components.

Ignoring the valve signs for a moment, let us commence our examination at the top of the other symbols—Notebook Page No. 31. The first two signs represent *variable* condensers, such as those used for tuning, reaction and several other purposes in radio apparatus. The arrows indicate that they are variable, as the same sign as the first one is also used to denote fixed condensers, but in such instances the *arrow* is *omitted*. Although it is usually recognised that the moving vanes of a variable condenser are connected to the low-potential part of the circuit, the second symbol is sometimes used when it is required to stress the connections to the *moving vanes* which are, therefore, represented by the *curved arrow*.

Condensers

A *differential* variable condenser has two sets of fixed vanes into which can be meshed one set of moving vanes, according to the direction of rotation of the operating spindle. To make it quite clear that a component of this type is required, the third sign is used and the small centre curved portion indicates the moving vane.

Pre-set condensers, which are nothing more than small variable condensers, are used when it is required to adjust the capacity in or across a circuit and leave it set at the correct value. For this reason the components are not usually fitted with a proper control spindle but with an adjusting screw. The fourth symbol is the one which is used in such instances. It should be noted that the arrow is *dotted*.

Chokes

The sign for a high-frequency choke, coil or any air-cored inductance comes next. An H.F.C. is indicated by the sign shown, but with modern coils, which usually have two, three or more windings, the necessary symbol is not always quite so simple. If it is remembered that each winding is generally shown, to indicate the type of coil required, by repetitions of the sign to which we are referring, it should be possible to understand most coil diagrams.

When an inductance is wound around an iron core as, for example, low-frequency chokes (L.F.C.s), L.F. transformers, mains transformers or the field of an energised moving-coil loudspeaker, it is usual to run a few lines through or alongside the coil symbol as shown in the diagram. This enables the observer to see at a glance that it is not a coil, such as those mentioned above, having a simple air-core.

Transformers

The H.F. transformer sign simply denotes that two separate coils are used with no direct electrical connection between them. The same sign is also used for aerial circuits when one winding, the primary, is connected between the aerial and earth, and the other, the secondary, across the crystal or valve as the case may be. The L.F. transformer, which has to have a very much higher value of inductance than its H.F. counterpart, uses the same two inductance signs plus the lines to indicate that an iron core is used or, in other words, to show that it is an L.F. component.

The next three signs are used to denote various forms of resistance, the first a simple fixed resistance, or to be more correct, the component should be called a resistor; the second indicates that the value of the resistance is variable (note the arrow); while the third shows a potentiometer which is nothing more than a variable resistance fitted with three connections. Two of these are taken to the ends of the resistance, while the third is connected to a moving arm which is so arranged that it sweeps over the resistance element.

(To be continued)

Radio in the Services

A Refresher Course for the Radio Mechanic—2

By Frank Preston

DRAW a skeleton circuit of a simple type of S.W. superhet, indicating the various stages; it is not necessary to include A.V.C., tuning indicators or the power-supply section. Very briefly outline your reason for choosing the principal components indicated.

An outline circuit for a four-valve, plus rectifier, superhet is given in Fig. 1, where approximate values of the chief components are marked. Vertical broken lines are drawn to divide the circuit into frequency - changer, intermediate - frequency, second-detector and output stages.

A triode-hexode valve is used as frequency-changer, it being considered that this is generally most efficient on short waves. The circuit shown should be suitable for working down to about 17 metres; for lower wavelengths it might be desirable slightly to modify the connections to the frequency-changer.

Ordinary plug-in coils would probably be used, as being most convenient in a receiver of this type. Alternatively, it would in most cases be satisfactory to employ standard, ready-made dual or triple-range S.W. tuners in conjunction with a gang condenser.

The intermediate-frequency transformers are shown as being of the 465 kc/s type, since this is found to be the most efficient standard frequency for which there is an ample choice of commercially-made I.F. transformers.

HOW would you proceed to check a wave-change switch suspected of being faulty if test instruments were not available?

The method would have to be dependent to a certain extent upon the circuit and the number of points on the switch. For example, a check could be made far more easily in the case of an H.F.-Det. receiver in which a three-point switch were used for short-circuiting the long-wave sections of the two coils, than if the switch were of the multi-gang type acting on several coils and, perhaps, bringing a load resistor or other component into circuit on one of the wave-bands covered.

In any type of circuit, however, the general procedure would be to set the switch to the position at which the contacts are supposed to be closed and then, where possible, to press the contacts together by means of a length of insulated rod. Where the contacts are inaccessible it may be necessary to bridge the terminal points with short lengths of wire.

The latter test would apply when it was suspected that the contacts were not closing when working on the lower of two wave-bands. If it were feared that some of the switch contacts were failing to open, the test would be made by disconnecting the leads when the switch was set to the "open" position. In both cases, the alterations mentioned should not have any effect if the switch is behaving correctly.

WHAT tests would you apply to a valve if only a multi-range meter was available?

First the valve should be connected to H.T., L.T. and G.B. supplies, and the voltages at each point noted. Knowing these values the anode current would be measured. If makers' data for the valve was available the general condition of the valve could be judged at once. If not, approximate anode-current figures would be known, so a good impression could be formed. A further test might take the form of comparing the anode current passed with different applied G.B. voltages; the cathode or anode-current supply should be switched off while making adjustments of G.B. voltage.

It might also be desirable to test for short-circuit (by means of a small dry battery and the meter) between cathode and heater, cathode and grid, cathode and anode, grid and anode, and also between the various other electrodes of a multi-electrode valve.

EXPLAIN briefly how a visual-tuning indicator, of any kind, could be devised and fitted in the circuit of any receiver provided with A.V.C.

All that is necessary to have a visual indication of the correct tuning point is a means of watching any change in the anode current of the controlled valves. Thus, a milliammeter included in the H.T. positive lead to the valves fed from the A.V.C. circuit would suffice. In case of difficulty in arranging this, it would generally be satisfactory to include the meter in the H.T. lead to one of the controlled valves, preferably the I.F. To avoid introducing instability the meter should be shunted with a fixed condenser of about 1 mfd.

The meter would give its lowest reading, on any particular transmission, when the set was exactly in tune; on each side of the tuning point the needle would rise. The lowest reading would not be the same on all transmissions, but would be dependent upon the signal strength of each. The needle would "dip" most on a strong signal when the A.V.C. was at a maximum.

Those making application for enrolment as radio mechanics are required to pass a test. Success in this may mean immediate promotion. In this article are given some questions of a type which may be asked—it is not suggested that any of them have been asked—along with what can be considered suitable replies. A preliminary set of typical questions and suggested replies was given last week.

DESCRIBE two methods of arranging variable selectivity control in conjunction with an I.F. transformer.

Probably the most obvious method is to mount one winding (either primary or secondary) in such a manner that its position can be changed in relation to the other. Thus, the secondary might be on a former separate from the primary, this former being mounted on a spindle so that it could be rotated through 180 degrees. The idea is similar to that employed in variometers and vario-couplers of 15 years ago. A corresponding but alternative method would be to wind the secondary on a smaller former than the primary. The two would be mounted concentrically and a threaded

(Continued on page 34)

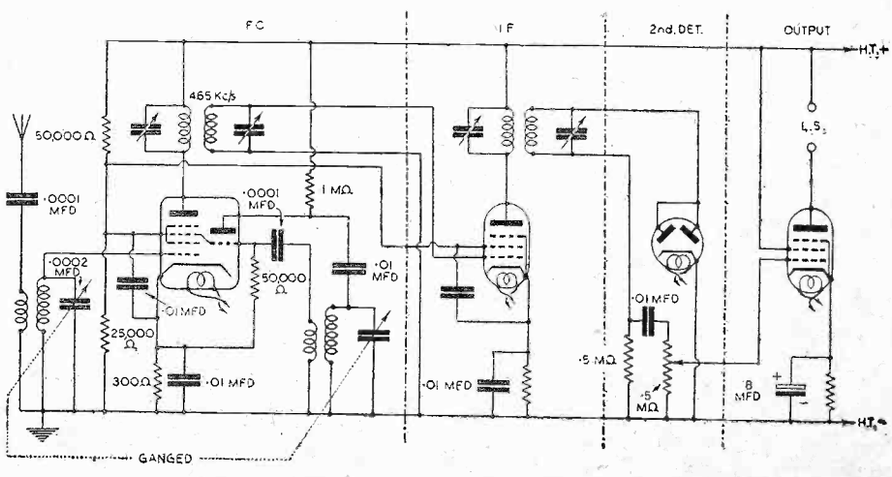


Fig. 1.—Skeleton diagram of a simple S.W. superhet. Values indicated are approximate.

Improved Permeability Tuning

A System in which Tuning Arrangements are Coupled Together by Shifting a Moulded Core

IT is well known that the tuning of oscillating circuits in receivers can be performed by displacement of the moulded core of the coils in the oscillating circuit. This method serves not only for continuous tuning, in place of a rotating condenser, but also for oscillating circuits which are connected in by actuating the push-buttons in push-button receivers. These oscillating circuits are, it is true, pre-tuned, but they are nevertheless in many cases tunable over a large range, so as to be able to pick up any desired transmitter in the wave-range for each push-button.

In order to be able more easily to achieve ganging of a number of tuning circuits over the whole frequency range, it is known to be desirable that the frequency curve representing the relation of frequency to core displacement should be as near straight-line as possible. It is then only necessary to take care that the frequency curves of different circuits have the same inclination, so that they can be brought into superposition by parallel displacement, which is not possible with non-linear curves.

Capacity Tuning

With capacity tuning by means of frequency-linear rotating condensers, the adjustment to equal inclination can be achieved by equalising the inductances, and the parallel displacement by a relative rotation of the rotors. A relative deviation of the inductance values leads to the frequency curves departing from each other in the direction of increasing frequency, because with a difference of inductance only the frequency ratio and not the frequency difference of the two circuits is constant over the range, so that at higher frequencies the frequency difference is also correspondingly higher.

The same considerations hold for the inductance tuning with which we are here concerned. In this case ganging can be achieved with frequency-linear tuning

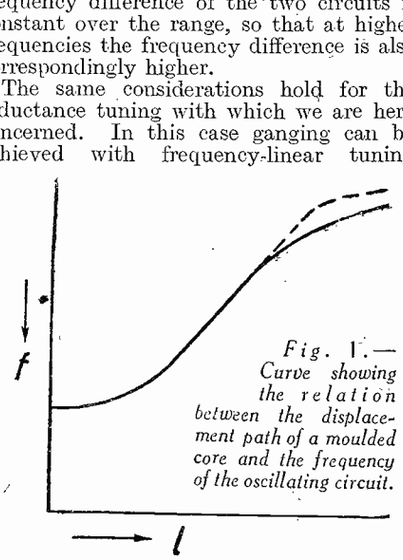


Fig. 1.—Curve showing the relation between the displacement path of a moulded core and the frequency of the oscillating circuit.

characteristic, the inclination of the characteristics being brought into agreement by equalising the capacities, which remain unchanged during the tuning, and the characteristics being brought into superposition by relative displacement of the moulded cores, which are coupled together. The advantages of this method are as follows. No auxiliary circuit elements are necessary for equalising the initial inductances, relative displacement of the moulded cores being sufficient. Moreover, on account of the absence of an auxiliary circuit element for equalising the initial inductances, the tuning variation range is not restricted.

Fig. 1 shows the relation between the displacement path l of a moulded core and the frequency f of the oscillating circuit. The beginning of the curve, at the bottom left, shows the frequency of the oscillating circuit with moulded core at a distance. As the core is approached the frequency falls at first slowly and then faster. This drop has a linear course over a small region and in the upper part the curve bends over. The upper curvature can, however, be pushed further out and at the same time made sharper, so that the straight-line region of the curve becomes longer.

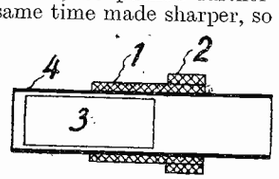


Fig. 2.—Section of a variable inductance.

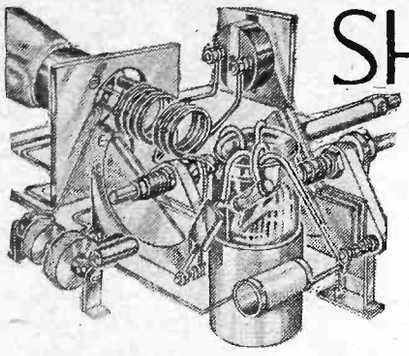
Variable Inductance

Fig. 2 shows how this can be achieved. A coil 1 consisting of a single-layer winding is first wound on the coil former 4. One or more additional layers of turns 2 are then wound on a third of the length of the coil. When the iron core 3 is pushed in the inductance therefore increases faster since the iron core is effective on a greater number of turns at the end of the coil. The inductance of the coil, moreover, increases quadratically along the linear part of the curve in Fig. 1.

This type of variable inductance can be used in circuits which are to be tuned to the same frequency as well as in superhet receivers, in which the input and oscillator circuits have to be tuned to a constant frequency difference. The frequency difference between the two circuits which is, of course, equal to the intermediate frequency, may be obtained in various ways. The cores of the two circuits may be so displaced with respect to each other that the desired frequency separation is available at the one end of the range. If the capacities are correctly set it will also be maintained over the whole range. This displacement of the moulded cores can, however, only be carried out when the intermediate frequency is small, for otherwise the range of variation is too limited. In order to avoid this it is possible to use moulded cores of different permeability, or to wind one of the coils with larger pitch, or to give it a larger diameter. It is, however, also possible to use like coils and cores for the two circuits by connecting a coil in parallel with the coil of the circuit oscillating at the higher frequency, and another small coil in series with it (corresponding to the parallel and series condenser in capacity tuning). With push-button receivers the latter case results in the advantage that it is only necessary to provide a single parallel inductance, and a single series inductance for all the tuned circuits, since the tuned circuits are, of course, connected in individually.

Television in Italy

ON two or three occasions recently attention has been drawn in these columns to the progress which Italy is making in the realm of television, while other nations are marking time because of the war. Both on the transmitting and receiving sides, as well as in the realm of special applications, evidence is forthcoming periodically of the work that is being done in that country. Quite recently it was brought home forcibly that a television service is operating by the furnishing of details concerning one of the latest types of cathode-ray-tube receivers. The set is built up into a neat skeleton framework with all the power supplies located at the base. Although the tube face has a 14in. diameter, its length is relatively small, and by mounting this at the top of the cabinet with a slight rake in the section where the picture aperture appears, comfortable direct viewing for a large number of people is made possible. Interlaced scanning is employed to reduce flicker, and the frame frequency is 50 per second. Magnetic scanning and focusing on normal lines characterise the functioning of the cathode-ray tube, while newly-developed secondary emission valves are used in the video-receiver section to segregate the synchronising pulses for controlling the time-base generator circuits. Both the vision and sound receivers are superheterodynes, and in the case of the former one video-frequency amplifying stage is used in conjunction with two intermediate and two video-frequency stages, often referred to erroneously as low-frequency stages. In the case of the sound receiver a high-frequency amplifying stage with two I.F.s are used, and steps have been taken to ensure that the frequency response is of a very high order so as to take advantage of the wide band width used when radiating sound on the ultra-short waves.



SHORT-WAVE SECTION

ADDING AN H.F. STAGE OR PRE-SELECTOR

How to Obtain Improved Summer-time Reception of Long-distance or Weak Stations.

By W. J. DELANEY.

THE longer hours of daylight which we are now experiencing are already making their presence felt in the reception of long-distance stations. It is well known that the sun's rays have a marked effect on signals which have to travel a considerable distance, and in many cases stations which have been well received during the early evening throughout the past few months are now beginning to fade out and difficult to receive until quite late at night. As many listeners are now making a regular practice of listening to news in

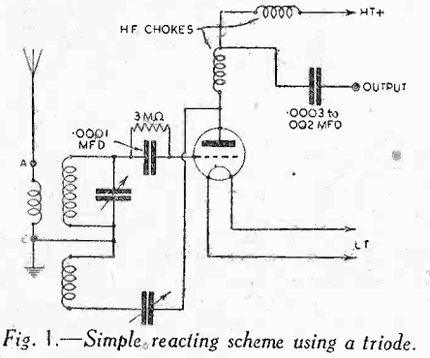


Fig. 1.—Simple reacting scheme using a triode.

English from such stations, it is desirable to adopt some scheme to enable these stations still to be heard. It must be remembered, of course, that during the summer certain bands may be found to fade out entirely and signals be unobtainable on those bands, even with the most powerful receiver. In these cases you must turn to the bands which are not seriously affected by these conditions. In general it may be said that during the summer the 15-metre band—that is, from 12 metres to 20 metres—will be found the most satisfactory. However, the simplest method of obtaining the desired improvement in normal cases is the addition of H.F. amplification, but there are several ways in which this may be carried out.

Pre-selection

The addition of an H.F. amplifier may simply add punch to an incoming signal or, by including a tuned circuit in the amplifier, additional selectivity may also be gained. On account of the latter fact such an amplifier is often referred to as a pre-selector. In the simplest form an aperiodic aerial circuit is adopted, consisting of an H.F. choke or resistance across the grid circuit of the H.F. valve, but whilst adding such a stage the advantages of the additional tuned circuit are well worth considering and the additional expense is not considerable. Many amateurs will have a spare tuning condenser and coil available, or a simple coil may be made up quite cheaply. But at the same time it is also worth while considering one other small point. As additional gain is obtained by the use of an H.F. stage it may be found in some cases that this will bring in weak stations working on wavelengths close to a desired station, and thus, in spite of the additional selectivity, some background interference may be experienced. In some cases this may negative all the advantages given by the pre-selector and thus it is worth while including a further refinement to such a circuit, namely, reaction or regeneration. By this means the gain and the selectivity of the amplifier may be easily controlled, and thereby the maximum benefits of the amplifier may be obtained.

The Circuit

For the battery user, a standard six-pin coil could be used for the tuner, with a standard short-wave tuning condenser of .00015 mfd. with, or without, the addition of a bandspread condenser. A triode or pentode valve may be employed, and the output from the anode is taken to the aerial terminal on the normal receiver, whilst the aerial is transferred from that terminal to

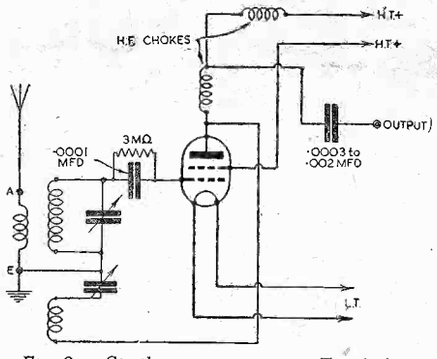


Fig. 2.—Similar arrangement to Fig 1, but using a pentode.

the aerial terminal on the H.F. unit. Reaction is adjusted in the normal manner after a station has been tuned in, such tuning being effected on both receiver and H.F. unit. The H.T. and L.T. supplies may be tapped off from any part of the receiver which is most convenient, whilst the earth terminal on the unit should be joined across to the earth terminal on the receiver.

By using an S.G. or H.F. pentode valve additional gain may be obtained, and by connecting a wander-plug to the screen-grid terminal the H.F. applied to this part of the valve may be adjusted to obtain the desired smoothness of reaction and gain in the stage.

The mains user (A.C.) is in a slightly better position, as he may make use of a much smoother reaction circuit, which will give greater benefits in all directions. This is the well-known electron-coupled arrangement, where the cathode of the valve is taken to a tapping on the grid coil, and reaction control then effected by varying the screen-grid potential by means of a potentiometer across the H.T. supply. The slight additional current taken by the valve and the potentiometer may generally be sacrificed from the receiver, but it may be found that if the heater of the valve is

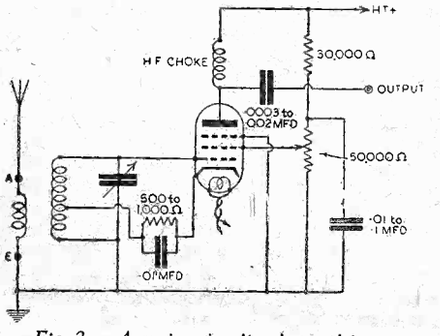


Fig. 3.—A mains circuit using resistance-controlled reaction.

joined in parallel with the valves in the receiver then the additional current drain will result in the valves being under-run sufficient to weaken reception. In this case a separate heater transformer should be obtained and mounted in the unit. The tapping point on the coil should be about one-tenth of the total grid winding, from the earth end of the coil.

Precautions

The coupling condenser in all of the circuits referred to may be of the small variable type if desired, and this will give an additional control. If, of course, a condenser of the value specified is already included in the aerial circuit of the normal short-wave receiver, it may be omitted from the pre-selector stage and the anode joined direct to the aerial terminal. In every case the unit should be enclosed in a metal box, effectively earthed, but if this cannot be done, then the valve should be enclosed in a standard metal valve screen. The lead between H.F. unit and receiver should be as short as possible, especially if the receiver is a superhet, as otherwise it will pick up sufficient energy to act as a good aerial and offset the advantages of the additional stage. It is not advisable to screen this particular lead unless it is found that it is not possible to obtain the maximum performance from the unit without doing so. A few tests will show whether or not such a step is necessary. If it is, then one of the special low-loss screening systems should be adopted, not the standard close-screened wire, which might result in much of the H.F. energy passing to earth before going into the receiver.

Comment, Chat and Criticism

Musical Criticism

Our Music Critic, Maurice Reeve, Discusses the Hazards of Music as a Profession

MUSIC has suffered grievous harm from a haphazard and often irresponsible, and most certainly unco-ordinated, system of criticism. Perhaps this is to be expected in a walk of life which is run on the most superbly individualist lines and which disdains every suggestion of a central authority or controlling body. 'Tis the greater pity because few professions own a more skilful, well-read or more devoted array of zealots. The music critic is invariably a passionate lover of the art and he invariably knows the programme he has come to assess "inside out." Yet the unmitigated harm he can, and often does, do is profound and lasting. I doubt whether any of them would believe it even from their most well-informed friends. I will first deal with these harmful effects and then treat of the cause, winding up with suggestions for a remedy.

As I said, music is individualist—fiercely so. It is the basis, and curse, of its life, but whether it can be avoided is another matter. Everything is done on one's own volition and without an atom of co-operation or help. It is the same with the individual débutant or the renowned society. In normal times it is nothing for a hundred individuals to give recitals in London between September and May. They are either freshmen, or freshwomen, or they may be up in their second or third year. But all are alike in that they are all totally unknown. In addition, there are the dozens of concerts given by the famous visiting artists and the great orchestral and other societies.

Now, every one of these "freshmen" is a most passionate and ardent disciple of music. A certain amount of arrogance and unjustifiable confidence can readily be pardoned them because they have staked their all on this appearance. After years of study and very often the expenditure of large sums of money, custom, a self-centred professor and an "easy chair" agent decree that they must give these recitals because they "must get press notices." Nothing is possible without the benediction of the critics. The critics *must* say that you are this, that and the other, all of which has to be reprinted and broadcast far and wide before anyone will have anything to do with you.

Well, not only is it a gamble as to what the critics will say (even Paderewski was severely censured on his first appearance concerning some of the fundamentals of piano playing), but it is a far greater gamble as to whether any critics will be there at all. The writer knows of two cases where this actually happened. And it is a frequent occurrence for only a small percentage of the press tickets sent out to be used. Tough luck! to put it mildly.

Few walks of life have money invested in them so promiscuously, and livelihoods sought, with so few, if any, guarantees provided or asked for.

An Explanation

What are the reasons? A hall has to be booked up quite six months before the date for which it is wanted. Consequently it is not always possible to ascertain what counter-attractions there will be on that particular day. Not unnaturally, and for reasons other than personal choice, a No. 1 critic will obviously make his way to the opera or a symphony concert rather than to G.B.'s first recital, should both happen to be on together. So would you or I, for that matter. Then, sometimes, the same critic will have two or even three recitals on the same evening, just hearing a snatch of each. If fortune should frown on the recitalist it will frequently just so happen that his critic will attend for the poorest portion of his programme. This is usually the first part, and many a concert giver has been damned just on that one group of pieces, played when nerves are highly strung and fingers unresponsive and unruly, whilst the remainder of the show has been quite brilliant. The result? Nothing less than utter oblivion, perhaps even the necessity of having to take up some other form of livelihood.

Then comes, perhaps, the most tragic part of all—that of the young artist who gets the critics to his recital and wins their praise, yet is told there is no work to be had because he has no money. No money for giving more recitals, and advertising. The public *must* be told what it was the critic said. "No money," he gasps. "But I thought that if one proved himself a first-class artist by winning over the critics, the work followed as a matter of course. Here I am, in your office. The daily 'this' and the morning 'that' say I am a great artist and you say there is no work!" Incredible hearing, but, alas, often listened to.

Some Remedies

What are the remedies for these troubles and trials? They are very difficult to put into practice in spite of their seeming obviousness. First, a duty rests with all teachers or schools of music. The mere fact that a gifted pupil has given a recital "in the West End" invariably means something to a teacher in helping him build up his connections, even if it proves of no artistic merit. When the result is a triumph in the music columns of the press it may well mean a fortune. But all teachers need to be much more sober and temperate in their advocacy of such appearances for their pupils. They owe each one the solemn duty of emphasising the fact that, for every one débutant who strikes the lucky number on the roulette table of recitaldom, there are a hundred who perish by the wayside. But I am afraid they are much too self-centred in this matter.

Secondly, a lot is up to the young artists themselves, and their intimate supporters. They, too, are much too self-centred and foolishly optimistic. Their friends, who are, in this respect, their worst enemies, load them with ignorant fulsome flattery over their "divine" playing and their "too, too exquisite" renderings of this and that, so that by the time recital time comes round there is really only one artist who is at all worth hearing—themselves. Consequently, their performance lacks that detached and respectful air which alone can give it distinction. It all speaks too loudly of "see how clever I am" instead of "I am the devoted servant of this great man whose music I am presenting to you."

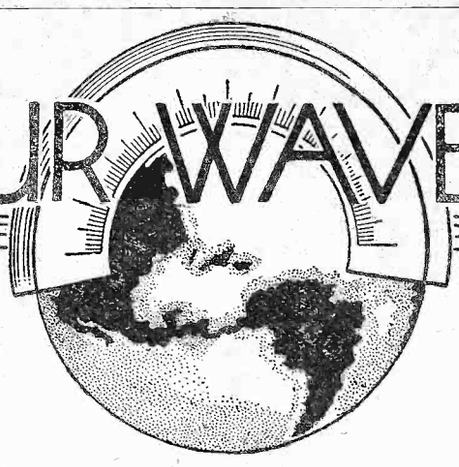
Apportioning the Blame

But it is with the critics that I think the chief blame lies. And the system prevailing. For such a body of such skilled, erudite and artistically minded men we find a strange apathy and nonchalant boredom at times. Few men give such open expression to their boredom; few men can pour such scorn on those whom they deem responsible for that boredom. We admit that it must be trying to hear the Moonlight Sonata played perhaps a hundred times during the season—and inadequately on many occasions. They should recognise to a greater extent than they sometimes do that it is their job. After all, can anyone fail to be bored with their job at times, no matter how exciting or remunerative it may be? And I should have thought it would be much more boring to have to *practise* the Moonlight Sonata or Chopin's A flat Ballade for many hours during a season and perform it many times, as a successful pianist necessarily must. I happen to know that the enormous amount of work that a big concerto demands, including rehearsals before every public performance, sometimes drives the poor artist almost frantic. But never must he dare put a finger wrong and, above all, must he never dare to show either his boredom or fatigue, in the only way he could show such feelings—through giving a cold, passionless, or in any way lethargic performance. He has to be at "concert pitch" the whole time. Paderewski has only just revealed in his own memoirs the killing effect this life had on him.

No, I am afraid many critiques seem to yawn at one while one reads them, and to add, "oh, this damned Moonlight again"! Very bad luck for a young fellow, or girl, to whom it may mean the perhaps unmerited stultification of their life's work and even a translation to an entirely different sphere of life.

The remedy would seem to lie with both sides. More critics are obviously wanted, to avoid one harassed man having to rush between two or three halls the same evening. Also a greater sense of responsibility on the part of some of them. They should not be allowed to display their journalistic talents at other people's expense. On the other side fewer recitals would be of great benefit to all concerned. Unhappily this is impossible without a central authority. At present this doesn't seem to be anywhere within music's reach, desirable as it would undoubtedly be.

ON YOUR WAVELENGTH



By Thermion

Wanted—an Announcer

AN advertisement appeared in the newspapers the other day to the effect that the B.B.C. requires an announcer at a salary of between £300 and £400 a year. An essential qualification is that the announcer must have had acting experience. Apparently, the belief is that an actor does not mumbo-jumbo his words, that his enunciation is perfect, and that he will not rerutilate his r's. This is my chief objection to a Scotch announcer. Even the late Ramsay Macdonald used to get the r in the throat and use it as a gargle. He was a standing joke with his wurrrrrrrrrrld when he was referring to the sphere on which you and I have our being.

But it is not my experience of actors that they are so nicely spoken as the advertisement leads one to convey. Very few actors speak so plainly that you can hear from the back of the auditorium what they are declaiming. It is almost impossible with a singer to understand the words of the song. No doubt microphone tests in any case will be applied to the applicants, and they will be suitably trained in pronunciation. Most actors overdo their pronunciation. They reduce the spoken passage to a caricature of the real thing. Something like this:

Thee curfewer tollser thee kneller of partinger dayer,
The lowinger herder winds slowly o'errrr the leaer,
Get the idea ?

Fuse Values

THE value of fuses for various types of receiver must be chosen with care. On the input side to mains receivers (either D.C. or A.C.), at least 1 amp. should be employed, and preferably a 1-amp. fuse should be included in each mains lead. A .5-amp fuse should be included in the H.T. negative lead of the mains section of an A.C. receiver, and in all filament or heater circuits the value of fuse chosen should be such that it will break down before any of the valves. It will vary, of course, according to the method of wiring the filaments or heaters. In battery receivers, where the filaments are in parallel, the fuse should be of the type which will blow before the current rises sufficiently high to damage the valve of the lowest rating.

Interaction

IF one compares the average home constructed receiver with a commercial product of similar size, both for appearance and performance, one will find many differences. On the grounds of appearance, the usual contrast between the two sets is that while the home product looks workmanlike the commercial receiver is usually a model of neatness and compact design. Under these conditions the performance is very often equal. When the home-made set is compressed a little, however, and made to look neat, it very seldom works as well. The one word "interaction" goes a long way to explain this phenomenon. While almost anyone with a little knowledge of radio principles can make an untidy set work well, it takes a qualified expert to design the same set in such a way that it still works when it is "tidied-up." The fact of the matter is that one cannot take liberties with the placing of the separate components of a set until one understands first principles.

New Australian Wireless School

COMPLETION of the A.W.A. Building, at 45-47, York Street, Sydney, has enabled the Marconi School of Wireless, in Australia, to make a new and handsomely appointed home at a time when the demand for trained men is becoming increasingly great.

The study of radio makes a strong appeal to many young men. In Australia several thousands have held an experimenter's licence. Few, however, have the qualifications which would enable them to take a position as wireless officer on a ship, to operate the radio equipment of an airliner, to serve in a broadcasting, coastal, or island radio station, or to design and supervise the construction and erection of wireless transmitting stations.

The purpose of the Marconi School, founded by Sir Ernest Fisk in 1913, is to train men for such positions.

Many of the senior executives of A.W.A. passed through the Marconi School; thousands of other ex-trainees are to be found either upon the company's staff in Australia or scattered up and down the world following their chosen profession.

New Phases of Radio

EVERY year new phases of radio are developed. Explorers now carry wireless into the uttermost wilds, new appliances appear on ships, broadcasting apparatus is elaborated, further radio aids to aircraft are devised. The progress thus indicated emphasises the need for the training which is given by the Marconi School.

The new Marconi School has an instructional staff of nine in Sydney (in addition to five in Melbourne)—experienced men in every phase of wireless on land, on sea and in the air.

The School occupies two floors of the sound-proof building. Morse tables are equipped with radio-frequency transceivers by means of which the students practise the sending and receiving of wireless traffic under conditions virtually identical with those met in the commercial operating services. An "apparatus room" contains several marine wireless stations complete with direction finders and auto-alarm distress signal receivers

Complete Broadcast Station

ALSO there are a complete broadcast station, aircraft transmitter and receiver. One room has been electrically screened for the testing of the selectivity, sensitivity, and fidelity of broadcast receivers; rows of benches have been set up for the training of broadcast technicians, radio mechanics, and service men. Lessons are given in the construction of broadcast receivers, the servicing and adjustment of transmitters and transmission lines.

Five separate courses are available to Marconi School students—a five-years course for engineers, a three-years course for technicians, and a two-years course for wireless operators, a year's course for radio mechanics and talking-picture operators. For the convenience of these last, the Marconi School incorporates an up-to-date theatrette.

Television for Palace of Soviets

I AM informed that the most powerful ultra-short wave television transmitter in the world, with a maximum capacity of 100 kWs., will be set up in the tall tower of the Palace of Soviets now under construction in Moscow. This, together with the antennæ system to be put up 985ft. above the ground, will make it possible for television programmes from the Palace of Soviets to be received at great distances.

About thirty outlets for television transmissions, as well as 150 sets to receive programmes, relayed by the main television reception apparatus in the Palace, will be installed at different points in the building. The large hall of the Palace, which will have seating accommodation for 21,000, will have a 478 square yard screen, and the small hall will have a screen of 120 square yards.

NEW SERIES

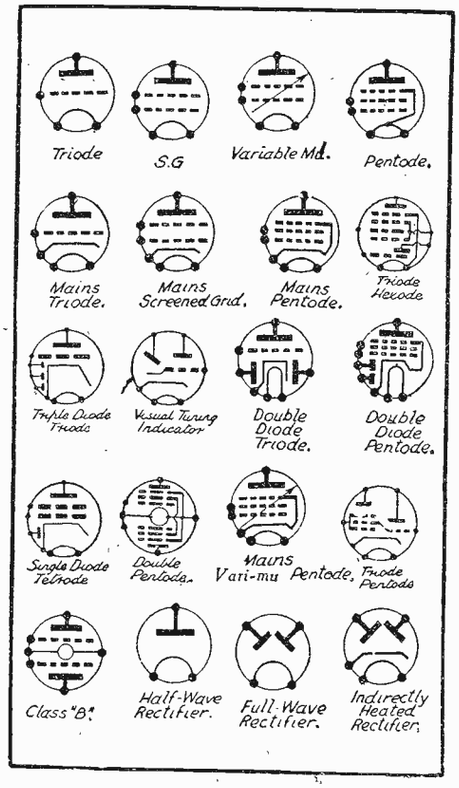
RADIO ENGINEER'S POCKET-BOOK

No. 29

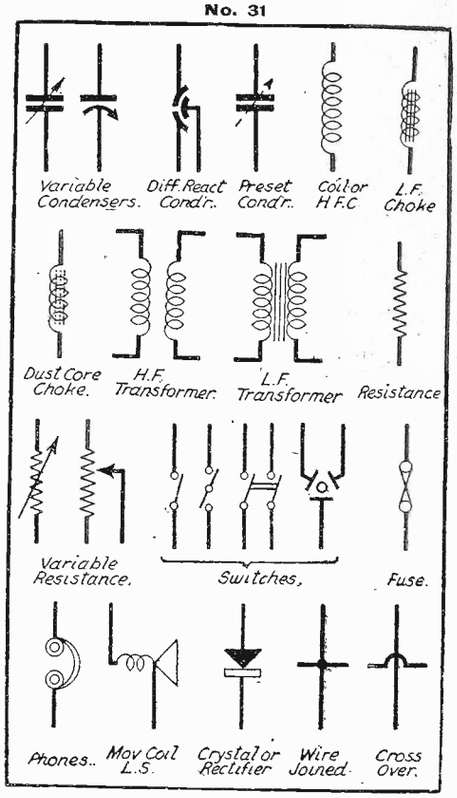
INTERNATIONAL AMATEUR CALL-SIGNS

PA	Netherlands	VK	Australia
PJ	Curacao	VO	Newfoundland, Labrador
YI	Iraq		
YL	Latvia	VP1	British Honduras
YM	Danzig	VP2	Leeward Is. and Windward Is.
YN	Nicaragua		
YR	Rumania	VP3	British Guiana
YS	Salvador	VP4	Trinidad and Tobago
YT, YU	Jugo-Slavia		
YV	Venezuela	VP5	Jamaica, Cayman Is., Turks and Caicos Is.
ZA	Albania		
ZB1	Malta		
ZB2	Gibraltar	VP6	Barbados
ZC1	Transjordania	VP7	Bahamas
ZC2	Cocos Is.	VP8	Falkland Is., South Georgia Is.
ZC3	Christmas Is.		
ZC4	Cyprus	VP9	Bermuda
ZC6	Palestine	VQ1	Zanzibar
ZD1	Sierra Leone	VQ2	Northern Rhodesia
ZD2	Nigeria, British	VQ3	Tanganyika
ZD3	Gambia	VQ4	Kenya
ZD4	Gold Coast, British Togoland	VQ5	Uganda
		VQ6	British Somaliland
ZD6	Nyasaland	VQ8	Mauritius
ZD7	St. Helena	VQ9	Seychelles
ZD8	Ascension Is.	VR1	Gilbert and Ellice Is.
ZD9	Tristan da Cunha	VR2	Fiji Is.
ZE1	Southern Rhodesia	VR3	Fanning Is.
ZK1	Cook Is.	VR4	British Solomon Is.
ZK2	Niue	VR5	Tonga
ZL	New Zealand	VR6	Pitcairn
ZM	Western Samoa	VS1	Straits Settlements
ZP	Paraguay		
ZS	Union of S. Africa	VS2	Fed. Malay States
ZS3	South West Africa	VS3	Non-Fed. Malay States
PK	Dutch East Indies		
PX	Andorra	VS4	Sarawak, North Borneo
PY	Brazil		
PZ	Surinam	VS5	Labuan, Brunei
SM	Sweden	VS6	Hong Kong
SP	Poland	VS7	Ceylon
ST	Sudan	VS8	Bahrein
SU	Egypt	VS9	Maldive Is.
SV	Greece	VU	British India
SV6	Crete	VU4	Laccadive Is.
TA	Turkey	W, WA	United States of America
TF	Iceland		
TG	Guatemala	XE	Mexico
TI	Costa Rica	XU	China
U, UE, UK	U.S.S.R.	XZ	Burma
VE	Canada	YA	Afghanistan

No. 30



No. 31



No. 32

PHONETIC ALPHABET

To avoid the possibility of the letters of a call-sign being misunderstood, it is usual to use the words given below in place of the letters. For example, G6PY would be given as G6 Paris Yokohama.

Letters to be spelt	Words to be used for spelling
A	Amsterdam
B	Baltimore
C	Casablanca
D	Denmark
E	Edison
F	Florida
G	Gallipoli
H	Havana
I	Italy
J	Jerusalem
K	Kilogram (or Kilowatt)
L	Liverpool
M	Madagascar
N	New York
O	Oslo
P	Paris
Q	Quebec
R	Roma
S	Santiago
T	Tripoli
U	Upsala
V	Valencia
W	Washington
X	Xanthippe
Y	Yokohama
Z	Zurich

No. 33

AMATEUR WAVEBANDS (BRITISH)

Five-metre Band - 56,020—59,980 kc/s.

Ten-metre Band - 28,010—29,990 kc/s.

Twenty-metre Band

Metres	Kilocycles	Metres	Kilocycles
20.9	14,353	21.2	14,151
21.0	14,285	21.3	14,085
21.1	14,218	21.4	14,019

Forty-metre Band

Metres	Kilocycles	Metres	Kilocycles
41.2	7,281.5	42.1	7,125.9
41.3	7,263.8	42.2	7,109.0
41.4	7,246.3	42.3	7,092.2
41.5	7,228.8	42.4	7,075.4
41.6	7,211.5	42.5	7,058.8
41.7	7,194.2	42.6	7,042.2
41.8	7,177.0	42.7	7,025.7
41.9	7,159.9	42.8	7,009.3
42.0	7,142.8		

Eighty-metre Band

Metres	Kilocycles	Metres	Kilocycles	Metres	Kilocycles
80.5	3,726.6	82.2	3,649.7	83.9	3,575.6
80.6	3,722.0	82.3	3,645.2	84.0	3,571.3
80.7	3,717.4	82.4	3,640.7	84.1	3,567.1
80.8	3,712.8	82.5	3,636.3	84.2	3,562.9
80.9	3,708.2	82.6	3,631.9	84.3	3,558.7
81.0	3,703.6	82.7	3,627.5	84.4	3,554.5
81.1	3,699.1	82.8	3,623.1	84.5	3,550.3
81.2	3,694.5	82.9	3,618.7	84.6	3,546.1
81.3	3,690.0	83.0	3,614.3	84.7	3,541.9
81.4	3,685.5	83.1	3,610.0	84.8	3,537.7
81.5	3,681.0	83.2	3,605.7	84.9	3,533.5
81.6	3,676.5	83.3	3,601.4	85.0	3,529.3
81.7	3,672.0	83.4	3,597.1	85.1	3,525.2
81.8	3,667.5	83.5	3,592.8	85.2	3,521.0
81.9	3,663.0	83.6	3,588.5	85.3	3,516.9
82.0	3,658.5	83.7	3,584.2	85.4	3,512.8
82.1	3,654.2	83.8	3,579.9	85.5	3,508.7

Note.—Wavelengths in Metres are not given for the 5- and 10-metre bands, owing to the narrow band width, which would result in awkward decimal fractions.

No. 34

SCREWS: BRITISH ASSOCIATION (B.A.)

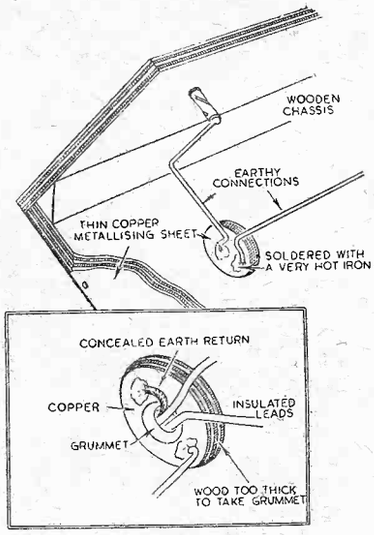
No.	Absolute Dimensions in Millimetres: Full Diameter	Absolute Dimensions in Millimetres: Pitch	Approximate Number of Threads per Inch	Approximate Dimensions in Inches: Full Diameter	Approximate Dimensions in Inches: Pitch
25	0.25	0.070	362.8	0.010	0.0028
24	0.29	0.080	317.5	0.011	0.0031
23	0.33	0.09	282.2	0.013	0.0035
22	0.37	0.10	254.0	0.015	0.0039
21	0.42	0.11	230.9	0.017	0.0043
20	0.48	0.12	211.6	0.019	0.0047
19	0.54	0.14	181.4	0.021	0.0055
18	0.62	0.15	169.3	0.024	0.0059
17	0.70	0.17	149.4	0.028	0.0067
16	0.79	0.19	133.7	0.031	0.0075
15	0.90	0.21	121.0	0.035	0.0083
14	1.0	0.23	110.4	0.039	0.0091
13	1.2	0.25	101.6	0.047	0.0098
12	1.3	0.28	90.7	0.051	0.0110
11	1.5	0.31	81.9	0.059	0.0122
10	1.7	0.35	72.6	0.067	0.0138
9	1.9	0.39	65.1	0.075	0.0154
8	2.2	0.43	59.1	0.087	0.0169
7	2.5	0.48	52.9	0.098	0.0189
6	2.8	0.53	47.9	0.110	0.0209
5	3.2	0.59	43.0	0.126	0.0232
4	3.6	0.66	38.5	0.142	0.0260
3	4.1	0.73	34.8	0.161	0.0287
2	4.7	0.81	31.4	0.185	0.0319
1	5.3	0.90	28.2	0.209	0.0354
0	6.0	1.00	25.4	0.236	0.0394

It is recommended that for screws less than ¼-in. diameter British Association Threads should be adopted. It was originally proposed by the British Association in 1884, and finally adopted by them in 1904. It is, however, not yet the usual practice in this country to use the sizes ranging from No. 17 upwards. Moreover, makers of taps, dies, screwplates, etc., usually supply sizes to No. 16.

Practical Hints

A Neat Wiring Hint

USING a sheet of copper on a wooden chassis, as I was unable to obtain an all-metal chassis, the idea occurred to me when drilling 1in. diameter holes for the valve-holders, that it would be far more convenient and neater if I made all the earth returns by drilling other holes of various diameters, in the wooden chassis only, the copper sheet covering these holes, so providing a means for directly soldering the leads to the underside, as illustrated.



A useful wiring hint for combined wood and metal chassis.

When putting this idea into effect, it also occurred to me that here again was a means for neatly grummeting holes through which a number of leads pass, since although a certain amount of protection is provided by the thickness of the plywood, the periphery of the copper sheet might soon cause fraying of insulation, and possible short circuit.

Numerous other modifications have since suggested themselves in connection with wiring facilities, and no doubt some readers will find this arrangement of use in other directions apart from those I have mentioned. It should be pointed out, however, that a really hot iron and clean Fluxite is essential if good soldered joints are to be made, the copper being thoroughly cleaned, whilst it is advisable to scratch the copper in order to provide a better purchase for the solder.—G. F. LEADER (Stratford).

Using a Torch Bulb as a Meter Shunt

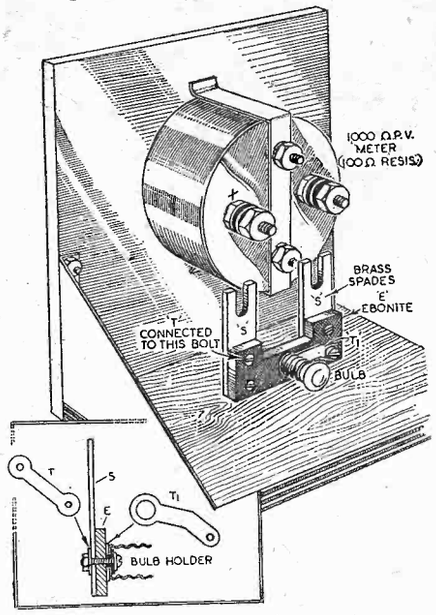
IN revising some of my test apparatus, I decided to include a 50 mA range for the 1,000 ohm-per-volt meter which I constantly use. This meter has a resistance of 100 ohms, so by applying the following formulæ it was a simple matter to determine the value of the required shunt.

$$\text{Shunt resistor} = \frac{1\text{mA (normal dissipation, full scale)}}{50\text{ mA (required range)} - 1\text{ mA}} \times \text{meter resistance}$$

$$= 1/40 \times 100 = 2.04 \text{ ohms.}$$

Disregarding the decimal places, as this only represented an error of 4 per cent. for this scale, I then hunted round for a suitable means for making the shunt, and hit upon the idea of using a torch bulb, provided that I could obtain one within the limits.

Using another meter which was calibrated to within 2 per cent., I then proceeded to check the resistance of a number of heavy current type bulbs, until I found one which gave me exactly 2 ohms: this was rated for 3.5 volts, but the current taken was not indicated. However, this would be in the neighbourhood of .25 amp., so since only 50 mA will flow for full scale deflection, the filament of the bulb will not heat up, so ensuring a constant reading.



A method of using a torch bulb as a meter shunt.

As will be seen from the accompanying sketches, the shunt fitment comprises strong brass "spades," and an ebonite cross member which also serves to fix the bulb holder.

There is a further advantage which can be derived from this method of fitment, and I propose to try it out. It consists of using the bulb holder principle for other ranges, the various resistors being in some way fitted to broken bulb cups, so that wiring can be done away with and a conveniently quick method of scale extension brought about.—B. A. SMITH (Evesham, Worcester).

THAT DODGE OF YOURS!

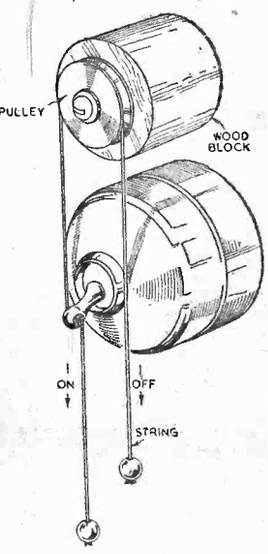
Every Reader of "PRACTICAL WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best hint submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL 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 "Practical Hints." DO NOT enclose Queries with your hints.

SPECIAL NOTICE

All hints must be accompanied by the coupon cut from page iii of cover.

Operating an Overhead Switch

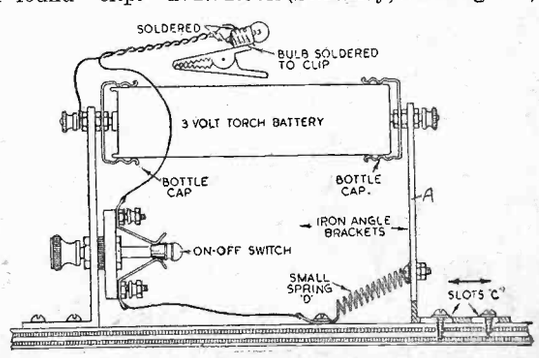
HAVING had to mount a mains switch well out of reach, and as it was a nuisance to step on to a pair of steps every time I wished to operate the switch, I contrived the arrangement illustrated. I drilled a hole through the switch dolly and threaded a piece of string through, tying a knot on each side of the dolly to prevent the string pulling through. A pulley was fitted above the switch in order to bring about the upward pull to switch off. If the dolly is a round one it will be easier to drill if a flat is filed on it.—J. W. B. EVANS (Conway).



A simple dodge for operating an overhead switch.

An Inspection Lamp and Battery Holder

THE device shown in the accompanying diagram is intended to be fixed to the baseboard of a set, so that should an inspection bulb be desired at a moment's notice, it is conveniently at hand. In order to insert the battery (of the 3-volt type), the iron strip "A" is pulled open (see slots "C") and the battery is inserted in the end holders, which consist of sauce-bottle caps. The battery is kept in place by the small spring "D." The wiring is as shown, the connections being soldered to the bulb, and the bulb to the crocodile clip.—T. N. ROCK (Stirchley, Birmingham).



A novel inspection lamp unit.

Combined Oscill

A Morse-code Practice L.F with a Single-valve

AN oscillator and key forms the first essential requirement of the student in the morse code. The next consideration, and one which is not so conveniently provided for, is the means for receiving a wide variety of morse signals, the domestic radio being frequently commissioned for this purpose, failing the help of an equally interested party, or the more expensive method of using an automatic sender.

When weighing up the pros and cons of combining the two functions it was appreciated that unless some care was exercised in the circuit arrangement and layout, there would be the possibility of losses arising in the receiver portion, particularly on the higher frequencies. Therefore, to satisfy oneself on this point, one or two different schemes were tried out before constructing the chassis illustrated, and the advantages in the circuit design will be apparent from the following notes.

The Circuit

Referring to the theoretical diagram given in Fig. 1, a study of this will soon clarify the simple way in which a minimum of switching is brought about; the wiring being arranged to reduce as far as possible any tendencies to interaction or the effect of stray capacities.

The aerial may be fed directly or through the medium of a series condenser of the preset type, this being fed into an aperiodic winding of a standard six-pin coil.

Tuning is carried out by a bandset condenser of 160 mmfds, in parallel with which is a bandspread condenser unit of the Eddystone pattern. The reaction control comprises a differential reaction condenser in a conventional circuit, whilst it will be noticed that detection is of the leaky-grid type, this proving preferable to anode-bend detection which was tried out in an endeavour to get ideal results using an L.F. "strapped" pentode valve.

The switching is effected by using three toggle switches ganged together by a brass rod and conveniently located on the chassis, since it is to be assumed that this type of chassis would not be housed in a cabinet, whilst from the design point of view, shorter wiring is in this way made possible.

Switching

The switch S1 has one pole taken to L.T. positive, this serving to change over the pilot bulbs, these bulbs being wired to the change-over contacts. To isolate the grid and anode circuits, a point was made to use separate switches to see that the

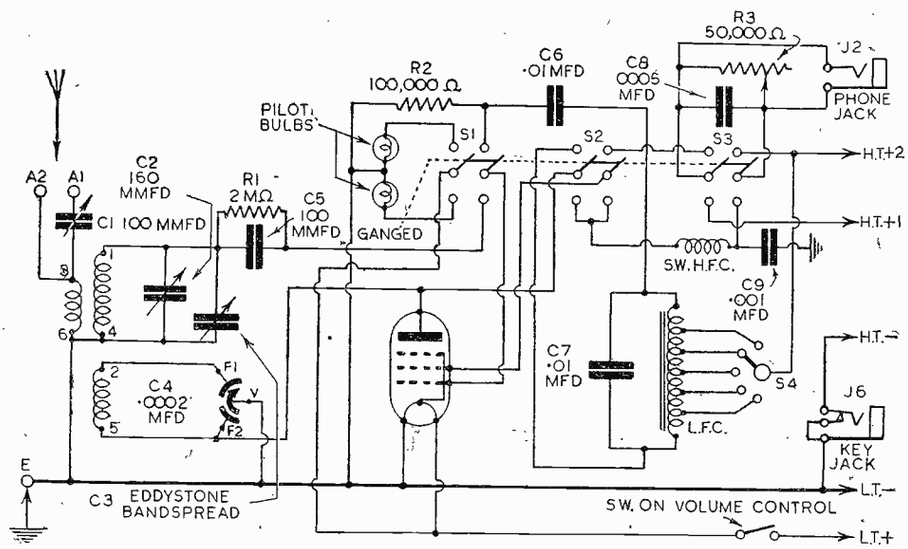


Fig. 1.—Theoretical circuit of the dual-purpose unit.

LIST OF COMPONENTS FOR COMBINED OSCILLATOR-RECEIVER PRACTICE CHASSIS

Resistors (Fixed)
One 2 megohms ½ watt (Bulgin).
One 1 megohm ½ watt (Bulgin).
Potentiometer
One type "M" 50,000 ohms (with switch) (Erie).
Condensers (Fixed)
One .0001 mfd. special mica (Radiomart).
One .0005 mfd. special mica (Radiomart).
One .001 mfd. special mica (Radiomart).
Two PC101 .01 mfd. (Bulgin).
Condensers, Pre-set
One type SW126 (70-100 mfd.) (Bulgin).
Condensers, variable
One type No. 1131 (160 mfd.) (Eddystone (Webb's Radio)).
One Bandspread unit, No. 1043. Complete with knob, dial and cursor (Eddystone (Webb's Radio)).
One type No. 2046 differential reaction (Jackson Bros.).
Rotary switch
One type S119 (5-way) (Bulgin).
Toggle switches
Three type S137 (d.p.c.o.) (Bulgin).
Ganging shaft for above (see text) (Bulgin).
6in. length of 5/32in. brass rod. (Bulgin).
L.F. Choke
One type L.F. 43 (Tone control choke) (Bulgin).
H.F. Choke
One type CHP (5-180 metres) (Radiomart).
Coils and Holder
One set of Eddystone 6-pin coils No. 959 (Eddystone).
One type V86 chassis mounting coil base (Radiomart).
Socket Strip
One type X382 (Clix).
Valveholders
One type X147 (5-pin) (Clix).
Brackets
One type No. 1007 (adjustable) (Eddystone (Webb's Radio)).
Pilot light assemblies
Two—one red and one green (Radiomart).
Two type B206 bulbs (Bulgin).
Battery cord
One type BC3 (5-way) (Bulgin).
Spades, plugs
Three type MP.1a plugs engraved (H.T.1, H.T.2, H.T. —) (Clix).
Two type R415 spade terminals (red, black) (Clix).
Jacks and jack plugs
One type J2 (single circuit) (Bulgin).
One type J6 (closed circuit) (Bulgin).
Two type P38 plugs (Bulgin).
Headphones
2,000 ohm (Ericsson).
Chassis
18 gauge aluminium (see text) (Paroussi).
Dials, knobs
Two black wheel type knobs (Eddystone (Webb's Radio)).
One No. 1,012 slow-motion driving head complete (Eddystone (Webb's Radio)).
Flexible coupler
One type 1009 (Eddystone (Webb's Radio)).
Valve
Tungsram PP2.
H.T. Battery
One 120 volts (Winner) (Eveready).
One 2 volt 10 a.h. accumulator (Exide).
Miscellaneous
Sleeving.
18 S.W.G. tin copper wire.
6 B.A. ⅜in. nuts and bolts (round head).
Four fibre embossed washers for J2 and S119.
8 round head ¾in. wood screws (brass).
Flex.

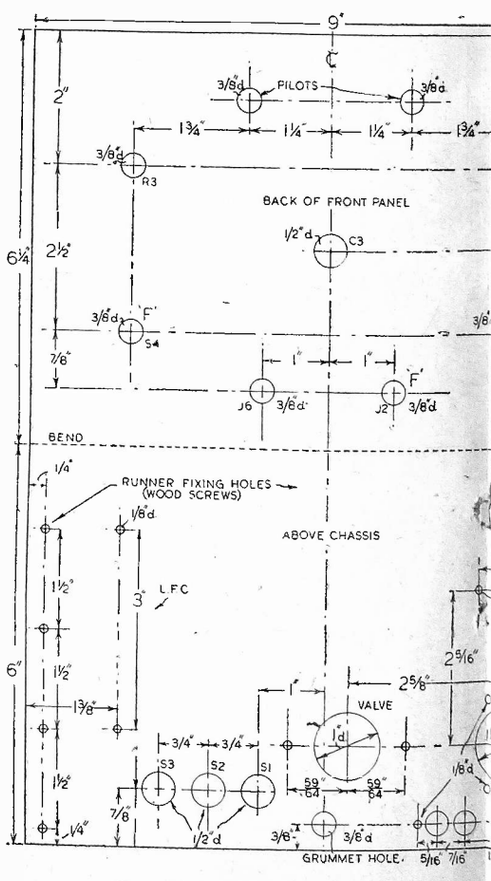


Fig. 4.—Drilling dimensions of the chassis

tor and Receiver

Oscillator Unit, Combined ort-wave Receiver

grid and anode connections were not made to the two poles of the same switch, so in the case of S1, the remaining pole is used for the grid return of the valve. This pole changes over to connect the tuned receiver circuit in the "Radio" position, whilst in the "Keying" position, the corresponding "Tuned" audio-frequency circuit is fed to the grid.

S2 serves the purpose of changing the anode and screen grid circuits over, so that in the radio position, the anode is "strapped" to the screen grid by both poles of the switch, at the same time completing the circuit for the anode H.F. choke.

In the L.F. position of this switch the anode connects up with one side of the L.F. tone control choke, while the other contact extends the screen grid connection to the 'phone and H.T. circuit in S3.

The poles of S3 are taken directly to the 'phone jack J2, across this jack being connected a volume control R3 and a small by-pass condenser C8.

In the radio position this switch series connects the 'phones with the H.F. choke and H.T.+1, whilst for the oscillator position, the 'phones are connected in series with the screen grid of the valve, H.T.2, and the wiper contact of S4.

So from this it will be seen how by ganging these switches a quick change-over may be made when it is desired to compare keying with actual transmissions.

The L.F. tone control choke circuit is provided with a frequency adjusting switch of the rotary type (S4), this making it possible for the operator periodically to change the note of the oscillator by reason of either matching a signal transmission or simply as a "Refresher."

Finally, the keying circuit. This simply comprises an interruption of the H.T.— battery connection, and it will be as well to point out the necessity for seeing that the L.T.— lead is not inadvertently taken to the H.T.— lead, for obvious reasons.

Operating Notes

Now a word on the operating conditions of this circuit prior to dealing with the construction and wiring.

In strapping the screen grid to the anode when using it for reception, it will be realised that a higher mutual conductance will result in the valve characteristic, and this is all to the good, a small grid swing giving an appreciably greater degree of conversion gain, although there is bound to occur a slightly higher anode current dissipation; however, on considering the current ratings given below, it will be seen that this is not of much consequence.

H.T. tapping (H.T.+1) I a+s (strapped)

48v.	1.8mA.
60v.	3.0mA.
72v.	4.2mA.

The oscillator should not require more than about 9 to 12 volts H.T., and the following are the current readings for tappings up to 36 volts to illustrate the proportionate increase in current.

H.T. tapping (H.T.+2) I a+s (not strapped)

12v.	.125mA.
24v.	.54mA.
36v.	1.5 mA.

Although by increasing H.T. for the oscillator a different pitch or frequency

(Continued on page 40.)

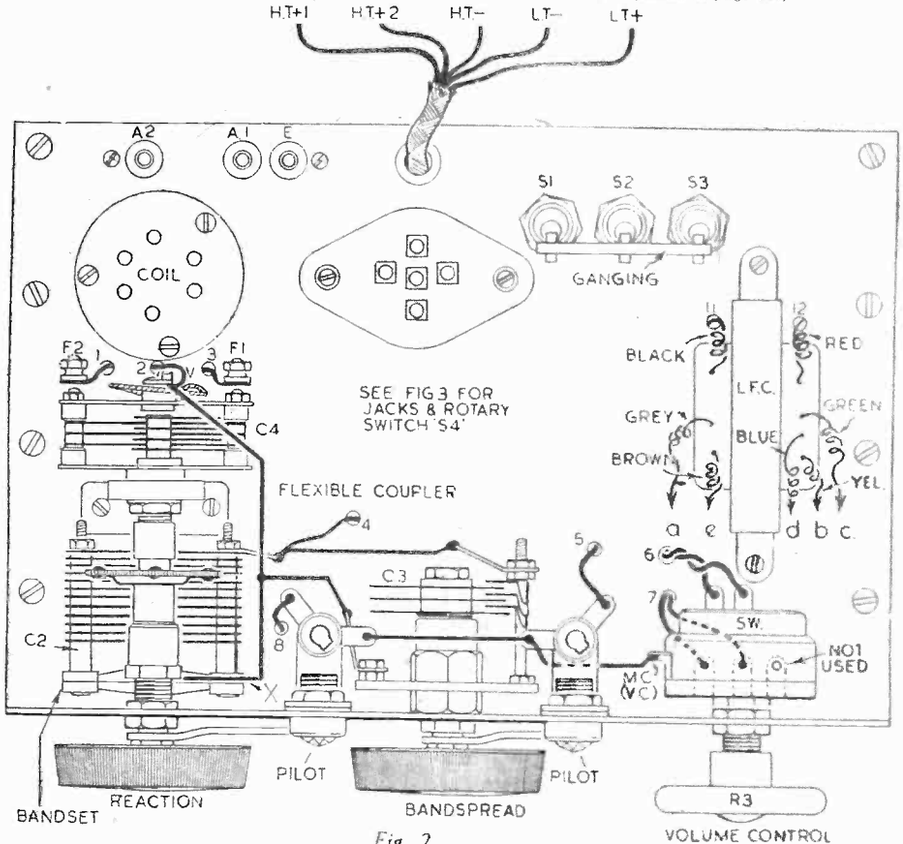


Fig. 2.

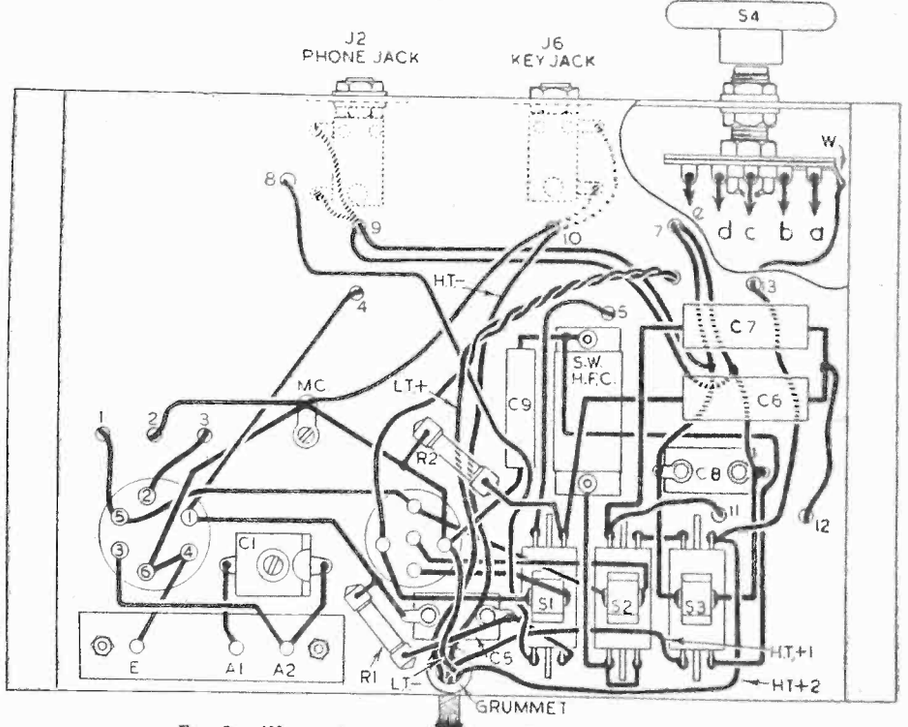


Fig. 3.—Wiring diagram of the complete unit.

PRACTICAL TELEVISION

March 23rd, 1940. Vol. 4. No. 195.

Efficient Mounting

CATHODE-RAY tube television receiver design has progressed very materially both in this country and abroad, and the results of this work have become very evident in the detail of sets which from time to time have appeared in the columns of PRACTICAL WIRELESS. One very marked feature is the considerable reduction in the size of the vision chassis which is called upon to handle the low-input signals from the elevated dipole aerial and amplify these with the minimum of amplitude and phase distortion to a voltage figure which is sufficient to give full modulation between black and white in the cathode-ray tube charged with the responsibility of reproducing the radiated picture in miniature. Coupled with this is the improvement in scanning circuits and the electron beam deflecting equipment, with the result that a number of units can be mounted conveniently on a single removable shelf in the receiver cabinet. The accompanying illustration features a modern example of this practice. A rigid metal chassis is built up to hold the time-base generator valves and transformers, and this part of the apparatus is seen on the left. In the centre is a metal cowl, inside which is the line and frame electro-magnetic deflecting coils, the former having an air core and being strapped to the cathode-ray tube glass neck, and the latter a laminated iron core with wing ends so that any tendency towards trapezoidal shaping in the scanning field can be rectified very readily. On the right of this is the screened box housing the vision receiver proper in a neat, compact form, the reduced size in many cases being made possible by the use of secondary emission valves.

A Neat Device

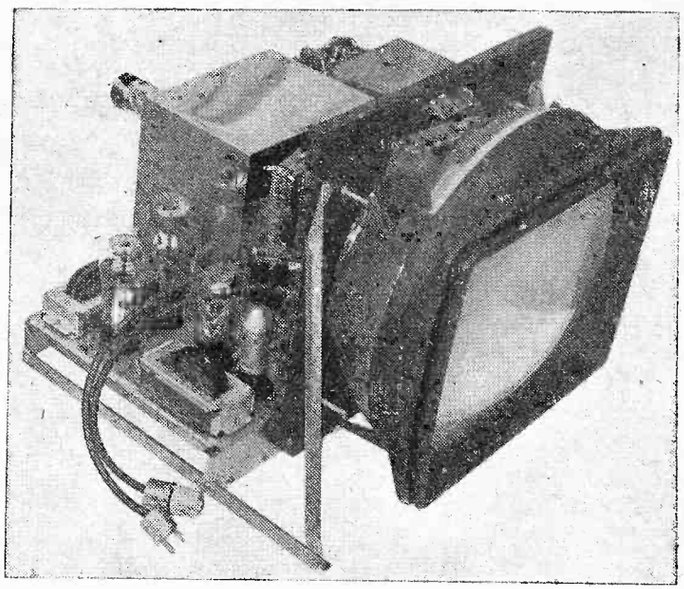
HELD to the front of this metal chassis by screws and bracket arms is a wooden board with a shaped hole through which projects the truncated glass section of the cathode-ray tube. The problem to be faced at this juncture is the efficient mounting of the cathode-ray tube itself so that it is lined up satisfactorily with the deflecting equipment, and shows no tendency to get off centre and so upset the scanning field produced on the fluorescent screen face. As can be seen from the illustration, a very satisfactory solution to this difficulty is to use a moulded rubber cap. This is stretched over the circular face of the C.R. tube and held in tension by four tongues with end holes slipped over L-shaped hooks screwed to the wooden board. The front of this rubber cap is cut out to a rectangular shape which corresponds exactly with the final size of the television picture, and a channel round the outer edge enables this to fit in the cut-out aperture in the front of the wooden cabinet. Both support and masking are therefore undertaken by this single fitting, and the work of assembly is made easier. Furthermore, with an efficient mounting of this nature the work of servicing is made simpler. The whole shelf can be slipped out of the cabinet quite readily after the removal of one or two registering screws, and if a cathode-ray tube has to be renewed it is the work of a few moments to release the rubber mask, remove the tube and replace a new one. Many variants of this form of mounting are possible, but there is no doubt that the whole idea is a marked improvement on the schemes adopted in the early days of cathode-ray tube television receivers.

Satisfactory Synchronising

IT is generally accepted that no matter how good a television picture may be from the point of view of brightness, contrast, detail and gradation, it will fail completely as home entertainment unless properly synchronised, so that it remains quite steady within the cabinet mask. It is for this reason that so much time is devoted by engineers to the synchronising problem in an endeavour to find a foolproof system. Some involve radical changes at the receiving end and others at the transmitting end, and an interesting example of the latter suggests that the line impulses should be radiated on a different carrier wave from the frame impulses. The inventor proposes that the frame impulse signals should be combined with the picture signals, it being arranged that the frame signals modulate the carrier-wave upwards from a given datum level, while the vision signals modulate it downwards from the same datum level. It is said that by this method the framing impulses can be employed for the purpose of automatic volume control in addition to fulfilling their normal function. The line impulses would be combined with the sound carrier wave, as it is claimed that they can be more clearly separated, and are also more immune from the upsetting effects of parasitic disturbances.

A Knotty Problem

WHILE the British authorities have been able to shelve many of the intricate television problems with which they were faced before the outbreak of war provided them with an adequate excuse, the development of the American television service has brought to the fore these same difficulties. It is possible, therefore that the British industry may ultimately profit by making a close observation of the solutions which the Americans will be forced to propound. One of the most acute problems being dealt with by the Federal Communications Commission in the United States is that associated with picture standards. Will a picture dissection of 441 lines with 60 frames per second interlaced to give 30 complete pictures per second be acceptable to the set buying public, and if so, for how long? Fraught with all manner of side issues, engineers and experts are agreed that just as was the case with British television after nearly a year's trial, the picture as seen on the home commercial set does not in any way approach theoretical quality of 441 lines. From the point of view of measured detail the figure seems to be nearer that of a picture of 250 lines, while gradation and contrast are well below the theoretical maximum. It would therefore be unwise to talk of improved picture standards until every avenue has been explored for the purpose of bringing the received picture up to the quality it should exhibit.

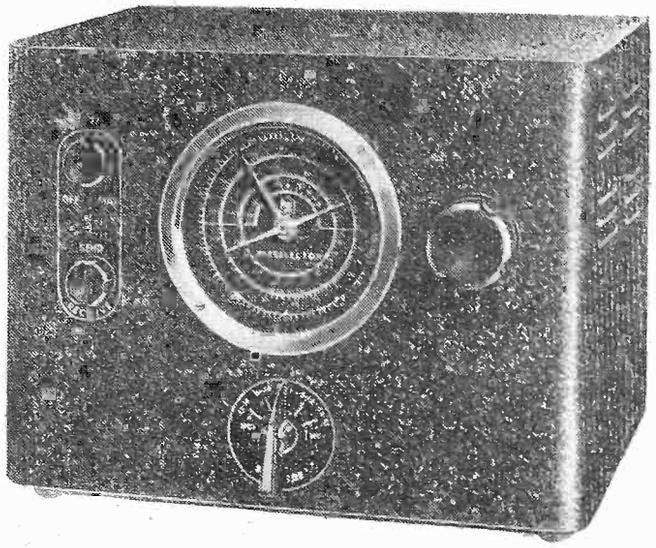


A very good example of a compact television receiver chassis mounting, providing also a first-class support for the cathode-ray tube.

Peto-Scott Pre-selector

WHEN it is desired to increase the range of an existing receiver on the short waves, and at the same time to introduce additional selectivity, a pre-selector is a valuable type of unit to use for the purpose. Normally this consists of a single valve arranged in a more or less standard H.F. circuit and the improvement is quite marked. An interesting unit designed on similar lines, but having additional gain and selectivity by the use of two valves is that shown in the accompanying illustration, and produced by the Peto-Scott Company. A standard two-H.F. circuit is employed, with H.F. transformers in both the input and inter-stage positions. The two valves are the latest "E" series low-noise H.F. pentodes, and a separate mains section is included to make the unit entirely self-contained. It is thus independent of any voltage supplies from the receiver with which it is used. The coil unit is of the standard Peto-Scott type divided into five bands, and covering the range from 7 to 550 metres. The appropriate band is selected by the lower switch, and the two controls on the left are for on-off volume control, and for "send-receiver" when the unit is used in conjunction with a short-wave receiver and transmitter.

The tuning control is the special band-spread mechanical drive which we have reviewed in these pages before. The input terminal socket is wired so that either a single or doublet type of aerial may be used.



The Peto-Scott Pre-selector. Note the bandspread dial.

Test Report

The unit was connected to a standard single aerial and coupled to an eight-valve communications type superhet. When the pre-selector was switched off it was found possible to tune in the higher-powered stations on the receiver without much loss of volume, and then when the pre-selector was switched on a very noticeable improvement was obtained. Apart from the additional gain, the improvement in selectivity was extremely good. Several weak stations which were normally blotted out by powerful stations on adjacent wavelengths, even on the superhet, were separated and brought to comfortable listening volume. The controls on pre-selector and receiver were independent, and sufficiently flat in tuning to remove all difficulty of finding stations. The approximate setting is obtainable aurally by the usual slight increase in background noise, and final tuning is then easily effected by the useful mechanical bandspread dial. Several American transmissions were heard during the early part of the afternoon which could only be found with difficulty on the superhet, and the improved input arising from the two-stage amplifier enabled the signal fed to the A.V.C. section of the superhet to be of such a level that the A.V.C. operated more efficiently, and thus it was possible to hold these stations and follow a programme through where previously it had been lost for quite long periods. The complete screening of the unit prevents inter-action between it and the receiver, and the only thing which was found worth while was to screen the lead connecting the unit to the aerial terminal of the superhet which was used for our test.

The price of this unit is £7 8s. 6d., and the dimensions of the cabinet are 12½in. wide, 9½in. deep and 9½in. high.

"Composers' Records"

LISTENING to the latest "hit" song on your gramophone, have you ever cast a thought back on the composers who sit up late nights thinking them out? This month the Decca Company have brought the actual composers to the microphone in order that they may sing their own songs to you. The series begins with Ross Parker and Hugh Charles, who cram six of their compositions on to one record. They introduce "We'll Meet Again," "Blue Skies are Round the Corner" and "There'll Always be an England," etc.—*Decca F* 7356. They will bring other composers to you each week under the title of "Song Writers on Parade."

How many times have you "known the name of that tune"—and yet been unable to name it? It is not so much over current song hits but over evergreen classics and near classics. A new Decca album contains ten such melodies which have been recorded by Harry Horlick and His Salon Orchestra. The second album to be issued under the same heading, it contains favourite airs as varied as Brahms' "Lullaby" (Wiegenlied, op. 49, No. 4) and the "Chinese Lullaby" from "East is West." This album of five 10in. records is excellent value for money—*Decca F*7239-43.

RADIO IN THE SERVICES

(Continued from page 23)

spindle could be used to move the secondary backward and forward within the primary.

Another method of providing variable selectivity is to place a small winding (generally referred to as a tertiary winding) on the former along with the primary and secondary; it would generally be placed between the two. This winding is not connected to any part of the circuit, but has a variable resistor in parallel with it. Alteration of effective resistance value varies the damping on the tuned circuits and therefore the selectivity.

WHAT would be the probable result if the bias resistor for an output pentode were (a) short-circuited, (b) open-circuited?

If the resistor, which is included between the cathode and H.T.—, were short-circuited, the valve would not be biased. This is because there would be no voltage drop across the resistor. As a result the valve would become excessively hot because of the marked rise in anode current, and would probably be damaged. Additionally, serious distortion would be noticeable.

Should the resistor become open-circuited the receiver would be "dead," because there would be no flow of H.T. current through the valve. It would also be found that the temperature of the glass bulb would be considerably less than usual.

EXPLAIN very simply, with the aid of a diagram, connections for a double-diode valve used as second detector and automatic volume control.

Fig. 2 shows representative connections, although there are many possible variations and modifications. The right-hand anode is used for second detection, and is connected to a centre-tapping on the secondary of the final I.F. transformer, the lower end of which is returned to earth through a load resistor. The diode is a rectifying (or one-way) device, and the rectified (strictly de-modulated) output is developed across the load resistance between the transformer and earth. A volume-control potentiometer is wired in parallel with this to provide the feed to the grid circuit of the L.F. valve. Included also in this circuit is a grid condenser of .01 mfd. and a 50,000-ohm H.F. "stopper" resistor.

The left-hand diode anode is used for A.V.C. and is connected to the anode of the I.F. valve through a .0001-mfd. fixed condenser. H.F. current is applied between the anode and cathode of the diode. As a result, a rectified or D.C. current is produced and is allowed to build up across the .25-megohm load resistor between the A.V.C. anode and earth. From the upper end of this (which is negative in respect of the earth line) a lead is taken to the grid circuits of the controlled valves. In Fig. 2 a .5-megohm decoupling resistor and a .05-mfd. by-pass condenser are shown in the A.V.C. line. Components of similar value to these would be used to decouple each of the controlled valves.

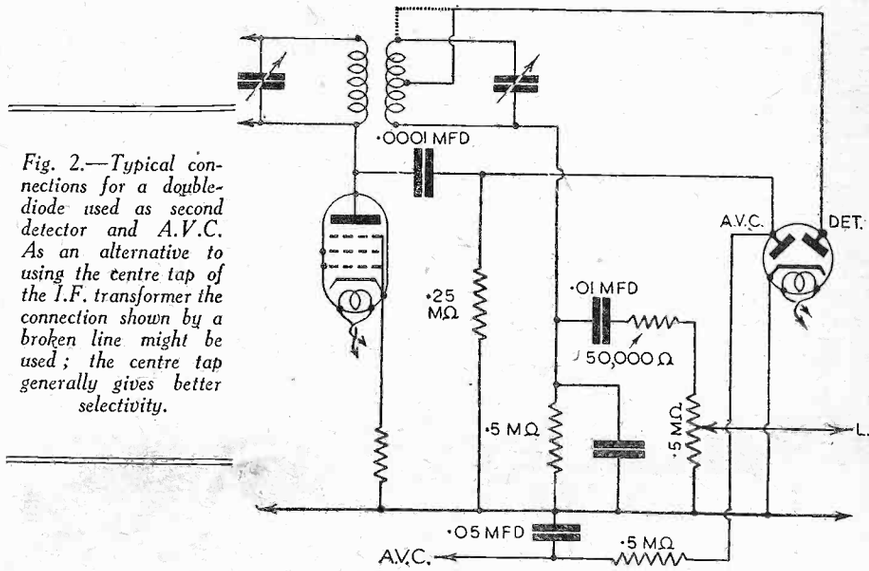


Fig. 2.—Typical connections for a double-diode used as second detector and A.V.C. As an alternative to using the centre tap of the I.F. transformer the connection shown by a broken line might be used; the centre tap generally gives better selectivity.

It should be stressed that the values indicated are approximate only, and might have to be altered to suit different valves and circuits.

C-R. Tube Focusing Refinement

IN order to produce a really satisfactory television picture it is essential that the beam of electrons should be in exact focus at every point of impact on the fluorescent screen. Many refinements are introduced in the electrode assembly in an endeavour to achieve this ideal condition, but frequently this is nullified by the secondary emission of electrons at the final apertured anode. These electrons are released at varying velocities and in consequence are not brought under the same focusing influence as the main electron stream passing at high constant velocity through the aperture. The result of this is evidenced by an enlarged light spot area on the screen, and a measure of distortion due to the irregularity of shape and random electron velocities. It is therefore preferable to adopt any measure which will serve to collect these secondary electrons before they have an opportunity of upsetting the focus of the main beam. One scheme which has achieved a measure of success is to mount on the remote side of the apertured anode a convex-shaped electrode of non-secondary emissive material. This has the main anode potential applied to it, and the secondary electrons passing through the main anode aperture are collected by this electrode. This enables the primary constant speed electrons to progress through the tube's focusing system, whether electro-magnetic or electro-static, and impact on the screen at a sharply defined small area as an intrinsic light spot.

A Morse Oscillator

Details of an Unusual Type of Morse Practice Outfit

IT is very seldom that one finds the opportunity of taking advantage of any of the various circuit differences with which one meets when experimenting, and it is improbable that a practical use will readily suggest itself should an exception be realised. However, if one treats a fault or inconsistency as a definite function, then there is no reason why something may not be made of the condition which can provide merits in other directions. The writer, adopting this idea, decided to make use of parasitic oscillation of the type which we all know so well, and which comes under the category of "microphony."

In the case of parasitic oscillation, which may take the form of a purely electronic condition, a mechanical state governed by resonance, or a combination of both, attempts are invariably made to eradicate or prevent this occurring, but in the application described, the results of speaker-to-microphone feed back is the basis for an audio oscillator for use as a morse practice unit.

The first experiment along these lines consisted simply of back coupling, through the medium of two headphones suitably mounted on a stand, one 'phone being supported on an adjustable bracket as is illustrated in Fig. 1.

By observing the signal intensity in audio output, there resulted another form of parasitic oscillation, this taking the form of electronic feed back, and resulting in a most unpleasant background very similar to that known as threshold howl.

Although this whistle, which resulted through the common core modifying the unit so that it functioned as a small L.F. transformer, was well below the signal strength, it had to be eradicated, and this was simply brought about by earthing the core of the "Transformer" or coil unit, and so a separate terminal (E) was provided as will be noticed in the illustration which shows also the corresponding coil connections to the other terminals.

A good deal of experimenting was carried out in an endeavour to get constant amplitude, and various other arrangements will no doubt suggest themselves. However, the methods adopted by the writer will prepare the ground for readers interested in this scheme.

The next step constituted a return to the double earpiece unit given in Fig. 1, but in this instance one 'phone, "P1," served as the oscillatory unit, embodying the self excitation principle just described, whilst the other 'phone, "P2," comprised an ordinary unmodified earpiece. This latter earpiece was used to convey the audio signals omitted from the oscillatory unit to a pre-amplifier, of the type illustrated in the combined mixer and pre-amplifier recently described in these columns, the output from this amplifier being taken to a pair of headphones.

The results of this experiment showed that the signal could be considerably attenuated to prevent resonance distortion in the mechanical movement of the diaphragm, thus permitting a more loosely adjusted diaphragm and closer coupling between the unit and receiver earpiece, this providing a more constant pitch.

The most important consideration which arises in this form of oscillation is the ability of the unit to respond to the morse key—and this was obtained by the apparatus used by the writer—but there is no doubt that with a little more critical design on the part of the experimenter, as for example by using separate cores for L1 and L2, a really serviceable arrangement could be evolved. It should be pointed out, in conclusion, that when bringing the input and output 'phones into close proximity, care should be taken that the leads to these earpieces are not near or parallel to each other, and the most favourable results will be obtained by screening these leads, although in early test this was not found to be absolutely essential.

Insulation should be carefully checked owing to the H.T. circuit in which the feed-back coil (the coil connected to the amplifier output terminals), is connected, and it would be preferable for a filter choke output scheme to be adopted in the output stage of the amplifier. Figs. 3 and 4 provide the keying circuit and a diagram of a non-amplifying system where the 'phones P1 and P2 (see Fig. 1) are assembled as a combined signal generator and receiver, using a common diaphragm, the pick-up in P2 being passed on to another pair of headphones.

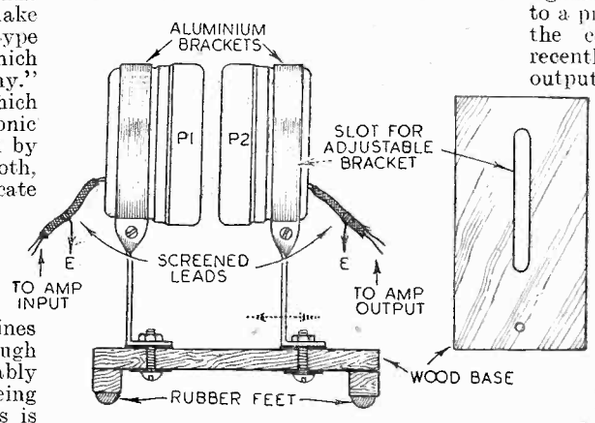


Fig. 1.—The first step in the development of the oscillator.

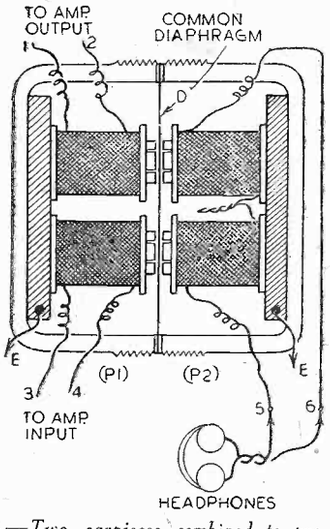


Fig. 3.—Two earpieces combined to provide a similar effect to Fig 1.

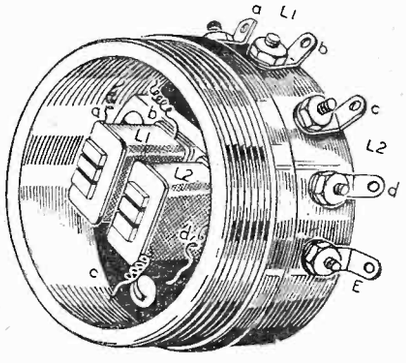


Fig. 2.—How the earpiece was split up and provided with terminals in a further stage of development.

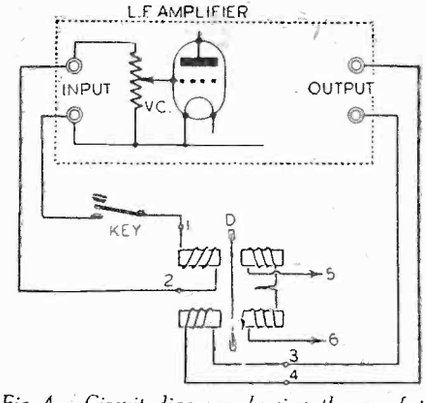


Fig. 4.—Circuit diagram showing the use of the oscillator and keying system.

Modifications

Experiments in this direction necessitated the interruption of the series coil connection in a cheap headphone, each coil connection now being brought out to separate terminals as is depicted in Fig. 2. Now, in adapting this headphone for the dual functions of microphone input and relation to such factors as the flexibility of the diaphragms, the distance between the 'phones and the output power of a simple hook up two-valve amplifier, it was soon realised that the oscillatory condition which, although subject to amplitude variations, could quite possibly be incorporated in a single unit in this way, somewhat restricting the mechanical vibration and thereby obtaining a fairly steady signal.

LATEST PATENT NEWS

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

Abstracts Published.

TWO-PART COUPLINGS. — Naamlooze Vennootschap Philips Gloeilampenfabrieken. No. 504866.

A radio receiver adapted for use on A.C. or D.C. mains by means of a converter is provided with a socket plate A, B (Fig. 1) mounted on the back of the set and engaged by a plug member (Fig. 2) engaging rows of contacts III and IV in one position, whereby the mains terminals 9, 10 are connected through the switch 5, and sockets 8, 12, 11, 15 to the set mains supply terminals 12, 15, while in the other position, the plug member is withdrawn, rotated about the shaft M through 180 deg., and engages rows of contacts II, III. In this latter position the mains terminals 9, 10 are connected to sockets 1, 4, connected to a converter, the A.C. output of which is fed back to sockets 2, 3, and thence via sockets 6, 7 to terminals 12, 15. The plug and socket members are so arranged that they can only be engaged in two positions, an indicator showing the kind of input current in use being exposed by the corresponding operation of the plug member (not shown). The switch 5 acts as a mains switch for either position. The device may also be used to switch a supply transformer in and out of circuit according to the A.C. mains voltage available.

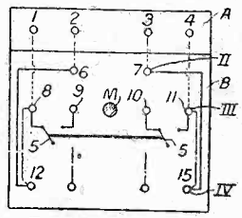


Fig. 1.

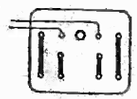


Fig. 2.

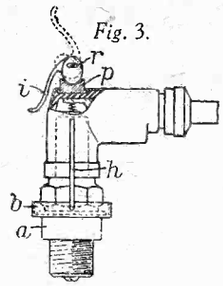


Fig. 3.

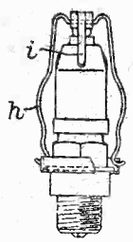


Fig. 4.

TWO-PART-COUPLINGS.—Bosch Ges., R. No. 502058.

A radio-screened sparkling-plug coupling is secured by a spring bail *h* (Figs. 3 and 4), pivoted in a member *b* secured to the casing *a* and tightened in position by a spherically-ended lever *i* rotatable to press in a concave seating *p*. The slot *r* in the lever through which the bail passes is narrower in the middle than at the ends, permitting the lever to be operated at one side or the other of its medial position.

EARTH RODS.—Adie and Nephew, Ltd., C. J., and Fletcher, R. A. No. 502269.

An earth rod has a cruciform, channelled, or other flanged or webbed cross-section and is formed by one or more suitably bent or folded metal strips. As shown in Figs. 5 and 6, a rod is of hollow cruciform

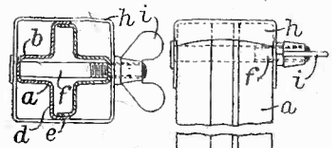


Fig. 6.

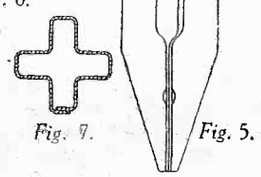


Fig. 7.

Fig. 5.

cross-section and is formed by two metal strips *a* each shaped by rolling, drawing or folding to a tee cross-section. The head *d* of each tee is formed with lips or flanges *e*, the lips or flanges of one tee being arranged within those of the other tee and united thereto by welding or riveting. The lower end of the rod is tapered and the upper end is closed by a cap *h* retained by a bolt *f* and wing nut *i* which serves also as the means for securing the earthing wire to the rod. In a modified construction, the two side portions *b* of the stem of each tee are in contact and the head portions of the two tees are also in contact. In another construction, a rod of **I** cross-section comprises a pair of channel-sectioned strips secured together with the channels outermost. Any of these constructions may be formed from a suitably shaped single meta strip. Fig. 7 shows a rod having a cross-section similar to that shown in Fig. 6 and formed from a single strip.

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.

3561.—Cinch Manufacturing Corporation.—Sockets for thermionic valves, etc. February 26th.

3614.—Condliffe, G. S.—Cathode-ray tube apparatus. February 27th.

3537.—Duncan, E. G., Mayturn, J. A., and Mulparvo, Ltd. — Radio receivers. February 26th.

3428.—Kramolin, L. L. de.—Arrangement for automatic or manual selectivity of tuning control of electric oscillatory circuits. February 23rd.

3557.—Lawson, D. I., Weighton, D., and Pye, Ltd.—Harmonic analysers. February 26th.

3710.—Marconi's Wireless Telegraph Co., Ltd.—High powered electron discharge device. February 28th.

3711.—Marconi's Wireless Telegraph Co., Ltd.—Wireless receiving systems. February 28th.

3712.—Marconi's Wireless Telegraph Co., Ltd. — Coupling devices. February 28th.

3462.—Marconi's Wireless Telegraph Co., Ltd., Cockerell, C. S., Brailsford, J. D., and Cufflin, M. H.—Directional radio receiver systems. February 23rd.

3464.—Marconi's Wireless Telegraph Co., Ltd., Cockerell, C. S., Brailsford, J. D., and Cufflin, M. H.—Plug socket, etc., connectors or racks. February 23rd.

3574.—Philips Lamps, Ltd.—Wireless receivers with bandspread tuning. February 26th.

3645.—Philips Lamps, Ltd.—Manufacture of coils, etc., for electrical purposes. February 27th.

3433. — Standard Telephones and Cables, Ltd., and Earp, C. W.—Radio beacons. February 23rd.

3434.—Standard Telephones & Cables, Ltd., and Earp, C. W.—Mechanical modulator for high-frequency waves, particularly for radio beacons utilising two tones. February 23rd.

Specifications Published.

518210.—I. M. K. Syndicate, Ltd., and Nagy, P.—Television systems, and thermionic valve circuits for use there.

518214.—Marconi's Wireless Telegraph Co., Ltd., and Kaell, O. E.—Electron-discharge tube amplifiers.

518311.—Compagnie Pour la Fabrication des Compteurs et Material D'Usines A Gaz.—Telecinema transmitters. (Cognate Application 21326/38).

518221.—Ferranti, Ltd., Miller, J. L., and Wood, H.—Cathode-ray tubes.

518229.—Cole, Ltd., E. K., and Bradfield, G.—Motor-operated tuning mechanism for radio receivers.

518273.—Belling & Lee, Ltd., Disney, A. L., and Strafford, F. R. W.—Means of suppressing electrical interference by sparking-plugs of internal-combustion engines.

518200.—R.C.A. Photophone, Ltd., and Underhill, J. L.—Potentiometer circuits for controlling voltages for push-pull photo cell circuits, thermionic valves, and similar purposes.

518378.—White, E. L. C.—Thermionic valve circuits.

518390.—Maclarty, B. N.—Thermionic valve amplifiers.

518205.—Holstensson, A. H.—Talking-machines for playing a plurality of records in succession.

518308.—Rudkin, E. P.—Wireless receiving system. (Divided out of 518128.)

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

Open to Discussion

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

A Five-valve S.W. Set Wanted

SIR,—I have been a reader of your grand paper from the first number, and have built many short-wave receivers from your designs, but I, and many other readers, I think, would welcome a receiver on the following lines: a five-valve A.C. mains short-waver, with 1 untuned H.F. Det., 2 L.F. (pentode output), rectifier, built-in energised speaker, and plug-in coils.—A. G. MARTIN (Bexleyheath).

Back Number Wanted

SIR,—I should be glad if any reader who has PRACTICAL WIRELESS dated Feb. 9th, 1935, which describes the construction of the Universal Hallmark 4, would kindly lend me the copy for a few days.—H. FRANKHAM (42, Harriett Street, Cathays, Cardiff).

Books Damaged in Transit

SIR,—I have just examined an amateur call book and two American text-books, all of the soft-backed variety and supplied by two different sources in this country who import them. Each book has a permanent crease and cracked cover due to being folded for postage. Personally, should I require any American publication I should place my order in the U.S.A., where a request to carefully pack flat is always granted. It is to be hoped that British suppliers will copy those of the U.S.A. The postage would be a little extra, but would assure that such books arrived minus the crease. Considering the prices of some of these publications, which are well worth the outlay, the purchasers at least deserve copies which arrive undamaged.—A. W. MANN (Middlesbrough).

Full-wave Detection

SIR,—Mr. Ford will have his little joke! Your readers will, no doubt, appreciate that it is all a matter of terminology. The arrangement he describes in his letter (your issue, dated February 24th), is, of course, not a "full-wave" detector, but a "push-pull" detector. He will not, I think, doubt the possibility of "push-pull" detection of radio-frequencies. Full-wave detection is, of course, theoretically possible, but since all available detectors are (like everything else in this world) imperfect, none having zero reverse current, they cannot detect (rectify) the "full" wave.—"EMPIRICIST" (Ickenham).

Stations Ankara and Helsinki

SIR,—I would like to report that station TAP on 9.46 mc/s is the only short-wave station in operation in Turkey at the present time. News is given in English at 20.15 B.S.T. to 20.30, and the station closes down at 22.30 B.S.T., QRA "Correspondence Dept.," Radio Ankara, Ankara, Turkey. The station welcomes reports. Helsinki (Finland) can still be heard at 04.00 B.S.T., with news in English.—C. W. HARVEY (Wembley).

Logged on 28 and 14 mc/s

SIR,—I append my log of stations heard here on my o-v-1 (home built), with a number 19 valve as det. and L.F. A twin cable antenna was used, 20ft. long and 30ft. high. 28 mc/s (fone): W1GE; W2IYX, FII; W3HFW, GUF, EVP, HUV; W6RKI; W8FGV, RXY, FXM, FJV, FZZ, QCK, AEM, PUV, DXE, RLT; W9YEL, HRC, DAX, USU, and OQ5AB. All stations heard between 15.00 and 17.30 hours.

14 mc/s (fone): W1JJK, AVK; W2IXY; W4DSY, CLK; W8AF, and ES5C.

The following broadcast stations were also heard: WCBX (13, 16 and 31 metres), WCAB (13 metres), WNBI (16 metres), WRUL, GEA, PIT (19 metres), WGEO, RCA (31 metres) and TGWA (31 metres). I think your paper is excellent, but I should like to see the return of the "Leaves from a Short-Wave Log." column.—R. BROMELL (Solihull, Birmingham).

Exchanging QSL Cards: Radio Saigon

SIR,—I have recently placed a standing order for your very fine paper. I have been very interested in its contents though I do not agree in this matter of exchanging QSL cards. I have been a S.W. listener for four or five years now, but have only about two dozen cards among these being W9XA and W9XUP on 11 m., W9TNP on 75 m., two VQ4's, K6OQE and VK4KH on 20 m. I have also a card from W6NBE. My report was first from Wales. Now, I naturally am very proud of these cards, and would never dream of exchanging them for cards confirming a station I have never heard.

Radio Saigon, Boite Postale, 412, Saigon, French Indo-China

Daily Schedule	Time, G.M.T.
11.35 p.m. to 12.15 a.m.	News in French.
5.05 a.m.	News in French.
5.15 to 5.45 a.m.	Light Music.
11.00 a.m.	News in English and Music.
12.35 p.m.	News in Dutch.
1.0 p.m.	News in French.
1.15 to 2.0 p.m.	Music and Variety.
2.0 to 2.30 p.m.	Paris Mondial (relay).
3.0 to 4.0 p.m.	English Programme.

Subject to change without notice

Wavelengths	
6,116 kc/s.	49.05 metres.
11,780 kc/s	25.40 metres.
1,000 kc/s.	300 metres.

This morning I received a nice card from Radio Saigon, confirming my reception of November 30th last. I enclose this station's programme which may be of interest to other readers.—W. J. PARRY (Bangor, N. Wales).

S.W. Reception Conditions: Proposed Club for Chelmsford

SIR,—I should like to take this opportunity of expressing my sincere appreciation of your excellent weekly. I have been a S.W. fan for about two years now and have gained quite a lot of useful information from this paper. My receiver, an o-v-2, Det. and 2 L.F., works very well *without* an earth, having logged most of the commercial American stations such as WGEA and WCBX. With an earth I find the set acts very peculiarly, signals being very weak, although the earth connection is good. Having no earth connection may seem to tend towards instability, but I find the set very stable under all conditions. I'm afraid S.W. DX is very scarce lately, even the Americans being very evasive at times, although Australia's new short-wave transmitters, VLQ and VLQ2, are certainly holding their own. I should like very much to see the formation of a Radio Club in this district, and I invite anyone who is interested in the proposition to write to me.—D. WATLING, 64, South Primrose Hill, Rainsford End, Chelmsford, Essex.

Proposed Club for Plymouth

SIR,—I would like to exchange views with other local enthusiasts regarding the formation of a Wireless Club in the Plymouth District.—W. F. NOYCE, 46, Clarence Road, Torpoint, Cornwall.

Correspondents Wanted

SIR,—I am at present confined to hospital, and being interested in radio, I would much appreciate a letter from any reader who cares to correspond with me.—EDWARD KIRBY, Ward 38, St. James's Hospital, Leeds.

SIR,—I have been a reader of your fine journal for a number of months, and I find it very helpful.

I would very much like a correspondent, who is interested in short-wave listening. I have a 2-valve S.W. set, and I am using a Telsen dual-range short-wave coil. Wishing your journal every success.—R. WHITELAW, 118, Leamington Road, Coventry, Warwicks.

The 30/- Three

SIR,—I would be glad if any reader who has built the 30/- Three would get in touch with me. I have been a reader of your excellent paper for the last two years, and have found it invaluable.—B. JOHNSTON, c/o A. Adair, 15, Woodhouse Street, Portadown, Ulster.

Prize Problems

PROBLEM No. 392.

JACKSON had a good milliammeter and decided to make up a general-purpose tester. The meter read 1 mA and he worked out the various current shunts and series resistors for voltage readings, and having obtained these he connected them all to the meter and various switches. When completed he made one or two tests of anode current on his set but found that on all the current readings he obtained practically the same reading. He examined the switches and found that these were working correctly. What was wrong? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 392 and must be posted to reach this office not later than the first post on Tuesday, March 26th, 1940.

Solutions to Problem No. 391.

When Marshall added his auto-bias circuit he overlooked the fact that the grid-return lead should have been taken to the H.T. negative terminal, but he connected it to earth. Consequently the valve was not biased.

The following three readers successfully solved Problem No. 390 and books have accordingly been forwarded to them: D. M. Webber, Millswood, South Brent, Devon; W. J. Barnsley, 8/27, Garbett Street, Ladywood, Birmingham; C. D. Sergeant, 6, Greenway, Chislehurst, Kent.

Practical Wireless
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These Blueprints are drawn full size.

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Amateur Wireless ... ... 4d. " "
Wireless Magazine ... ... 1/8 " "

The index letters which precede the Blueprint Number indicates the periodical in which the description appears: Thus P.W. refers to PRACTICAL WIRELESS. A.W. to *Amateur Wireless*. W.M. to *Wireless Magazine*.

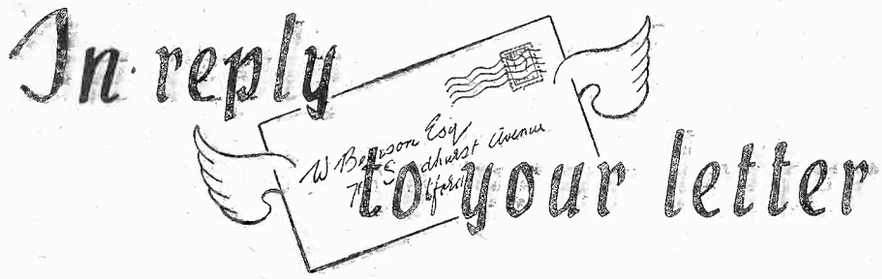
Send (preferably) a postal order to cover the cost of the blueprint, and the issue (stamps over 6d. unacceptable) to PRACTICAL WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS CRYSTAL SETS

	Date of Issue.	No. of Blueprint
Blueprints, 6d. each.		
1937 Crystal Receiver	—	PW71
The "Junior" Crystal Set	27.8.38	PW94
STRAIGHT SETS. Battery Operated.		
One-valve: Blueprints, 1s. each.		
All-Wave Unipen (Pentode)	—	PW31A
Beginners' One-valver	19.2.38	PW85
The "Pyramid" One-valver (HF Pen)	27.8.38	PW93
Two-valve: Blueprint, 1s.		
The Signet Two (D & LF)	24.9.38	PW76
Three-valve: Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (Trans))	—	PW10
Sixty Shilling Three (D, 2 LF (RC & Trans))	—	PW34A
Leader Three (SG, D, Pow)	22.5.37	PW35
Summit Three (HF Pen, D, Pen)	—	PW37
All Pentode Three (HF Pen, D (Pen), Pen)	29.5.37	PW39
Hall-Mark Three (SG, D, Pow)	—	PW41
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	PW49
Cameo Midget Three (D, 2 LF (Trans))	—	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	—	PW53
Battery All-Wave Three (D, 2 LF (RC))	—	PW55
The Monitor (HF Pen, D, Pen)	—	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	14.8.37	PW64
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	18.2.39	PW72
The "Rapide" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	PW82
F. J. Camm's Oracle All-Wave Three (HF, Det., Pen)	28.8.37	PW78
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.38	PW84
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.38	PW87
The "Hurricane" All-Wave Three ((SG, D, Pen), Pen)	30.4.38	PW89
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	3.9.38	PW92
Four-valve: Blueprints, 1s. each.		
Sonotone Four (SG, D, LF, P)	1.5.37	PW4
Fury Four (2 SG, D, Pen)	8.5.37	PW11
Beta Universal Four (SG, D, LF, Cl. B)	—	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	—	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67
"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B)	12.2.38	PW83
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	3.9.38	PW90
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen)	—	PW18
A.C.-D.C. Two (SG, Pow)	—	PW31
Selectone A.C. Radiogram Two (D, Pow)	—	PW19
Three-valve: Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)	—	PW23
D.C. Ace (SG, D, Pen)	—	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Pow)	7.1.39	PW35C
D.C. Premier (HF Pen, D, Pen)	—	PW35B
Unique (HF Pen, D (Pen), Pen)	—	PW36A
Armada Mains Three (HF Pen, D, Pen)	—	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	—	PW50
"All-Wave" A.C. Three (D, 2 LF (RC))	—	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	—	PW56
Mains Record All-Wave 3 (HF Pen, D, Pen)	—	PW70
Four-valve: Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	—	PW47
SUPERHETS.		
Battery Sets: Blueprints, 1s. each.		
£5 Superhet (Three-Valve)	5.6.37	PW40
F. J. Camm's 2-valve Superhet	—	PW52
Mains Sets: Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve)	—	PW43
D.C. £5 Superhet (Three-valve)	—	PW42
Universal £5 Superhet (Three-valve)	—	PW44
F. J. Camm's A.C. Superhet 4	31.7.37	PW59
F. J. Camm's Universal £4 Superhet 4	—	PW60
"Qualitone" Universal Four	16.1.37	PW73
Four-valve: Double-sided Blueprint, 1s. 6d.		
Push Button 4, Battery Model / Push Button 4, A.C. Mains Model	22.10.38	PW95
SHORT-WAVE SETS. Battery Operated.		
One-valve: Blueprint, 1s.		
Simple S.W. One-valver	23.12.39	PW88
Two-valve: Blueprints, 1s. each.		
Midget Short-wave Two (D, Pen)	—	PW38A
The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.38	PW91
Three-valve: Blueprints, 1s. each.		
Experimenter's Short-wave Three (SG, D, Pow)	—	PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	—	PW63
The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	1.10.38	PW68
PORTABLES.		
Three-valve: Blueprints, 1s. each.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	—	PW65
Parvo Flyweight Midget Portable (SG, D, Pen)	3.6.39	PW77
Four-valve: Blueprint, 1s.		
"Imp" Portable, 4 (D, LF, LF (Pen))	—	PW86
MISCELLANEOUS.		
Blueprint, 1s.		
S.W. Converter-Adapter (1 valve)	—	PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

	Date of Issue.	No. of Blueprint
Blueprints, 6d. each.		
Four-station Crystal Set	23.7.38	AW427
1934 Crystal Set	—	AW444
150-mile Crystal Set	—	AW450
STRAIGHT SETS. Battery Operated.		
One-valve: Blueprint, 1s.		
B.B.C. Special One-valver	—	AW387
Two-valve: Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)	—	AW388
Full-volume Two (SG det, Pen)	—	AW392
Lucerne Minor (D, Pen)	—	AW426
A Modern Two-valver	—	WM409
Three-valve: Blueprints, 1s. each.		
£5 5s. S.G.3 (SG, D, Trans)	—	AW412
Lucerne Ranger (SG, D, Trans)	—	AW422
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
Transportable Three (SG, D, Pen)	—	WM271
Simple-Tune Three (SG, D, Pen)	*June* '33	WM327
Economy-Pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans)	*Mar.* '34	WM354
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
PTP Three (Pen, D, Pen)	—	WM389
Certainty Three (SG, D, Pen)	—	WM393
Minitube Three (SG, D, Trans)	*Oct.* '35	WM396
All-Wave Winning Three (SG, D, Pen)	—	WM400
Four-valve: Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans)	—	AW370
2HF Four (2 SG, D, Pen)	—	AW421
Self-contained Four (SG, D, LF, Class B)	*Aug.* '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2 LF)	*Feb.* '35	WM381
The H.K. Four (SG, SG, D, Pen)	—	WM384
The Auto Straight Four (HF Pen, HF, Pen, DDT, Pen)	*Apr.* '36	WM404
Five-valve: Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans)	—	WM320
Class B Quadradyne (2 SG, D, LF, Class B)	—	WM344
New Class B Five (2 SG, D, LF, Class B)	—	WM340
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	—	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C.-D.C. Two (D, Pen)	—	WM394
Three-valve: Blueprints, 1s. each.		
Home Lover's New All-Electric Three (SG, D, Trans) A.C.	—	AW383
Mantovani A.C. Three (HF Pen, D, Pen)	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401
Four-valve: Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	*July* '33	WM329
Harris' Jubilee Radiogram (HF Pen, D, LF, P)	*May* '35	WM386
SUPERHETS.		
Battery Sets: Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
'Varsity Four	*Oct.* '35	WM395
The Request All-Waver	*June* '36	WM407
1935 Super-Five Battery (Superhet)	—	WM379
Mains Sets: Blueprints, 1s. 6d. each.		
Heptode Super Three A.C.	*May* '34	WM359
"W.M." Radiogram Super A.C.	—	WM366
PORTABLES.		
Four-valve: Blueprints, 1s. 6d. each.		
Holiday Portable (SG, D, LF, Class B)	—	AW393
Family Portable (HF, D, RC, Trans)	—	AW447
Two H.F. Portable (2 SG, D, QP21)	—	WM363
Tyers Portable (SG, D, 2 Trans)	—	WM367
SHORT-WAVE SETS. Battery Operated.		
One-valve: Blueprints, 1s. each.		
S.W. One-valver for America	15.10.38	AW429
Rome Short-Waver	—	AW452
Two-valve: Blueprints, 1s. each.		
Ultra-Short Battery Two (SG, det, Pen)	*Feb.* '36	WM402
Home-made Coil Two (D, Pen)	—	AW440
Three-valve: Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
The Carrier Short-waver (SG, D, P)	*July* '35	WM390
Four-valve: Blueprints, 1s. 6d. each.		
A.W. Short-wave World-beater (HF Pen, D, RC, Trans)	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valve Short-waver (SG, D, LF, P)	22.7.39	WM383
Superhet: Blueprint, 1s. 6d.		
Simplified Short-wave Super	*Nov.* '35	WM397
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C.	13.1.40	AW453
"W.M." Long-wave Converter	—	WM380
Three-valve: Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C.	—	WM352
Four-valve: Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	—	WM391
MISCELLANEOUS.		
S.W. One-valve Converter (Price 6d.)	—	AW329
Enthusiast's Power Amplifier (1/6)	—	WM387
Listener's 5-watt A.C. Amplifier (1/6)	—	WM392
Radio Unit (2v.) for WM392 (1/-)	*Nov.* '35	WM398
Harris Electrogram battery amplifier (1/-)	—	WM399
De Luxe Concert A.C. Electrogram (1/-)	*Mar.* '36	WM403
New style Short-wave Adapter (1/-)	—	WM388
Trickle Charger (6d.)	—	AW462
Short-wave Adapter (1/-)	—	AW456
Superhet Converter (1/-)	—	AW457
B.L.D.L.C. Short-wave Converter (1/-)	*May* '36	WM405
Wilson Tone Master (1/-)	*June* '36	WM406
The W.M., A.C. Short-wave Converter (1/-)	—	WM408



Oscillator Tone

"I recently put together a small single-valve oscillator for morse practice. I used an old transformer I had and it works admirably except for one thing, and that is the tone. It is rather low and unpleasant and after using it for half an hour or so it begins to bore. Is there any way of varying the tone so that I can get a higher pitch after using it for some time to relieve the monotony?"—H. W. (Feltham).

THE tone is dependent upon the transformer, and if it is an old spare model you could remove some of the laminations of the core in order to raise the tone. If you use the two windings without any core the tone will be very high, and thus by making an adjustable core from pieces of the existing laminations you could provide an easily operated form of tone control. The volume will, of course, fall off as the core is removed, but this should not be of any importance as the H.T. may be raised to compensate.

I.F. Transformer Design

"I recently made up a pair of I.F. transformers, using some data which I found. When completed I wished to try and avoid changes due to moisture or climatic conditions, and dipped the coils in ordinary paraffin wax. I find, however, that I cannot get the two transformers to tune and I wonder if the dipping has had any effect on them. Could you please ascertain this for me?"—W. T. R. (Holloway).

THE data which you used no doubt applied to an air-spaced coil, probably of the honeycomb type of winding. This has a very low self-capacity and with the trimmers which had been specified they would no doubt have been quite in order. When coils are dipped in wax the self-capacity is increased, and in your case you may have omitted to dry out the coils thoroughly first and thus, although impregnated, they may be full of moisture and this will aggravate the effects of the added wax. A smaller padding condenser might be capable of giving the desired frequency range, but if not, then turns will have to be stripped until the desired range has been obtained.

Beginner's One-Valver

"What is the approximate cost of the Beginner's One-Valver, details of which appeared in the issue dated December 23rd, 1939? Also, what sort and type of valve is used in this set?"—A. G. W. (Truro).

THE approximate cost to-day would be about 25s., but owing to price fluctuations it is not possible to quote an exact figure. A suitable valve would be the Cossor 210 HF.

Short-wave Station Addresses

"Could you recommend to me a book containing the addresses of short-wave broadcast stations? How much would a copy cost and where would I have to send to obtain it?"—D. H. (Gildersome, nr. Leeds).

WE do not know of any book which contains only a list of short-wave stations, but a very comprehensive list of such stations and addresses has been included in our latest book, the "Short-wave Manual." This may be obtained from this office, price 5s., or by post for 5s. 6d.

Making a Microphone

"When looking through my spares box I came across a single headphone and the idea came to me as to whether I could possibly make a microphone out of it. Could you help me in this matter?"—T. H. D. (Monkwearmouth).

RULES

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

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

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

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

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

THE earphone alone is unsuitable as a mike as it would be very insensitive. There are several methods of improving it, however, and one of the simplest would be to fit a much thinner diaphragm. This should then preferably be mounted at the end of a small horn or sound collector to provide greater movement, but in general the magnet system does not lend itself to a very good type of microphone, although for experimental purposes you can find quite a lot of interest in it.

Medium-wave Coil

"Could you please let me have the method of making a medium-wave coil for a home-made one-valve receiver?" — A. McC. (Kilrea, Co. Derry).

A SUITABLE coil was recently described for our simple one-valver. A coil former of cardboard about 2½ or 3ins. in diameter is needed and for the grid winding you need about 45 turns of 22 or 24 gauge, double-cotton-covered wire. At the end of the coil former, and separated by about ½in. wind another small coil of thinner wire, say 28 or 30 gauge, and use 35 turns. This coil must be in the same direction as the grid winding. The end of the latter and the beginning of the second winding should be joined together and are connected to earth. The second winding is for reaction and the end is joined to the reaction condenser. The tuning condenser is connected across the grid winding. For an aerial coupling coil you can wind a further coil of 20 turns on a strip of paper, wound over the grid winding at the earth end, connecting the lower end of this to earth. Alternatively, the aerial may be joined through a small variable condenser (maximum capacity .0002 mfd.) to the top of the grid winding.

Servicing

"I wish to improve my knowledge of wireless service repairs in up-to-date sets. I thought you might publish a book on this, but if not what course would you advise me to take?"—G. C. (Slaithwaite).

WE publish a very good book on the subject, entitled "The Practical Wireless Service Manual." This covers every phase of the subject, including modern superhets, and costs 6s. from any newsagent or by post from these offices at 6s. 6d.

REPLIES IN BRIEF

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

A. B. (Ayr). Write to the Premier Radio Company, whose advertisements appear in these pages.

S. W. B. (Edgware). All the points raised by you have been covered in various articles, but we regret that we cannot insert your general request in our correspondence columns.

H. S. (Croydon). We replied to your letter of February 20th, but it has been returned by the Postal Authorities marked "Unknown."

C. B. R. (Prestwich). We cannot give you constructional data of the coil, but it may be obtained direct from Messrs. Bulgin, of Abbey Road, Barking.

L. H. (Slough, Bucks.). Messrs. Electradix may be able to supply you, but we cannot give any idea as to the price.

W. P. (Market Drayton). The coil is not now obtainable, having been withdrawn by the makers.

I. D. (Bushbury). We think the condensers are obtainable from Radiomart or from Webb's Radio.

J. A. G. (Bilton Grange). A total of 66 volts would be ample.

C. F. (Huddersfield). We can supply designs for various types of receiver, and details will be found in our Blueprints page.

K. T. (Bletchley). The transformer should not be of higher ratio than 5 to 1.

L. R. (Devizes). Couple the two coils through a non-inductive 1,000 ohm resistor.

G. T. E. (Barnet). Neither of the valves is obtainable now. We suggest a good modern A.C./D.C. type of valve.

N. E. (Perth). The transformer is quite suitable, although you may have to fit a bleeder to obtain an improved current drain.

R. A. (Cardiff). We cannot supply a diagram in this particular case. We do not know of any source from which it could be obtained.

T. W. (Maldon). The makers will assist you if you write to them and explain the matter.

R. E. G. D. (Oxford). The alternative parts mentioned would not prevent reception. We think, therefore, that you have made some mistake in the wiring.

A. M. (Kenilworth). We cannot advise the fitting of the switch mentioned. We cannot suggest modifications without further details of the receiver.

G. R. C. (Houghton Bank). A battery and 'phones in series will enable you to check the windings. I.P. may be taken as equivalent to Plate or Anode terminal and O.S. equivalent to Grid. The S terminals are the secondary and the P terminals primary.

W. M. (West Lothian). The only people who could supply details are the designers, the General Electric Company, Ltd.

J. W. S. (Sittingbourne). You will have to add further decoupling, or modify the H.T. supply lines so that a single output is taken from the mains unit.

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

COMBINED OSCILLATOR AND RECEIVER

(Continued from page 31.)

will result, it is not to be recommended, since with a heavier anode current and in an oscilliatory condition, the emission of the valve is affected.

The Lay-out

Now with regard to the component lay-out. From the cover illustration and in conjunction with the wiring diagram, Figs. 2 and 3, it will be noticed that a symmetrical appearance is obtained whilst allocating the left-hand portion of the chassis for the receiver circuit, with the right-hand portion for the audio oscillator components.

It will be seen on referring to Fig. 2, that the band-set condenser C2 is located underneath the reaction condenser, and this is pointed out since the earth connection to this condenser, indicated by X, may not be quite clear otherwise.

In the chassis illustrated, a different key jack was employed from that quoted in the list of components, this jack being located directly under the 'phone jack but on the underside of the chassis; however, as this was the original experimental lay-out, it has been realised since that the 'phone and key jacks quoted would be more conveniently mounted as depicted in the under-chassis diagram Fig. 3, which shows these jacks in dotted lines for convenience in following the wiring, but as will be realised on checking the component lay-out with the diagram of measurement Fig. 4, these two jacks are located above chassis and fitted to the front panel.

When wiring this switch it should be noted that turning the knob in a clockwise direction brings about a step-by-step increase in the inductance of the choke, as will be seen on checking the leads "a" to "e."

The switches S1, S2, and S3 are ganged by soldering a 1¾in. length of $^{5}/_{32}$in. diameter brass rod to the slotted toggles.

The drilling details given in Fig. 4 are for the components only, since this will prevent confusion which could arise in including the drillings for through-chassis connections; and as the relationship of the wiring holes numbered from 1 to 13 is clearly defined in Figs. 2 and 3, it is only necessary for the constructor to provide these holes as close to components as possible, conforming to the wiring diagram.

Holes 9 and 10, however, indicated in Fig. 3, are not included in Fig. 2 for the reason mentioned concerning these two jacks.

The runners for the chassis should be about 1¾in. deep and comprise any form of wood strip, measuring 6in. long by at least ¼in. thick, and to finish off, these should be rounded at the edges.

The 'phone jack J2 and the rotary switch S4 are fitted with fibre embossed washers to insulate them from the metal panel, consequently the holes marked "F" in Fig. 4, will require slightly enlarging, by filing after drilling, to accommodate these washers.

It will be seen in Fig. 3 that the wiper contact of S4 is indicated by "W," and although not mentioned previously when referring to holes 9 and 10, hole No. 13 is similarly treated, being shown only in the under-chassis diagram.

In conclusion it should be pointed out that whilst there is marginal adjustment in H.T., it will be found that 60 to 72 volts will be ample for H.T.+1, with 9 to 12 volts for H.T.+2.

RECEIVERS AND COMPONENTS

(*Continued from page 40.*)

VOLUME controls. American C.T.S., finest made, divided spindles. Length, 2½". With switch. 2,000, 5,000, 10,000 25,000, 100,000, 250,000 500,000, and 1 meg., **2/6** each. Wire wound, ½ watt (less switch), 2,000, 5,000, 10,000, 20,000, and 25,000 ohms, **2/-** each.

24 MFD. can type, electrolytics, 450v. working, **1/-** each.

B.I. wire-end type bias electrolytics. 50 mfd., 12v, **1/6** each; 50 mfd., 50v, **2/-** each.

TUBULAR wire-end non-inductive paper condensers. All sizes up to 0.1, **5d.** each, **4/9** dozen.

PLESSEY energised speakers, 6" cone, 1,500 ohms field, **5/11** each.

BATTERY output pentode valves. Well-known make. **3/11** each.

BATTERY double diode triode. Well-known make. **3/6** each.

ROTARY converters, 6v. and 12v., D.C. input, output 240v. 40 m.a. Complete with smoothing and suppression. State voltage when ordering. To clear **15/-** each.

RAYTHEON first-grade valves. Largest stockists all types in stock, including glass series, glass octal series, metal series, bantom series, single-ended series, and resistance tubes, all at most competitive prices; send for valve lists. All orders must include sufficient postage to cover. Hours of business: 9 a.m.-6 p.m. weekdays. Saturday, 9 a.m.-1 p.m. Please write your address in block letters.

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15/- Service Man's Component Kit. Electrolytic Condensers, Volume Controls, Resistances, Tubular, Mica, Paper Condensers, Valve Holders, etc. 120 articles contained in strong carrying case, 9" x 7" x 7", 15/- the Kit.

21/- Small Trader's Parcel of Components. 150 Articles comprising all types Condensers, Valve Holders, Resistances, Chokes, Coils, Wire, etc. Value 85/-. 21/- the parcel.

5/- 100 Wire-end Resistances, assorted capacities. ½ and 1 watt, 5/- per 100.

ORMOND Loud-speaker Units, 2/6; Crystal Sets, 5/6; Westectors Type W2, 2/6; Crystal Detectors, 2/-; Crystals, 6d.; Marconi V24 Valves, 9d.

2/- Tool or Instrument Carrying Cases, ex Government Stock; Wood, 9" x 7" x 7", 2/-.

SOUTHERN Radio, 46, Lisle Street, London, W.C. Gerrard 6653.

LONDON Central Radio Stores, 23, Lisle Street, W.C.2. Gerrard 2969.
Multi-contact Selector Switches, 12/6.

EX-G.P.O. Multi-contact Relays for Automatic Tuning, etc. Superior Models complete with Contacts, 3/6 and 4/6. Huge Selection and Bargains for Callers. **LONDON** Central Radio Stores, 23, Lisle Street, W.C.2. Gerrard 2969.

RADIO Exchanges. Wanted good second-hand radio sets in exchange for brand new 1939/40 models leading makes with guarantees and cash adjustment. Send 1½d. stamp for list of makes. Radio Exchanges, 610, Kingsbury Road, Erdington, Birmingham.

SCRAP your H.T. battery with Mallory vibrator converter, 12v., 150v., 30m.a., 18/9; listed £5/5/0. Or Genemotor, 12v., 250v., 50m.a., 25/-. Postage 1/3.—Aeronautical Radio, 47, River Road, Littlehampton.

TRANSFORMERS for L.T. Rectifiers for charging and safety, 12v. lighting, from 12/6.—Thompsons, 176, Greenwich High Road, S.E.10.

COULPHONE Radio, 22, Grimshaw Lane, Ormskirk. Collaro A.C. Motors, 12" turntable, 27/6; with pick-up, 42/6. Rola G.12 energised speakers, 52/6, P.M. 65/-. Brand new goods. 1½d. stamp list.

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

BANKRUPT Bargains. Good stock of new receivers at keen prices. Practically every type of valve. —Butlin, 6, Stanford Avenue, Brighton.

TECHNICAL PUBLICATIONS

R.S.G.B. AMATEUR RADIO HANDBOOK, 300 pages, 3s., by post.—16, Ashridge Gardens, London, N.13.

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8-10 watt A.C./D.C.„	£5 - 5 - 0	£6 - 2 - 6
15-watt A.C. „	£6 - 14 - 0	£8 - 2 - 6

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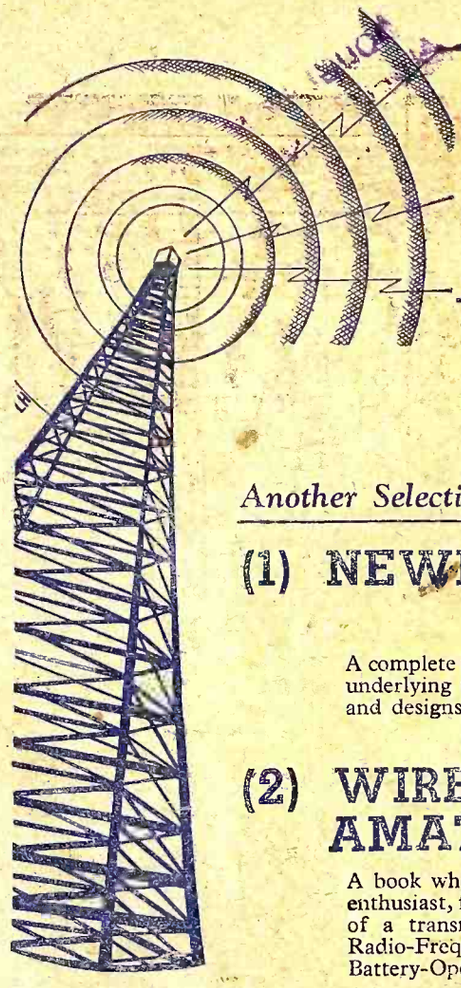

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